BEST QUOTES ON COMPUTERS

Computers are incredibly fast, accurate, and stupid. Human beings are incredibly slow, inaccurate, and brilliant. Together they are powerful beyond imagination.

—Albert Einstein

It is as unforgivable to let a student graduate without knowing how to use a computer as it was in the past to let him graduate without knowing how to use a library.

--John Kennedy

I have a spelling checker,
It came with my PC.
It plainly marks four my revue
Mistakes I cannot sea.
I've run this poem write through it,
I'm shore your pleas too no
It's letter perfect in it's weigh,
My checker tolled me sew!

--*New York Times*

A word processor is only a fancy combination of a pencil, an eraser, and a scissors with a pot of paste; it's the mind with its creativity that does the real work.

--Dan L. Miller

When a true history of our time is written—covering not only personalities and events but also technology, culture and lifestyles--the computer reckons to be a dominant character. It may ultimately rank with the steam engine, electricity and automobiles as a remolder of America.

--Robert J. Samuelson

Frankly, it's shocking that almost every other enterprise in this country—from banks to airlines to hotels to places of commerce—has, quite literally, been transformed by technology. These companies simply could not carry on their work without it. But if all the technology were suddenly removed from schools, hardly anyone would notice. How can we be serious about educating our children for the next century when we've barely equipped them for this one?

--Ernest Boyer

We have the technology today to enable virtually anyone who is not severely handicapped to learn anything, at a 'grade A' level, anywhere, anytime.

--Lewis J. Perelman

Computers will never replace office workers entirely until they learn how to spread gossip.

--Unknown

The factory of the future will have only two employees, a man and a dog. The man will be there to feed the dog. The dog will be there to keep the man from touching the equipment.

--Warren Bennis

A computer terminal is not some clunky old television with a typewriter in front of it. It is an interface where the mind and body can connect with the universe and move bits of it about.

--Douglas Adams

Teach people to surf the Internet and they can tour the world. Teach people to serve on the Internet and they can touch the world.

--Harry M. Kriz

The Internet, an immeasurably powerful computing system, is subsuming most of our other intellectual technologies. It's becoming our map and our clock, our printing press and our typewriter, our calculator and our telephone, and our radio and TV.

--Nicholas Carr

Concern for man and his fate must always form the chief interest of all technical endeavors. Never forget this in the midst of your diagrams and equations.

--Albert Einstein

It is indeed one of the great ironies of our time, that having designed computers that can perform the function of information storage and retrieval better than any human, we continue to emphasize in our teaching and testing, information storage and retrieval.

--Edward T. Clark

Home computers are being called upon to perform many new functions, including the consumption of homework formerly eaten by the dog.

—Doug Larson

In 1838, Sidney Morse wrote to his brother Samuel to congratulate him on the recent unveiling of the telegraph, which Sidney called 'not only the greatest invention of this age, but the greatest invention of any age.' He prophesied, 'The surface of the earth will be networked with wire, and every wire will be a nerve. The earth will become a huge animal with ten million hands, and in every hand a pen to record whatever the directing soul may dictate!'

—Emerson T. Brooking
and P. W. Singer

Computer science is no more about computers than astronomy is about telescopes.

—Edsger Dijkstra

I think it's fair to say that personal computers have become the most empowering tool we've ever created. They're tools of communication, they're tools of creativity, and they can be shaped by their user.

—Bill Gates

First were mainframes, each shared by lots of people. Now we are in the personal computing era, person and machine staring uneasily at each other across the desktop. Next comes ubiquitous computing, or the age of calm technology, when technology recedes into the background of our lives.

—Mark David Weiser

Tools and technology are important only in their application. A baboon with a computer is still a baboon.

—Ed Miller

Internet went down and I had to spend time with the family. They seem like good people.

—Unknown

The guy who knows about computers is the last person you want to have creating documentation for people who don't understand computers.

—Adam Osborne

On the Internet you can be anything you want. It's funny how many people choose to be stupid.

—Ged Backland

Before you marry a person you should first make them use a computer with slow internet to see who they really are.

—Ged Backland

To my children,
Never make fun of having to help me with computer stuff. I taught you how to use a spoon.

—Sue Fitzmaurice

I think kids should learn programming not to be computer scientists but to be better problem solvers.

--Vint Cerf

Psychologists have found that when we work with computers, we often fall victim to two cognitive ailments—complacency and bias—that can undercut our performance and lead to mistakes. Automation complacency occurs when a computer lulls us into a false sense of security. Confident that the machine will work flawlessly and handle any problem that crops up, we allow our attention to drift. We become disengaged from our work, and our awareness of what' going on around us fades. Automation bias occurs when we place too much faith in the accuracy of the information coming through our monitors. Our trust in the software becomes so strong that we ignore or discount other information sources, including our own eyes and ears. When a computer provides incorrect or insufficient data, we remain oblivious to the error.

--Nicholas Carr

Moore's Law: Computer processing power doubles every two years.
--Gordon E. Moore

Some people waste time in front of computers, but that doesn't mean that technology in general—or even computer technology specifically—is holding us back. A commuter is a tool. You can use the tool appropriately, in which case it's a blessing, or inappropriately, in which case it can be a waste of time.

—Bill Gates

The gap between an 'Internet addict' and John Q. Public is thin to nonexistent. One of the early flags for addiction was spending more then 38 hours a week online. By that definition, we are all addicts now, many of us by Wednesday afternoon, Tuesday if it's a busy week.

--Tony Dokoupil

If it keeps up, man will atrophy all his limbs but the push-button finger.

--Frank Lloyd Wright

Passwords are like underwear: you don't let people see it, you should change it very often, and you shouldn't share it with strangers.

--Chris Pirillo

Part of the inhumanity of the computer is that, once it is competently programmed and working smoothly, it is completely honest.

--Isaac Asimov

The Internet is a great equalizer.

--Al Cooper

Putting a computer in front of a child and expecting it to teach him is like putting a book under his pillow, only more expensive.

--Joseph Weizenbaum

Technology feeds on itself. Technology makes more technology possible.

--Alvin Toffler

We are at a point in the history of education when radical change is possible, and the possibility for that change is directly tied to the impact of the computer.

--Seymour Papert

We need to recognize that our public schools are low-tech institutions in a high-tech society. The same changes that have brought cataclysmic change to every facet of business can improve the way we teach students and teachers. And it can also improve the efficiency and effectiveness of how we run our schools.

--Louis V. Gerstener, Jr.

We humans are prisoners of our limbs and minds. We see galaxies but cannot reach them. We can conceive of nuclear fusion, yet we have trouble doing sums in our heads. The computer is the tool that can set us free.

--Jean-Louis Gassee

Will our brains start shrinking now that machines do our thinking?

--Unknown

The ultimate destiny of the computer is to make creativity a mass phenomenon.

--Michael Neman

It took twenty of us working twenty hours a day, six days a week for an entire year, to accomplish what one Dartmouth student now can do in one afternoon.

--John Kemeny
Dartmouth College
president and
an architect of
the A-bomb, on the
$15 calculator

Computers that have already begun to replace and enslave us may eventually leave us incompetent to do the simple tasks we once did for ourselves.

--Laurence J. Peter

Computers are fantastic: in a few minutes they can make a mistake so great that it would take many men many months to equal it.

--Merle L. Meacham

Cheerful obedience to the computer leads to worse performance by society. It makes it easier for dictators to accomplish their ends. It brings a lessening of freedom. Being loyal to the computer means selling out....The computer is there only to serve man—not to be served by him.

--H. Matusow

The real danger is not that computers will begin to think like men, but that men will begin to think like computers.

--Sydney J. Harris

The perfect computer has been developed. You just feed in your problems, and they never come out again.

--Al Goodman

I swore off computers for about a year and a half—the end of the ninth grade and all of tenth. I tried to be normal, the best I could.

--Bill Gates

With a book tucked in one hand, and a computer shoved under my elbow, I will march, not sidle, shudder or quake, into the twenty-first century.

--Ray Bradbury

You can't do today's job with yesterday's tools and be in business tomorrow.

--Helen Mackintosh

Enough people by now know what a word processor does to make unnecessary the recounting of its versatility. It is resistance to it that absolutely confounds. And the notion that this resistance is widely deemed to be conservative is to reinforce the stereotype of the conservative as someone who cannot appreciate that which is self-evidently progressive...Well, then, there is only one thing for it. Progressive conservatives should pass a law making it unlawful not to use a computer.

--William F. Buckley, Jr.

The seven million Americans who experienced the awesome potentialities of the brain via LSD certainly paved the way for the computer society.

--Timothy Leary

Anything treated as a panacea eventually creates ailments for which there is no cure. In some ways, computers are a poison.

--Stewart Brand

The Seymour Paperts of the world bear Mephistophelian gifts. They provide the lure which tempts us in, and we lose our soul.

--Joseph Weizenbaum

I think the Logo-BASIC debate is like the Latin-Greek debate in the Middle Ages.
--Herbert Kohl

I think one of the reasons programmed instruction was rejected was that it was too powerful. It suggested that the system was teaching rather than that the student was learning.

--B. F. Skinner

The computer is a machine that will put you all out of work. Something made of sand—silicon—may turn a lot of you into hod carriers. I hope I'm not the first to tell you this. Your teachers should have; that's what you're paying them for.

--Hunter S. Thompson

The epitome of waste is to perform a worthless job in an ingenious manner on a computer.

--Ronald Banwart

Computers are much more useful than cigarettes.

--Jack Tramiel

A computer has no tact. It will not flatter. It will not use judgment. It will not say, 'Yes, sir; at once, sir!' to wrong instructions, then go away and do the job right. It will simply follow the wrong orders, so long as they are clearly given.

--Laurence Peter

The genius of the future lies not in technology alone, but in the ability to manage it.

--Bell Atlantic

The computer is now indispensable.

--Robert J. Samuelson

Computers are where cars were in the 1920's—escaping from mud ditches. Their full social impact is still hazy.

--Robert J. Samuelson

There has been this new rash of surveys reporting that 'kids don't like computers' or that schools are losing interest in them. That is a little like saying the child doesn't like pencils; the child doesn't like paper.

--Sherry Turkle

The computer is only a device, which can be used well or used poorly. Used well, technology can vastly improve education.

--Alfred Bork

We now have within our grasp the possibility of making major improvements in the way people—from all economic classes and in all parts of the world—learn. We can transform the learning process, making it more attractive, more efficient and more powerful. We can assure that individuals learn to their full capacity. The key to all this lies in the computer.

--Alfred Bork

Garbage in, garbage out (GIGO).

--Unknown

Man is still the most extraordinary computer of all.

--John F. Kennedy

Electronic calculators can solve problems which the man who made them cannot solve; but no government-subsidized commission of engineers and physicists could create a worm.

--Joseph Wood Krutch

It is said that one machine can do the work of fifty ordinary men. No machine, how-ever, can do the work of one extraordinary man.

<div align="right">--Tehyi Hsieh</div>

Pay close attention to...tiny chips of silicon that engineers call 'integrated circuits.' Like the industrial revolution that extended the influence of man's muscles, the electronics revolution will extend the influence of his mind, enabling him to reach new levels of mastery and control.

<div align="right">--Harry J. Gray</div>

The computer is a great invention. There are as many mistakes as ever, but now they're nobody's fault.

<div align="right">--Unknown</div>

There's nothing wrong with a computer that a little competency on the part of the operator couldn't cure.

<div align="right">--Unknown</div>

A cheap but top-rate computer is the one between your ears.

<div align="right">--Unknown</div>

To err is human. But to really louse it up, it takes a computer.

<div align="right">--Paul R. Ehrlich</div>

Modern science is simply wonderful. It would take fifty people twenty years to make the same mistake a computer can make in only two seconds.

<div align="right">--Unknown</div>

The real problem is not whether machines think but whether men do.

<div align="right">--Burrhus Frederic
Skinner</div>

The computer is no better than its program.

<div align="right">--Elting Elmore Morison</div>

We are becoming the servants in thought, as in action, of the machine we have created to serve us.

<div align="right">--John Kenneth
Galbraith</div>

In this interactive, wired world, we may be connected to information and lose our connection to humans.

--Edward Esber, Jr.

Men find new technology appealing even if they don't know what they want it for. It's just the latest and the fastest, and they have to have it.

--Oliver Strimpel

Imagine a world in which a Boeing 737-500 has come down in price from $35 million to $3,500. You can get one at any Wal-Mart and take it home. But it's no less complicated to fly, no less complicated to maintain. If something goes wrong, there are no mechanics standing by to help you. You are expected to fix the problem yourself, after calling tech support.

That's just about what has happened in the computer industry. You come home with a 166-million-instruction-per-second monster, controlled by an operating system with 3 million lines of code, and if something doesn't work you are expected to fix it yourself.

--*Forbes*

We think American society is an insane anthill, and the human being has been living for, you know, hundreds of thousands of years before we had any of the things we consider so necessary in American life today. You can actually live, you can make love, you can enjoy food, you can raise children, without being a computerized mechanized American.

--Timothy Leary

To be a leader today, you better make technology your friend. That's the fifth leadership behavior we need to cultivate, because whoever 'obsoletes the existing' wins.

--James R. Houghton

If the human race wants to go to Hell in a basket, technology can help it get there by jet.

--Charles M. Allen

The computer is a moron.

--Peter Drucker

I do not fear computers. I fear the lack of them.

--Isaac Asimov

To me, there is something superbly symbolic in the fact that an astronaut, sent up as assistant to a series of computers, found that he worked more accurately and more intelligently than they. Inside the capsule, man is still in charge.

--Adlai E Stevenson

I think there is a world market for maybe five computers.

--Thomas Watson
(Chairman of IBM, 1943)

If automobiles had followed the same development cycle as the computer, a Rolls-Royce would today cost $100, get a million miles per gallon, and explode once a year, killing everyone inside.

--Robert Cringely

Computers are useless. They can only give you answers.

--Pablo Picasso

Technology is only a tool, a great tool. But it's not what you live for, it should not take over our lives.

--David Wang

Technology is the combination of human imagination, inventiveness, and the electronic tools that transform ideas into reality.

--Ed Wenk

There are many thousands of teachers who must be frustrated, overloaded and ill equipped. We provide the supermarket checker more technical support today than we do teachers. That's outrageous!

--Dr. Terrel Bell

If education is going to provide the level of achievement essential for tomorrow's world, outmoded practices have to give way to a new era of high technology.

--Dr. Terrel Bell

Another major problem in education is the passivity of the students. Students spend far too much time sitting in classrooms only half attentive to teacher's talk...They often tune out instruction completely....Research shows again and again that the more students are actively involved in mastering a subject, the more quickly they will learn it....Modern technology can help free students from this cycle of passivity.

--Dr. Terrel Bell

The world has changed dramatically. Nobody today can avoid technology. Those unable to use it face a lifetime of menial work.

--William E. Brock

In too many schools, computers are used solely for 'computer literacy,' the computer equivalent of knowing the mechanics of an automobile rather than knowing how to drive it and where to go. The computer's real strength is in providing intellectual advantages, in the same way that machines provide mechanical advantages.

--*Business Week*
Magazine

In part, the promise of technology is the substitution of physical capital for human capital, using machines to do things that formerly required teachers. But such substitution does not mean the elimination of teachers. Rather, the promise of modern technology is even more dramatic, for it extends the hope of major productivity breakthroughs, something the schools desperately need if they are to flourish. The issue in the schools is the same as on the farm or in the factory—find more efficient and effective ways to accomplish routine tasks, and free teachers to do things machines cannot.

--*Business Week*
Magazine

Technology that improves learning in the classroom must go from being the last priority to the first priority. Technology should be built into the base budget of the school and of the classroom. The school boards must be told by the superintendents and the principals that technology is something they must have. It should be the same as having a blackboard and chalk. Those are the tools of learning, and technology is now a tool of learning.

--Thomas H. Kean

As in the military, technology-based training is now the norm in most corporations, and its promise is extraordinary. It can free teacher and student from much of the drudgery and frustration associated with drill and practice. Free to assign students to imaginative and creative programs, the teacher is also free to manage instruction more creatively. And the student, using modern computers, finds that a machine's boundless patience, capacity to move at the student's pace, and memory are enormous advantages.

--*Business Week*
Magazine

Timid and unimaginative leaders who have tried to modernize their institutions by clinging to the status quo need to move aside. Visionary leaders, who can see the full potential of technological innovations in schools are what schools need.

--Dr. Terrel Bell

People who accept the idea that offices and factories need the latest in technology if they are to be productive and competitive often consider technology for schools a frill.

--Albert Shanker

Society can't afford the money which would be required to deal with this problem by drastically increasing the teacher-to-student ratio, to one-to-three or so. The only alternative, therefore, is to use technology to help teachers maximize the help and supervision which can be given to the independent work and learning of their students.

--*New York State
Business Council*

We are still using 19th Century technology to educate the work force of the 21st Century....the nation's school system lags far behind private business, and behind other sectors of government, in adopting the new technology needed to improve quality and productivity.

--*New York State
Business Council*

Computers have not really been integrated into the classroom; they are an adjunct, sometimes a distraction. Often the computers are put into a special lab, where a whole class will go at once to drill on them. Students who especially need the drill may not get any more time on it than their fellows do; on the other hand, students who need more drill may be sent out of the classroom to get it—in which case they may miss classroom instruction....Only in the last few years, and so far only in a relatively limited number of programs implemented in only a relatively small number of schools, have computers begun to be integrated into regular classroom work on regular academic subjects.

--*New York State
Business Council*

The purpose of the schools is to teach carpentry, not hammer. We need to teach the whys and ways of the world. Tools come and tools go. Teaching our children tools limits their knowledge to these tools and hence limits their futures.

--Michael Bellino

Advanced technology is the ideal tool for implementing a new approach to learning which optimizes student time-on-task...increases the quality and quantity of feedback...and paces instruction to student's capabilities. For such an approach to work, the school system must first make the drastic switch from 'teacher-centered, classroom-controlled instruction' to 'learner-centered, performance-paced instruction.'

--Robert K. Branson

There is no good evidence that most uses of computers significantly improve teaching and learning, yet school districts are cutting programs—music, art, physical education—that enrich children's lives to make room for this dubious nostrum, and the Clinton Administration has embraced the goal of 'computers in every classroom' with credulous and costly enthusiasm.

--Todd Oppenheimer

I see a parallel between the goals of 'Sesame Street' and those of children's computing. Both are pervasive, expensive and encourage children to sit still. Both display animated cartoons, gaudy numbers and weird, random noises....Both give the sensation that by merely watching a screen, you can acquire information without work and without discipline.

--Clifford Stoll

The technological gap between the school environment and the 'real world' is growing so wide, so fast that the classroom experience is on the way to becoming not merely unproductive but increasingly irrelevant to normal human existence.

--Lewis J. Perelman

To gauge the extent to which education has shortchanged the research and development of productive learning technology, consider that the Gillette Company's high-tech 'Sensor' razor blade cost some $200 million in R & D investment over thirteen years to create. Gillette, a company whose annual revenues of more than $3.5 billion are less than the education budgets of three-fourths of the U.S. states, thus spent more to invent a better shave than all the states combined spent during the same period to develop a better technology for teaching and learning than the thousand-year-old 'Yak in the Box' (the lecturing classroom professor).

--Lewis J. Perelman

The computer is converging with the TV in the same sense the automobile converged with the horse.

--George Gilder

REMEMBER WHEN

A computer was something on TV from a science fiction show?
A window was something you hated to clean?
Meg was a girl's name,
And ram was the cousin of a goat?
Now they all mean different things, and that really 'mega bytes!'

An application was for employment.
A program was a TV show.
A cursor used profanity,
A keyboard was a piano.
Memory was something you lost with age, and a CD was a bank account.
Compress was something you did with the garbage, not something you did to a file.
And if you unzipped anything in public, you'd be in jail for quite awhile.

Logon was adding wood to the fire.
Hard drive was a long trip on the road.
A mouse pad was where a mousie lived.
And a backup happened to your commode.
Cut you did with a pocketknife.
Paste you did with glue,
A web was a spider's home,
And virus was the flu.

I guess I'll stick to my pad and paper,
And the memory in my head!
I hear nobody's been killed in a computer crash, but when it happens,
They'll wish they all were dead!

> --*The Webmaster
> Quarterly*,
> Marquette
> University

The Mac is not a religion, it's just a very good computer.

> --Dave Winer

In a sense, the Macintosh was a virtual reality machine. An artificial world existed in every box.

> --Steven Levy

We live in the most marvelous and accelerated of times. The Computer Revolution is flipping the world upside down, with an impact far greater than that of the entire Industrial Revolution. Nothing can remain unchanged by this revolution. Individuals will advance or fall behind depending on how they adapt to it. Governments and corporations will succeed mightily or collapse based in part on their level of skill and wisdom in introducing the right forms of automation in the right ways at the right times.

<div align="right">--Jake Kirchner</div>

Mariner I, the Venus-bound rocket, suddenly surged off its planned course and had to be exploded Jul 22, 1962, costing United States taxpayers $18.5 million. The reason: A hyphen had been left out of the flight computer program.

<div align="right">--Unknown</div>

Technology is dominated by two types of people: those who understand what they do not manage, and those who manage what they do not understand.

<div align="right">--Archibald Putt</div>

People in the computer industry use the term *user*, which to them means 'idiot.'

<div align="right">—Dave Barry</div>

Computers come in two varieties: the prototype and the obsolete.

<div align="right">--Unknown</div>

It was not so long ago that people thought that semiconductors were part-time orchestra leaders and microchips were very, very small snack foods.

<div align="right">--Geraldine Ferraro</div>

Sattinger's Law: It works better if you plug it in.

<div align="right">--Arthur Bloch</div>

If there is technological advance without social advance, there is, almost automatically, an increase in human misery.

<div align="right">--Michael Harrington</div>

Technology. . . the knack of so arranging the world that we need not experience it.

<div align="right">--Max Frisch</div>

The modern computer hovers between the obsolescent and the nonexistent.

<div align="right">--Sydney Brenner</div>

In the old days it was important to be able to run down an antelope and kill it with a single blow to the forehead. But that skill is becoming less important every year. Now all that matters is if you can install your own Ethernet card without having to call tech support and confess your inadequacies to a stranger whose best career option is to work in tech support.

--Scott Adams

The business value of a computer is its management. The productivity of management is the decisive element that makes the difference of whether a computer hurts or helps.

--Paul A. Strassmann

Information networks straddle the world. Nothing remains concealed. But the sheer volume of information dissolves the information. We are unable to take it all in.

--Günter Grass

We are standing on the verge, and for some it will be the precipice, of a revolution as profound as that which gave birth to modern industry. It will be the environmental revolution, the genetic revolution, the materials revolution, the digital revolution, and, most of all, the information revolution.

--Gary Hamel &
C. K. Prahalad

If you are unable to get organized with a notepad and pen, you're not likely to get organized with computer technology.

--Unknown

Automized and computerized industry requires more and more young men and women who have white-collar skills but behave with the docility expected of blue-collar workers.

--Staughton Lynd

They can rattle off the Manhattan telephone directory unerringly time after time, which no human can do, but they cannot begin to distinguish one face from another, as babies can do.

--Lee Dembart

It would take one hundred clerks working for one hundred years to make a mistake as monumental as a single computer can make in one thousandth of a second.

--Dental Economics

In the future, you're going to get computers as prizes in breakfast cereals. You'll throw them out because your house will be littered with them.

--Robert Lucky

In guessing the direction of technology it is wise to ask who is in the best position to profit most.

--Ben H. Bagdikian

The day may soon come when the concept of student and teacher will be obsolete. All knowledge will be acquired electronically.

--Todd Strasser

We are drowning in information and starved for knowledge.

--John Naisbitt

Few benefits of online interactivity are of such potential importance as the Internet's promise for improving democracy.

--Bill Gates

The freedom we are talking about on the Internet is not the freedom to be the recipient of man-produced information. It is the freedom to receive and create information, and interact with other people.

--Steven McGeady

Technology must not become the fault line between the haves and have nots.

--Linda Roberts

If the automobile had followed the same development as the computer, a Rolls Royce would today cost $100, get a million miles per gallon and explode once a year killing everyone inside.

--Robert Cringely

We may begin to see reality differently simply because the computer...provides a different angle on reality.

--Heinz Pagels

Technology: Opening minds with a new set of keys.

--Unknown

Rather than bringing me closer to others, the time that I spend online isolates me from the most important people in my life, my family, my friends, my neighbourhood, my community.

--Clifford Stoll

A computer once beat me at chess, but it was no match for me at kick boxing.

--Emo Philips

We make a mistake if we just bring a bunch of technology into a room and then think that an excellent educational program is going to materialize. It's not. We need to look at the child and base our decision on how kids learn.

--David Thornberg

The potential of the new technologies of Information and Communication should lead one to rethinking the role and functioning of schooling and schools in general...their content, their focus, their purpose, and their values. The technology will be very important, but primarily because it should force us to DO NEW THINGS rather than because it will enable us to do old things better.

--Peter Drucker

Small children will have free access to encyclopedic knowledge. Any question that comes to mind, they can explore. Access to knowledge will be like access to air and water.

--Seymour Papert

I would argue that a student equipped with strong skills in word processing will more rapidly develop and improve their writing fluency and ability to consume and interpret the writing of others. In other words, what we think of as a 'digital' literacy ends up really being a mechanism for enhancing students' abilities in a 'traditional' literacy.

--William J. Kelly

Today in education, we must reach children where they are and not where we were....We should work to support students in responsibly using technology to access, manage, and evaluate information, solve problems, and build and share knowledge.

--Joe A. Hairston

The Internet is the most important single development in the history of human communication since the invention of call waiting.

--Dave Barry

'Weinberg's Second Law'
If builders built buildings the way programmers wrote programs, then the first woodpecker that came along would have toppled civilization.

--Gerald Weinberg

The word *user* is the word used by the computer professional when they mean *idiot*.

--Dave Barry

The Internet is causing the disappearance of retrospection and reminiscence. Our lives are increasingly lived in the present, completely detached even from the most recent of the pasts…Our ability to look back and engage with the past is one unfortunate victim.

--Evgeny Morozov

It is a very sad thing that nowadays there is so little useless information.

--Oscar Wilde

The Internet: transforming society and shaping the future through chat.

--Dave Barry

Technological progress is like an axe in the hands of a pathological criminal.

--Albert Einstein

What the Net seems to be doing is chipping away my capacity for concentration and contemplation. My mind now expects to take in information the way the Net distributes it: in a swiftly moving stream of particles. Once I was a scuba diver in the sea of words. Now I zip along the surface like guy on a Jet Ski.

--Nicholas Carr

It is clear that users are not reading online in the traditional sense; indeed there are signs that new forms of 'reading' are emerging as users 'power browse' horizontally through titles, contents, pages and abstracts going for quick wins. It almost seems that they go online to avoid reading in the traditional sense.

--Researchers from the
   University College
   London

To better understand why you need a personal computer, let's take a look at the pathetic mess you call your life.

--Dave Barry

We are not only what we read. We are how we read. The style of reading promoted by the Net, a style that puts efficiency and immediacy above all else, may be weakening our capacity for the kind of deep reading that emerged when an earlier technology, the printing press, made long and complex works of prose commonplace. When we read online, we tend to become mere decoders of information. Our ability to interpret text, to make the rich mental connections that form when we read deeply and without distraction, remains largely disengaged.

--Maryanne Wolf

Information is a kind of commodity, a utilitarian resource that can be mined and processed with industrial efficiency. The more pieces of information we can access and the faster we can extract their gist, the more productive we become as thinkers.

--Nicholas Carr

As we are drained of our inner repertory of dense cultural inheritance, we risk turning into pancake people—spread wide and thin as we connect with that vast network of information accessed by the mere touch of a button.

--Richard Foreman

Within this world of instant and absolute communication, unbounded by limits of time or space, we suffer from unprecedented alienation. We have never been more detached from one another, or lonelier. In a world consumed by ever more novel modes of socializing, we have less and less actual society. We live in an accelerating contradiction: the more connected we become, the lonelier we are. We were promised a global village: instead we inhabit the drab cul-de-sacs and endless freeways of a vast suburb of information.

--Stephen Marche

My unhappy reactions to Facebook may be more universal than I had realized. When I scroll through page after page of my friends' descriptions of how accidentally eloquent their kids are, and how their husbands are endearingly bumbling, and how they're all about to eat a home-cooked meal prepared with fresh local organic produce bought at the farmers' market and then go for a jog and maybe check in at the office because they're so busy getting ready to hop on a plane for a week of luxury dogsledding in Lapland, I do grow slightly more miserable. A lot of other people doing the same thing feel a little bit worse, too.

--Stephen Marche

These days, insecure in our relationships and anxious about intimacy, we look to technology for ways to be in relationships and protect ourselves from them at the same time.

--Sherry Turkle

Facebook's isolation is a grind. What's truly staggering about Facebook usage is not its volume...but the constancy of the performance it demands. More than half its users...log on every day. Among 18-to-34-year-olds, nearly half check Facebook minutes after waking up, and 28 percent do so before getting out of bed. The relentlessness is what is so new, so potentially transformative. Facebook never takes a break. We never take a break. Human beings have always created elaborate acts of self-presentation. But not all the time, not every morning, before we even pour a cup of coffee.

<div align="right">--Stephen Marche</div>

What Facebook has revealed about human nature—and this is not a minor revelation—is that a connection is not the same thing as a bond, and that instant and total connection is no salvation, no ticket to a happier, better world or a more liberated version of humanity. Solitude used to be good for self-reflection and self-reinvention. But now we are left thinking about who we are all the time, without ever really thinking about who we are. Facebook denies us a pleasure whose profundity we had underestimated: the chance to forget about ourselves for a while, the chance to disconnect.

<div align="right">--Stephen Marche</div>

In our youth we were promised flying cars. What did we get? 140 characters.
<div align="right">--Peter Thiel</div>

I wish I were a technoptimist. It must be heart-warming to believe that Facebook is ushering in a happy-clappy world where everybody 'friends' everybody else and we all surf the net in peace (insert smiley face). But I'm afraid history makes me a depressimist. And no, there's not an app—or a gene—that can cure that.

<div align="right">--Niall Ferguson</div>

The Internet leads to behavior that people are conscious is not in their best interest and does leave them anxious and does make them act compulsively.
<div align="right">--Nicholas Carr</div>

The Web fosters our obsessions, dependence, and stress reactions. It encourages—and even promotes—insanity.

<div align="right">--Larry Rosen</div>

Most college students are not just unwilling, but functionally unable, to be without their media links to the world.

<div align="right">--*University of Maryland Study*</div>

The more a person hangs out in the global village, the worse they are likely to feel. Web use often displaces sleep, exercise, and face-to-face exchanges, all of which can upset even the chirpiest soul.

--Tony Dokoupil

She now reveals a sad, stressed-out world of people coated in Dorito dust and locked in a dystopian relationship with their machines.

--Sherry Turkle

Recent studies show that kids spend at least four hours a day on social and recreational media, distracted and disengaged from the world and each other.

--Lee Siegel

Wherever we are, we are always available, and everybody knows it. The media tells us how lucky we are to live in the Information Age. I believe we have created a hell on Earth for ourselves.

--Robert D. Kaplan

Information overload is not the issue. If it were, you'd walk into the library and die. As soon as you connected to the Web, you'd just explode. In fact, the most information rich place in the world is the most relaxing: it's called nature. It has more varied horizons, more detail, more input of all sorts. As a matter of fact, if you want to go crazy, get rid of all your information: it's called sensory deprivation. The thing about nature is, it's information rich, but the meaningful things in nature are relatively few—berries, bears and snakes, thunderstorms, maybe poison oak.

--David Allen

In 2001...Marc Prensky popularized the term digital natives to describe the first generations of children growing up fluent in the language of computers, video games, and other technologies. (The rest of us are digital immigrants, struggling to understand.

--Hanna Rosin

Most parents can sympathize with the disturbing sight of a toddler, who five minutes earlier had been jumping off the couch, now subdued and staring at a screen, seemingly hypnotized….Jane Healy even gives the phenomenon a name, the 'zombie effect,' and raises the possibility that television might 'suppress mental activity by putting viewers in a trance.'

--Hanna Rosin

The computer is like electronic cocaine.

--Peter Whybrow

We live in a screen age, and to say to a kid, 'I'd love for you to look at a book but I hate it when you look at the screen' is just bizarre. It reflects our own prejudices and comfort zone. It's nothing but fear of change, of being left out.

--Marc Prensky

Not only all of our emails and Google searches, but also the sensors in the water system, in medical implants, in stoplight cameras and sound-activated street gunshot detectors—there's so much of it...that the Internet is a surveillance state.

--Bruce Schneier

In the 1990s hackers hacked for fun, but those happy days are behind us...The happy hackers have disappeared. Today, all hackers have motives for their actions.

--Mikko Hypponen

Facebook makes me feel bad. No matter how satisfied I am with my life, career, family, social life, house, etc., as soon as I log on to Facebook and peek into other's lives, I immediately feel that unease caused by comparison….A little kernel of doubt settles into my gut, and it feels really bad.

--Glennon Doyle Melton

Computers improve so quickly that their capabilities pass from the realm of science fiction into the everyday world not over the course of a human lifetime, or even within the span of a professional's career, but instead in just few years.

--Erik Brynjolfsson and
Andrew McAfee

Social networks like Facebook haven't changed the way people respond to bragging; they've changed how much people brag. The ability to publicize so much has blurred the line between sharing and boasting. When you brag in a group, you notice when they wander away. When you brag on Facebook, it's harder to tell who you're alienating.

--Dr. Pamela Rutledge

A TV can insult your intelligence, but nothing rubs it in like a computer.

--Unknown

I can't, in restaurants, not watch families not talking to each other. In parks, I can't not watch mothers not talking to their children. In streets, I can't not watch mothers texting while they're pushing their children.

<div align="right">--Sherry Turkle</div>

It's a beautiful day, and we walk past boutiques, restaurants, and packed sidewalk cafés….The pair of high-school-age girls walking down Boylston Street, silent, typing. The table of brunchers ignoring their mimosas (and one another) in favor of their screens. The kid in the stroller playing with an iPad. The sea of humans who…on this sparkling Saturday…seem to be, indeed, alone together.

<div align="right">--Megan Garber</div>

We're not talking to each other. We're talking all the time, in person as well as in texts, in e-mails, over the phone, on Facebook and Twitter. The world is more talkative now, in many ways, than it's ever been. The problem…is that all of this talk can come at the expense of conversation . We're talking at each other rather than with each other.

<div align="right">--Megan Garber</div>

Computers can figure out all kinds of problems, except the things in the world that just don't add up.

<div align="right">--James Magary</div>

Anyone who has lost track of time when using a computer knows the propensity to dream, the urge to make dreams come true and the tendency to miss lunch.

<div align="right">--Tim Berners-Lee</div>

The Internet is so big, so powerful and pointless that for some people it is a complete substitute for life.

<div align="right">--Andrew Brown</div>

There is a computer disease that anybody who works with computers knows about. It's a very serious disease and it interferes completely with the work. The trouble with computers is that you 'play' with them!

<div align="right">--Richard P. Feynman</div>

I will argue that in the literal sense the programmed computer understands what the car and the adding machine understand, namely, exactly nothing.

<div align="right">—John Searle</div>

Computers are like Old Testament gods; lots of rules and no mercy.

--Joseph Campbell

We must learn to balance the material wonders of technology with the spiritual demands of our human nature.

--John Naisbitt

The force of the advertising word and image dwarfs the power of other literature in the 20th century.

—Daniel J. Boorstin

'This little computer,' said the a sales clerk, 'will do half your job for you.'
The senior manager studying the machine made his decision... 'Fine, I'll take two.'

—Unknown

The best way to get the right answer on the Internet is not to ask a question…it's to post the wrong answer.

—Ward Cunningham

My friends think I'm a computer genius for always fixing their computers. Truthfully, I'm just really better at using Google than they are.

—*theChive*

Microsoft Excel is a program your resume says you're proficient in, because you could probably figure it out if you needed to, right?

—*TL;DR Wikipedia*

'Reply All' is an email function that streamlines the process of getting fired.

—*TL;DR Wikipedia*

Google is an Internet search engine used to find Wikipedia articles instead of just going directly to Wikipedia to find them.

—*TL;DR Wikipedia*

If you had bought the computing power found inside an iPhone 5S in 1991, it would have cost you $3.56 million.

—Bret Swanson

Computer: a million morons working at the speed of light.

—David Ferrier

Since nothing really gets removed from it, in about 15 years, the Internet will be full of pictures of cats that are dead.

—Unknown

Reading computer manuals without the hardware is as frustrating as reading sex manuals without the software.

—Arthur C. Clarke

The next major explosion is going to be when genetics and computers come together. I'm talking about an organic computer —about biological substances that can function like a semiconductor.

—Alvin Toffler

Computers are so dexterous that predicting their application 10 years from now is almost impossible. Who could have guessed in 2005, two years before the iPhone was released, that smartphones would threaten hotel jobs within the decade, by helping homeowners rent out their apartments and houses to strangers on Airbnb? Or that the company behind the most popular search engine would design a self-driving car that could soon threaten driving, the most common job occupation among American men?

—Derek Thompson

In 2013, Oxford University researchers forecast that machines might be able to perform half of all U.S. jobs in the next two decades. The projection was audacious, but in at least a few cases, it probably didn't go far enough. For example, the authors named psychologist as one of the occupations least likely to be 'computerisable.' But some research suggests that people are more honest in therapy sessions when they believe they are confessing their troubles to a computer, because a machine can't pass moral judgment. Google and WebMD already may be answering questions once reserved for one's therapist. This doesn't prove that psychologists are going the way of the textile worker. Rather, it shows how easily computers can encroach on areas previously considered 'for humans only.'

—Derek Thompson

Since I've got on the Internet, it's opened a whole world of wasted time for me. My wife says she's an Internet widow.

—Mick Ralphs

Today, 2 year olds can unlock a phone, open and close their favorite apps all by themselves…When I was that age I was eating dirt.

—Unknown

Technology is so much fun but we can drown in our technology. The fog of information can drive out knowledge.

—Daniel J. Boorstin

There are so many ghosts in our machines—their locations so hidden, not to feel haunted is not to be awake.

—Walter Kirn

I was having trouble with my computer so I called my 13-year-old son to help me. He clicked a couple of buttons and fixed it. As he was walking back to his room I asked him what the problem was. He said : It was an ID ten T issue. Not wanting to sound stupid but curious in case I had the same problem again, I asked him what an ID ten T was. Write it down, he said, so I did. ID10T. He was never my favorite child anyway.

—Unknown

My internet was down for almost 4 minutes. I'm OK, but the 911 operator was a total bitch about it!

—Unknown

Facebook—Giving 'old people' the ability to completely annoy and embarrass their children in a way never before possible!

—*lovethispic.com*

What a computer is to me is the most remarkable tool that we have ever come up with. It's the equivalent of a bicycle for our minds.

—Steve Jobs

People who saw my computer could take one look at it and see the future, and it was a one-way door. Once you went through it, you could never go back.

—Steve Wozniak

If you put tomfoolery into a computer, nothing comes out of it but tomfoolery. But this tomfoolery, having passed through a very expensive machine, is somehow ennobled and no-one dares criticize it.

—Pierre Gallois

Buying the right computer and getting it to work properly is no more complicated than building a nuclear reactor from wristwatch parts in a darkened room using only your teeth.

—Dave Barry

At 10 p.m. on June 29, 1975, Steve Wozniak was ready to test his odd new computer. It didn't look like much—just a circuit board with 32 chips attached, connected to a video monitor and a keyboard. But when he turned it on? Magic. A cursor appeared on the screen—and better yet, it reacted instantly to whatever keys Wozniak pressed. 'I typed a few keys on the keyboard and I was shocked!' he recalled in his memoir, *iWoz*. It was, he observed, the first time in history anyone had typed on a personal computer and seen the results 'show up on their own computer's screen right in front of them.' The sensation of success—he was looking at random numbers he had programmed—was 'like getting a putt from 40 feet away.'

—Clive Thompson

Many people rely on libraries for their computer and internet use. According to a 2015 Pew Research Center report, more than a quarter of Americans who had visited a public library in the past year had used a computer, the internet, or a WIFI connection there, with the usage numbers higher among minorities and low-income groups.

—Deborah Fallows

Each human being is a superbly constructed astonishingly compact, self ambulatory computer.

—Carl Sagan

A clean house is the sign of a broken computer.

—Unknown

Technology is a gift of God. After the gift of life it is perhaps the greatest of God's gifts. It is the mother of civilizations, of arts and of sciences.

—Freeman Dyson

Computing is not about computers anymore. It is about living.

—Nicholas Negroponte

There is no reason anyone would want a computer in their home.

—Ken Olsen, founder of
*Digital
Equipment* (1977)

Laziness is a programmers main virtue.

—Larry Wall

The box said 'Requires Windows 95 or better.' So I installed Linux.

—Unknown

There are 10 Types of people in the world: those who understand binary, and those who don't.

—Unknown

A computer lets you make more mistakes faster than any invention in human history—with the possible exceptions of handguns and tequila.

—Mitch Ratcliffe

The power of computer science lies in augmenting our thinking and in its ability to accelerate research exponentially in other areas. Even areas as diverse as art, economics, medicine and political science can benefit from integrating computational thinking into their research and education. The possibilities are endless.

—Julio M. Ottino

Technology is just a tool. In terms of getting the kids working together and motivating them, the teacher is the most important.

—Bill Gates

It goes against the grain of modern education to teach children to program. What fun is there in making plans, acquiring discipline in organizing thoughts, devoting attention to detail and learning to be self-critical?

—Alan Perlis

The fact is that the world is divided between users of the Macintosh commuter and users of MS-DOS compatible computers. I am firmly of the opinion that the Macintosh is Catholic and that DOS is Protestant. Indeed, the Macintosh is counter-reformist and has been influenced by the ratio studiorum of the Jesuits. It is cheerful, friendly, conciliatory; it tells the faith how they must proceed step by step to reach —if not the kingdom of heaven—the moment in which their document is printed. It is catechistic. The essence of revelation is dealt with via simple formulas and sumptuous icons. Everyone has a right to salvation.

—Umberto Eco

Each time you toss out a 'singing' greeting card, you are disposing of more computing power than existed in the entire world before 1950.

—Paul Saffo

With enthusiasm rising for massive open online courses, or MOOCs….the current interest in 'competency-based learning'—liberating students to earn degrees not by amassing credit hours but by preparing for assessments of particular skills at whatever pace and by whichever route they choose—is…something some reformers see as the seeds of a revolution in college education, promising ultra-convenient, self-guided, low-cost courses of study for everyone. The 'beginning of the unbundling of the American university' is how one observer has described the transformation. All it will take for students to avail themselves of this emerging opportunity is a clear sense of where they're headed, lots of self-motivation, and good access to information about what mix of skills is likely to lead to a promising career.

<div align="right">--Ann Hulbert</div>

Since the introduction of microcomputers into elementary and secondary schools in the early 1980s, stories have blossomed of children who hate school, discovering the joy of learning through computing or who perform precocious intellectual feats at the keyboard.

<div align="right">--Pamela McCorduck and
Avery Russell</div>

Use of the internet opens a world of research and information to students that they would not experience otherwise (and can provide) students with skills such as problem solving and abstract thinking that are requisite for the 21st-century work force.

<div align="right">--Dianne Griffin</div>

The kind of teacher who is afraid that they are going to be replaced by a computer should be.

<div align="right">—Michael Fullan</div>

Teachers need to integrate technology seamlessly into the curriculum instead of viewing it as an add-on, an afterthought, or an event.

<div align="right">—Heidi Hayes Jacobs</div>

Ignorance is the curse of the age we live in. We talk about the dark ages. When was there one so dark as this? We have smothered ourselves, buried ourselves, in the vast heap of information which all of us have and none of us has.

<div align="right">--Gamaliel Bradford</div>

As we come to rely on computers to mediate our understanding of the world, it is our own intelligence that flattens into artificial intelligence.

<div align="right">--Nicholas Carr</div>

Learning anything new past the age of 30 is an upward climb: Researchers have found that some of your cognitive abilities (in particular, processing speed) begin to decline in your 20s and 30s. In a cruel act of betrayal, the middle-aged brain even turns its singular advantage—our experience—against us. Through a phenomenon known as interference, the expertise we have accumulated can slow further learning. As Sherry L. Willis, a behavioral scientist at the University of Washington, puts it, 'Your store of knowledge—the number of file drawers you have to go through to retrieve and to get the relevant information and refile the information—increases with age.' This explains, for example, why switching from a PC to a Mac makes people homicidal: The fact that your brain and fingers remember the old key-command system makes mastering the new one more of a struggle.

—Barbara Bradley
Hagerty

When you learn to use computers, I hope you also learn to add and subtract in your head.

—Paul Harvey

It used to be the proverbial question: 'It's 10 o'clock, do you know where your children are?' Now your kid can be sitting a few feet away from you in the living room with a laptop, being damaged.

--Jamie Wasserman

On the one hand, parents want their children to swim expertly in the digital stream that they will have to navigate all their lives; on the other hand, they fear that too much digital media, too early, will sink them. Parents end up treating tablets like precision surgical instruments, gadgets that might perform miracles for their child's IQ and help him win some nifty robotics competition—but only if they are used just so. Otherwise, their child could end up one of those sad, pale creatures who can't make eye contact and has an avatar for a girlfriend.

--Hanna Rosin

151 Countries, One Technology.

—*ThinkSlogans.com*

Technology is a way of organizing the universe so that man doesn't have to experience it.

—Max Frisch

Don't leave Private information on a public computer screen.
That information is private and should not be seen.

—Slogan

All of the biggest technological inventions created by man – the airplane, the automobile, the computer—says little about his intelligence, but speaks volumes about his laziness.

—Mark Kennedy

If they email you asking for cash, be sure to throw it in the trash.

—Slogan

Filesharing and torrents might be free, but there may be trojans that you can't see.

—Slogan

If it sounds too good to be true it probably is.
Show Internet scammers who the real whiz is.

—Slogan

Think twice what you type.

—Slogan

I think it goes back to my high school days. In computer class, the first assignment was to write a program to print the first 100 Fibonacci numbers. Instead, I wrote a program that would steal passwords of students. My teacher gave me an A.

—Kevin Mitnick

If students get a sound education in the history, social effects and psychological biases of technology, they may grow to be adults who use technology rather than be used by it.

—Neil Postman

In education, technology can be a life-changer, a game changer, for kids who are both in school and out of school. Technology can bring textbooks to life. The Internet can connect students to their peers in other parts of the world. It can bridge the quality gaps.

—Queen Rania of Jordan

The Internet is the first technology since the printing press which could lower the cost of a great education and, in doing so, make that cost-benefit analysis much easier for most students. It could allow American schools to service twice as many students as they do now, and in ways that are both effective and cost-effective.

—John Katzman

Leaders in China and India realize that science and technology lead to success and wealth. But many countries in the West graduate students into the unemployment line by teaching skills that were necessary to live in 1950.

—Michio Kaku

I removed 'cyberspace' from my vernacular. The idea, which I grew up with, of going into a place separate from the real world, is something my students just don't recognise.

—Clay Shirky

Kids who are good at traditional school—repeating rote concepts and facts on a test—can fall apart in a situation where that isn't enough. Programming rewards the experimental, curious mind.

—Ketil Moland Olsen

The most successful sites and apps hook us by tapping into deep-seated human needs. When LinkedIn launched, for instance, it created a hub-and-spoke icon to visually represent the size of each user's network. That triggered people's innate craving for social approval and, in turn, got them scrambling to connect.

—Bianca Bosker

The U.S. National Intelligence Council has estimated that more people in sub-Saharan Africa, South Asia, and the Middle East have internet access than have electricity.

—Emerson T. Brooking
and P. W. Singer

Researchers have found that online behavior is dominated by 'homophily' a tendency to listen to and associate with people like yourself, and to exclude outsiders. Social networks are bad at helping you empathize with people unlike you, but good at surrounding you with those who share your outlook. The new information ecosystem does not challenge biases; it reinforces them.

—Emerson T. Brooking
and P. W. Singer

The tech industry is like Big Tobacco before the link between cigarettes and cancer was established: keen to give customers more of what they want, yet simultaneously inflicting collateral damage on their lives.

—Josh Elman

You can't unwrite what you submit, so when in doubt just quit.

<div align="right">—Slogan</div>

Could the United States government, under great duress in some future conflict or catastrophe, censor or nationalize the social-media industry? Extreme as it may sound, there is ample precedent. During the Civil War, Abraham Lincoln ordered the censorship of telegrams. Twelve days after Pearl Harbor, Franklin Roosevelt formally established the U.S. Office of Censorship—its official motto was 'Silence Speeds Victory.' Would such control of social media be advisable? Would it even be possible?

<div align="right">—Emerson T. Brooking
and P. W. Singer</div>

I wonder what my parents did to fight boredom before the internet…I asked my 17 brothers and sisters, and they didn't know either.

<div align="right">—*womenafter50.com*</div>

Kids didn't have huge backpacks when I was their age. We didn't have backpacks at all. Now it seemed all the kids had them. You saw little second-graders bent over like sherpas, dragging themselves through the school doors under the weight of their packs. Some of the kids had their packs on rollers, hauling them like luggage at the airport. I didn't understand any of this. The world was becoming digital; everything was smaller and lighter. But kids at school lugged more weight than ever.

<div align="right">—Michael Crichton</div>

When you have strict censorship of the internet, young students cannot receive a full education. Their view of the world is imbalanced. There can be no true discussion of the issues.

<div align="right">—Ai Weiwei</div>

Those aren't books. You can't hold a computer in your hand like you can a book. A computer does not smell. There are two perfumes to a book. If a book is new, it smells great. If a book is old, it smells even better. It smells like ancient Egypt. A book has got to smell. You have to hold it in your hands and pray to it. You put it in your pocket and you walk with it. And it stays with you forever. But the computer doesn't do that for you. I'm sorry.

<div align="right">—Ray Bradbury</div>

The humanities are the flower that blossoms on top of the 'stem.' (Science, Technology, Engineering, Math.)

<div align="right">--John Lithgow</div>

Maybe you believe that you need a computer so your children can get smarter faster....No, if you want your kids to get smarter, encourage them to read books. Books cost less and they will not crash, conk out and freeze on the screen. They can also be read in the kitchen, the living room, the bathroom, the bedroom, sitting up or lying down. Amazingly versatile product, the book.

--Mike Royko

The people who were building it [the internet] were a bunch of engineers—pretty much a homogenous bunch of geeks, and all we wanted was to get it to work. The general public has a rather broad range of characteristics; some people do not have other people's interests at heart, and so they run scams and generate malware and do all kinds of things that are harmful. I'm unhappy that the internet is host to that. But it's like every infrastructure. It's like the road system we depend heavily on but people get drunk and they drive and they destroy property or kill themselves or other people. And we don't look to get rid of cars. So we just have to learn to make the system more secure—make you and me safer in our use of the net.

—Vinton Cerf

I've discovered that searching the internet doesn't necessarily get you only to the thing that you were looking for. Maybe this is like wandering around the stacks in the library and pulling the book next to the one you were looking for, and discovering there was something interesting there. This is part of critical thinking. We really have to accept the responsibility in this online environment to think critically about what we are seeing and hearing, and deliberately pay attention to the other side of the argument.

—Vinton Cerf

If more women want to be a part of the computer industry today, they have to do more to put themselves there. Nobody is keeping them out.

—Roberta Williams

It has become appallingly obvious that our technology has exceeded our humanity.

--Albert Einstein

One thing that the internet has taught me…is that stupidity is international.

—Unknown

One of the problems the internet has introduced is that in this electronic village, all the village idiots have internet access.

—Peter Nelson

Well before Facebook, digital technology was enabling our tendency for isolation, to an unprecedented degree. Back in the 1990s, scholars started calling the contradiction between an increased opportunity to connect and a lack of human contact the 'Internet paradox.'

--Stephen Marche

Electronic aids, particularly domestic computers, will help the inner migration, the opting out of reality. Reality is no longer going to be the stuff out there, but the stuff inside your head. It's going to be commercial and nasty at the same time, like 'Rite of Spring' in Disney's Fantasia ... our internal devils may destroy and renew us through the technological overload we've invoked.

—J. G. Ballard

I do not fear computers. I fear the lack of them.

—Isaac Asimov

It has been said that computing machines can only carry out the processes that they are instructed to do. This is certainly true in the sense that if they do something other than what they were instructed then they have just made some mistake. It is also true that the intention in constructing these machines in the first instance is to treat them as slaves, giving them only jobs which have been thought out in detail, jobs such that the user of the machine fully understands what in principle is going on all the time. Up till the present machines have only been used in this way. But is it necessary that they should always be used in such a manner? Let us suppose we have set up a machine with certain initial instruction tables, so constructed that these tables might on occasion, if good reason arose, modify those tables. One can imagine that after the machine had been operating for some time, the instructions would have altered out of all recognition, but nevertheless still be such that one would have to admit that the machine was still doing very worthwhile calculations. Possibly it might still be getting results of the type desired when the machine was first set up, but in a much more efficient manner. In such a case one would have to admit that the progress of the machine had not been foreseen when its original instructions were put in. It would be like a pupil who had learnt much from his master, but had added much more by his own work. When this happens I feel that one is obliged to regard the machine as showing intelligence.

—Alan M. Turing

The strength of the computer lies in its being a logic machine. It does precisely what it is programed to do. This makes it fast and precise. It also makes it a total moron; for logic is essentially stupid.

—Peter Drucker

Man is not a machine, ... although man most certainly processes information, he does not necessarily process it in the way computers do. Computers and men are not species of the same genus. .... No other organism, and certainly no computer, can be made to confront genuine human problems in human terms. ... However much intelligence computers may attain, now or in the future, theirs must always be an intelligence alien to genuine human problems and concerns.

—Joesph Weizenbaum

The construction of an analogue computer or a supersonic airplane is simple when compared to the mixture of space and evolutionary eons represented by a cell.

—Charles A. Lindbergh

A bus station is where a bus stops. A train station is where a train stops. On my desk, I have a work station….

— William Faulkner

The inside of a computer is as dumb as hell but it goes like mad!

—Richard P. Feynman

The real question is not whether machines think but whether men do.

—B. F. Skinner

There is a popular cliché ... which says that you cannot get out of computers any more than you have put in..., that computers can only do exactly what you tell them to, and that therefore computers are never creative. This cliché is true only in a crashingly trivial sense, the same sense in which Shakespeare never wrote anything except what his first schoolteacher taught him to write—words.

—Richard Dawkins

[My favourite fellow of the Royal Society is the Reverend Thomas Bayes, an obscure 18th-century Kent clergyman and a brilliant mathematician who] devised a complex equation known as the Bayes theorem, which can be used to work out probability distributions. It had no practical application in his lifetime, but today, thanks to computers, is routinely used in the modelling of climate change, astrophysics and stock-market analysis.

—Bill Bryson

…comparing the capacity of computers to the capacity of the human brain, I've often wondered, where does our success come from? The answer is synthesis, the ability to combine creativity and calculation, art and science, into whole that is much greater than the sum of its parts.

—Garry Kasparov

Computers don't create computer animation any more than a pencil creates pencil animation. What creates computer animation is the artist.

—John Lasseter

Few companies that installed computers to reduce the employment of clerks have realized their expectations... They now need more, and more expensive clerks even though they call them 'operators' or 'programmers.'

—Peter Drucker

We've lost touch and allowed technology to take precedence over organic nature. But let's not forget that those microchips in our computers came from elements of the earth.

—Emilio Estevez

Computers were never designed in the first place to become musical instruments. Within a computer, everything is sterile - there's no sound, there's no air. It's totally code. Like with computer-generated effects in movies, you can create wonders. But it's really hard to create emotion.

—Thomas Bangalter

Imagine if every Thursday your shoes exploded if you tied them the usual way. This happens to us all the time with computers, and nobody thinks of complaining.

—Jef Raskin

Once a new technology rolls over you, if you're not part of the steamroller, you're part of the road.

—Stewart Brand

Only science can hope to keep technology in some sort of moral order.

--Edgar Z. Friedenberg

The science of today is the technology of tomorrow.

--Edward Teller

The Internet is probably the most important technological advancement of my lifetime. Its strength lies in its open architecture and its ability to allow a framework where all voices can be heard.

—Adam Savage

I'm online, therefore I am.

—Stewart Lee Beck

The Greek language with its mathematical structure is the language of Information Technology and the new generation of advanced computers, because only in the Greek language there are no limits.

—Bill Gates

[On robotic assistants] What can an assistant do on our behalf? Should it be able to make purchases for us? What if we ask it to do something illegal—could it override our commands?….If an AI agent determines that a teenager is depressed, can it inform his parents?….Can they report us to law enforcement? Can they be subpoenaed?

—Matthew Hutson

Technology means the systematic application of scientific or other organized knowledge to practical tasks.

—John Kenneth
Galbraith

Less than 5% of girls, on average, contemplate pursuing a STEM career….
And in their professional lives, women often face obstacles such as harassment.

—Ximena Rojo

The Internet is a giant international network of intelligent, informed computer enthusiasts, by which I mean, people without lives. We don't care. We have each other...

—Dave Barry

There are few things ever dreamed of, smoked or injected that have as addictive an effect on our brains as technology. This is how our devices keep us captive and always coming back for more. The definitive Internet act of our times is a perfect metaphor for the promise of reward: we search. And we search. And we search some more, clicking that mouse like—well, like a rat in a cage seeking another 'hit', looking for the elusive reward that will finally feel like enough.

—Kelly McGonigal

On the fourth day of telecommuting, I realized that clothes are totally unnecessary.

—Scott Adams, 'Dilbert'

[Susan] Wu is struck by 'the countless times I've had to move a man's hand from my thigh (or back or shoulder or hair or arm) during a meeting (or networking event or professional lunch or brainstorming session or pitch meeting) without seeming confrontational (or bitchy or rejecting or demanding or aggressive).' In a land of grand ideas and grander funding proposals, she found that the ability to neatly reject a man's advances without injuring his ego is 'a pretty important skill that I would bet most successful women in our [tech] industry have.'

Wu learned how to calibrate the temperature of her demeanor: friendly and approachable, neither too intimate nor too distant. She learned the fine art of the three-quarters smile, as well as how to deflect conversation away from her personal life and return to topics like sports and market strategy. She learned to distinguish between actual predators and well-meaning guys who were just a bit clueless. And yet to not be overly wary, because that, too, can affect career prospects.

—Liza Mundy

Succeeding in tech as a woman requires something more treacherous than the old adage about ginger Rogers doing everything Fred Astaire did, only backwards in high heels. It's more like doing everything backwards and in heels while some guy is trying to yank at your dress, and another is telling you that a woman can't dance as well as a man, oh, and could you stop dancing for a moment and bring him something to drink?

—Liza Mundy

More than half of college and university students are women, and the percentage of women entering many STEM fields has risen. Computer science is a glaring exception: the percentage of female computer-and information-science majors peaked in 1984, at about 37 percent. It has declined, more or less steadily, ever since. Today it stands at 18 percent.

—Liza Munday

A 2015 study published in *Science* confirmed that computer science and certain other fields, including physics, math, and philosophy, fetishize 'brilliance,' cultivating the idea that potential is inborn. The report concluded that these fields tend to be problematic for women, owing to a stubborn assumption that genius is a male trait.

—Liza Munday

No matter who you are or what you plan to do, learn to type!

--Liz Smith

We are more advanced technologically than ever before. However, technology, in many respects, is leading to the decline of conversation.

—Cindy Ann Peterson

[Shelley] Correll says, 'I worked with one company that insisted that the best way for good ideas to emerge was to have people on teams screaming their ideas at each other. When you watch these teams work, they literally scream at each other and call each other names. They believe this dynamic is essential to scientific discovery—absolutely essential. I said, 'Could you at least say you disagree with someone without saying you think they are an idiot?"

There's a term for the screaming-and-name-calling approach to scientific discovery. It's called 'constructive confrontation,' and it was pioneered by the company that helped give silicon Valley its name. That would be *Intel*, maker of the silicon chip.

—Liza Munday

What worries people in factories is electronics, robots. If you don't know jack about computers and electronics, then you don't have anything in this life anymore. One day, they're not going to need people; the machines will take over. People like me, we're not going to be around forever.

--Factory Worker Maddie Parlier

Half of the decline [labor losses] is the result of businesses' replacing workers with computers and software. In 1964, the nation's most valuable company, AT & T, was worth $267 billion in today's dollars and employed 758,611 people. Today's telecommunications giant, Google, is worth $370 billion but has only about 55,000 employees—less than a tenth the size of AT & T's workforce in its heyday.

—Derek Thompson

In 2013, Oxford University researchers forecast that machines might be able to perform half of all U.S. jobs in the next two decades. The projection was audacious, but in at least a few cases, it probably didn't go far enough. For example, the authors named psychologist as one of the occupations least likely to be 'computerisable.' But some research suggests that people are more honest in therapy sessions when they believe they are confessing their troubles to a computer, because a machine can't pass moral judgment. *Google* and *WebMD* already may be answering questions once reserved for one's therapist. This doesn't prove that psychologists are going the way of the textile worker. Rather, it shows how easily computers can encroach on areas previously considered 'for humans only.'

—Derek Thompson

We know that to compete for the jobs of the 21st century and thrive in a global economy, we need a growing, skilled and educated workforce, particularly in the areas of science, technology, engineering and math. Americans with bachelor's degrees have half the unemployment rate of those with a high school degree.

—Mark Pocan

Completing advanced math courses in high school has a greater influence on whether students will graduate from college than any other factor—including family background. Students who take math beyond Algebra II double their chances of earning a bachelor's degree. Through 2016, professional occupations are expected to add more new jobs—at least 5 million—than any other sector; within that category, computer and mathematical occupations will grow the fastest. Simply taking advanced math has a direct impact on future earnings, apart from any other factors. Students who take advanced math have higher incomes 10 years after graduating—regardless of family background, grades, and college degrees.

—*Achieve* [A Group Created by Governors and CorporateLeaders]

A report released by the *Partnership for a New American Economy* and the *Partnership for New York City* predicts that by 2018, there will be 800,000 science, technology, engineering, and mathematics (STEM) jobs in the United States that require a master's degree or higher—and only around 550,000 American-graduates with this training.

—Marvin Ammori

The great growling engine of change—technology.

—Alvin Toffler

Technological change feeds on previous technological change, and the rate of change increases steadily.

--Isaac Asimov

Technology is the most tremendous and far-reaching engine of social change which has ever either blessed or cursed mankind.

--Charles Francis Adams

The ultimate goal of technology, the *telos of techne*, is to replace a natural world that's indifferent to our wishes—a world of hurricanes and hardships and breakable hearts, a world of resistance—with a world so responsive to our wishes as to be, effectively, a mere extension of the self.

—Jonathan Franzen

I'm not sure if my antivirus software is effective because no viruses are detected on my computer or ineffective because no viruses are detected on my computer.

—*theChive*

Blogging is a great tool for undertaking assignments. If you encourage students to write a blog post every week over the course of a six-week project, both you and they have a record of what they learned, and how their project and their thinking developed. It's a way of maintaining a project record without the associated boredom….That would have had the additional advantage of making it easy for parents and the principal to see whey they'd been doing.

—Terry Freedman

By 2018 there will be more than two million open jobs in STEM (science, technology, engineering, math) professions, but only 19 percent of current college degrees are in STEM fields. Even worse, 75 percent of students that do well in science and math decide to not pursue STEM in college. If we want to remain a global leader, we have to develop more interest in these topics. One way to do that is to show students that coding ties into nearly everything we do. And to do that, we need to incorporate programming into the curriculum.

—Ellen Ullman

I focus on the vocational aspect of coding. How will the skills I teach help students in their career or profession after high school? Concepts of programming are good in any subject, since they prepare students to develop ideas and use the code to provide the answer.

—Luna Ramirez

Technology is taking over all jobs, even trucking—all trucks will be driven by computer programs in a few years. If you don't know coding, you won't have a job. When you're coding, you have to spend hours to troubleshoot if it doesn't work. It builds up endurance and perseverance. You have to be patient and pay attention to detail. Those soft skills are vital for everyone, and you can only get those skills from programming.

—Luna Ramirez

There's a basic principle about consumer electronics: it gets more powerful all the time and it gets cheaper all the time. That's true of all types of consumer electronics.

—Trip Hawkins

Cultural values are, in themselves, neutral as well as universal, and so much depends on how individuals or ethnic groups use them. Values are influenced by so many factors such as geography, climate, religion, the economy and technology.

—F. Sionil Jose

Humanity is becoming hopeless, everyone is looking to something with internet capability for everything, heck some people have gone as far as finding someone to love through the internet, if we were to lose electricity forever, I doubt that many people would survive, because people would just be helpless, because they can't look up how to survive on their phone, and they don't even know what a book is, so they can't go and find one about survival, and if they do know, they wouldn't know how to use it because they are used to touching their screens and the book turning the pages, and when the food in stores would go bad, they wouldn't know how to fend for themselves, or how to skin animals, or find good edible plants, so we must pray that we will never lose our electronics, or humanity is doomed.

—Satuin Segi

Providing better computer science education in public schools to kids, and encouraging girls to participate, is the only way to rewrite stereotypes about tech and really break open the old-boys' club.

—Ryan Holmes

A professor I had hoped to work with in graduate school candidly told me that he couldn't add me to his research group, because he'd already agreed to hire another woman and the group couldn't tolerate two of us.
One tactic that we used then might be useful in tech companies. Gather as many technical women from all levels of your organization as possible and invite the men in responsible positions to join you for lunch, one at a time. This allows each man to see how it feels to be the only man in the room for at least a brief period. Although it isn't possible to quantity the effects of these lunches, they did produce some interesting results. One admiral at the Office of Naval Research was so discomfited that he talked nonstop for an hour and a half without touching his food. Lunch groups also send a subtle message throughout the organization that women will support one another.

—Kristl Hathaway, Ph.D.

I think human relationships are going to hell. Young people don't know how to relate to one another. Technology is a wonderful thing for its purpose, but for human relations, it's a horror. It's made everybody into a mini-machine. All people know how to do is press buttons.

—Iris Apfel

Technology, like art, is a soaring exercise of the human imagination.
—Daniel Bell

Computer dating is fine, if you're a computer.

--Rita Mae Brown

I've seen a dramatic increase in cases where something on the computer triggered the breakup. People are more likely to leave relationships, because they're emboldened by the knowledge that it's no longer as hard as it was to meet new people. But whether it's dating sites, social media, e-mail—it's all related to the fact that the Internet has made it possible for people to communicate and connect, anywhere in the world, in ways that have never before been seen.

--Gilbert Feibleman,
Divorce Attorney

Online dating is responsible for an increasing number of marriages. Computer algorithms are starting to breed humans.

—Unknown

It is practically impossible to teach good programming to students that have had a prior exposure to BASIC: as potential programmers they are mentally mutilated beyond hope of regeneration.

—Edsger Dijkstra

Programming today is a race between software engineers striving to build bigger and better idiot-proof programs, and the Universe trying to produce bigger and better idiots. So far, the Universe is winning.

—Rich Cook

A computer lets you make more mistakes faster than any invention in human history—with the possible exceptions of handguns and tequila.

—Mitch Ratcliffe

Computers are to design as microwaves are to cooking.

—Milton Glaser

The question of whether a computer can think is no more interesting than the question of whether a submarine can swim.

--Edsger W. Dijkstra

The most important thing I learned in school was how to touch type.

—Joichi Ito

The most important property of a program is whether it accomplishes the intention of its user.

—C. A. R. Hoare

The best programs are written so that computing machines can perform them quickly and so that human beings can understand them clearly. A programmer is ideally an essayist who works with traditional aesthetic and literary forms as well as mathematical concepts, to communicate the way that an algorithm works and to convince a reader that the results will be correct.

--Donald Ervin Knuth

The computer only gives back ourselves. It is a faithful mirror that reflects the human traits that are brought to it.

--William Barrett

Programming in machine code is like eating with a toothpick.

--Charles Petzold

The business we're in is more sociological than technological, more dependent on workers' abilities to communicate with each other than their abilities to communicate with machines.

--Tom DeMarco

An activity originally intended to be performed by low-status, clerical—and more often than not, female—computer programming was gradually and deliberately transformed into a high-status, scientific, and masculine discipline.

--Nathan L. Ensmenger

It can be argued that the computer is humanity's attempt to replicate the human brain. This is perhaps an unattainable goal. However, unattainable goals often lead to outstanding accomplishment.

--Zubair Saleem Fazal

Computers are like bikinis. They save people a lot of guesswork.

—Sam Ewing

Computers are getting smarter all the time. Scientists tell us that soon they will be able to talk to us. (And by 'they', I mean 'computers'. I doubt scientists will ever be able to talk to us.)

—Dave Barry

It's ridiculous to live 100 years and only be able to remember 30 million bytes. You know, less than a compact disc. The human condition is really becoming more obsolete every minute.

—Marvin Minsky

Hardware: The parts of a computer system that can be kicked.

—Jeff Pesis

Controlling complexity is the essence of computer programming.

—Brian Kernigan

There's an old story about the person who wished his computer were as easy to use as his telephone. That wish has come true, since I no longer know how to use my telephone.

—Bjarne Stroustrup

Just remember: you're not a 'dummy,' no matter what those computer books claim. The real dummies are the people who–though technically expert—couldn't design hardware and software that's usable by normal consumers if their lives depended upon it.

—Walter Mossberg

That's the thing about people who think they hate computers. What they really hate is lousy programmers.

—Larry Niven

Computer science education cannot make anybody an expert programmer any more than studying brushes and pigment can make somebody an expert painter.

—Eric Raymond

A hacker on a roll may be able to produce–in a period of a few months—something that a small development group (say, 7-8 people) would have a hard time getting together over a year. IBM used to report that certain programmers might be as much as 100 times as productive as other workers, or more.

—Peter Seebach

A great lathe operator commands several times the wage of an average lathe operator, but a great writer of software code is worth 10,000 times the price of an average software writer.

—Bill Gates

Measuring programming progress by lines of code is like measuring aircraft building progress by weight.

—Bill Gates

First, solve the problem. Then, write the code.

—John Johnson

Optimism is an occupational hazard of programming; feedback is the treatment.

—Kent Beck

There is no programming language–no matter how structured–that will prevent programmers from making bad programs.

—Larry Flon

You can't have great software without a great team, and most software teams behave like dysfunctional families.

—Jim McCarthy

As soon as we started programming, we found to our surprise that it wasn't as easy to get programs right as we had thought. Debugging had to be discovered. I can remember the exact instant when I realized that a large part of my life from then on was going to be spent in finding mistakes in my own programs.

—Maurice Wilkes

It would appear that we have reached the limits of what it is possible to achieve with computer technology, although one should be careful with such statements, as they tend to sound pretty silly in 5 years.

—John Von Neumann,
(1949)

There is no reason for any individual to have a computer in his home.

—Ken Olson, President
(1977)

640K ought to be enough for anybody.

—Bill Gates (1981)

The computer was born to solve problems that did not exist before.

—Bill Gates

Less than 10% of the code has to do with the ostensible purpose of the system; the rest deals with input-output, data validation, data structure maintenance, and other housekeeping.

—Mary Shaw

Getting information off the Internet is like taking a drink from a fire hydrant.

—Mitchell Kapor

How rare it is that maintaining someone else's code is akin to entering a beautifully designed building, which you admire as you walk around and plan how to add a wing or do some redecorating. More often, maintaining someone else's code is like being thrown headlong into a big pile of slimy, smelly garbage.

—Bill Venners

Simplicity, carried to the extreme, becomes elegance.

—Jon Franklin

On two occasions I have been asked, 'If you put into the machine wrong figures, will the right answers come out?' I am not able rightly to apprehend the kind of confusion of ideas that could provoke such a question.

—Charles Babbage

As a rule, software systems do not work well until they have been used, and have failed repeatedly, in real applications.

—Dave Parnas

When debugging, novices insert corrective code; experts remove defective code.

—Richard Pattis

BASIC is to computer programming as QWERTY is to typing.

—Seymour Papert

I think computer viruses should count as life. I think it says something about human nature that the only form of life we have created so far is purely destructive. We've created life in our own image.

—Stephen Hawking

The only truly secure system is one that is powered off, cast in a block of concrete and sealed in a lead-lined room with armed guards.

—Gene Spafford

Hoaxes use weaknesses in human behavior to ensure they are replicated and distributed. In other words, hoaxes prey on the Human Operating System.

—Stewart Kirkpatrick

Many people tend to look at programming styles and languages like religions: if you belong to one, you cannot belong to others. But this analogy is another fallacy.

—Niklaus Wirth

If you aren't, at any given time, scandalized by code you wrote five or even three years ago, you're not learning anywhere near enough.

--Nick Black

When human beings acquired language, we learned not just how to listen but how to speak. When we gained literacy, we learned not just how to read but how to write. And as we move into an increasingly digital reality, we must learn not just how to use programs but how to make them. In the emerging highly programmed landscape ahead, you will either create the software or you will be the software. It's really that simple: Program, or be programmed.

--Douglas Rushkoff

That's the best definition of success: if a new system comes out and everyone says, 'Wow, I can't believe we put up with that old thing because it was so primitive and limited compared to this.'

--Douglas Edwards

In the history of ideas, it's repeatedly happened that an idea, developed in one area for one purpose, finds an unexpected application elsewhere. Concepts developed purely for philosophy of mathematics turned out to be just what you needed to build a computer. Statistical formulae for understanding genetic change in biology are now applied in both economics and in programming.

--Patrick Grim

What one programmer can do in one month, two programmers can do in two months.

—Fred Brooks

An international power supply is the device which means it doesn't matter what country you're in, or even if you know what country you're in (more of a problem than you might suspect)—you just plug your Mac in and it figures it out for itself. We call this principle Plug and Play. Or at least, Microsoft calls it that because it hasn't got it yet. In the Mac world we've had it for so long we didn't even think of giving it a name.

--Douglas Adams

An algorithm must be seen to be believed.

--Donald Ervin Knuth

Computers are better than we are at arithmetic, not because computers are so good at it, but because we are so bad at it.

—Isaac Asimov

Here's to the crazy ones. The misfits. The rebels. The troublemakers. The round pegs in the square holes. The ones who see things differently. They're not fond of rules. And they have no respect for the status quo. You can quote them, disagree with them, glorify or vilify them. About the only thing you can't do is ignore them. Because they change things. They push the human race forward. And while some may see them as the crazy ones, we see genius. Because the people who are crazy enough to think they can change the world, are the ones who do.

--Rob Siltanen

There's a danger in the internet and social media. The notion that information is enough, that more and more information is enough, that you don't have to think, you just have to get more information—gets very dangerous.

—Edward de Bono

I know there's a proverb that says 'To err is human,' but a human error is nothing to what a computer can do if it tries.

--Agatha Christie

No one messes around with a nerd's computer and escapes unscathed.

—E. A. Bucchianeri

Doing research on the Web is like using a library assembled piecemeal by pack rats and vandalized nightly.

--Roger Ebert

Man is a slow, sloppy, and brilliant thinker; computers are fast, accurate, and stupid.

--John Pfeiffer

All of a sudden, we've lost a lot of control. We can't turn off our internet; we can't turn off our smartphones; we can't turn off our computers. You used to ask a smart person a question. Now, who do you ask? It starts with g-o, and it's not God.

--Steve Wozniak

The fantastic advances in the field of electronic communication constitute a greater danger to the privacy of the individual.

--Earl Warren

Our first computers were born not out of greed or ego, but in the revolutionary spirit of helping common people rise above the most powerful institutions.

--Steve Wozniak

Man is the best computer we can put aboard a spacecraft... and the only one that can be mass produced with unskilled labor.

—Werner von Braun

If the automobile had followed the same development as the computer, a Rolls Royce would today cost $100, get a million miles per gallon, and explode once a year killing everyone inside.

--Robert Cringely

Dartmouth College employs computer learning techniques in a very broad array of courses. For example, a student can gain a deep insight into the statistics of Mendelian genetics in an hour with the computer rather than spend a year crossing fruit flies in the laboratory.

--Carl Sagan

In another thirty to fifty years, the demand for cheap labor will have produced even more machines over the employment of actual humans. And in that time frame, humans will have lost their voice, their power, all freedoms, and all worth. It is inevitable that machines will one day become the ultimate enemies of mankind. We are not evolving or progressing with our technology, only regressing. Technology is our friend today, but will be our enemy in the future.

--Suzy Kassem

Jobs proposed Apple Computer: 'I was on one of my fruitarian diets,' he explained. 'I had just come back from the apple farm. It sounded fun, spirited, and not intimidating. Apple took the edge off the word 'computer.' Plus, it would get us ahead of Atari in the phone book.'

--Steve Jobs

Computers can not dream, they can not visualize—That is your part and that's how you create, innovate and make a difference.

--Ravindra Shukla

All computers expect to be yelled at. There's not a single computer in the whole world that hasn't been sworn at. Even the discreet little VDU with the crossed keys monogram on the keyboard that sits on the Pope's desk in his office in the Vatican has in its time heard language that'd make a Marine blush.

--Tom Holt

In the short run, technology may be more efficient than man, but it will never be perfect. Every piece of equipment will eventually reveal an error code. In the long run, man will never be perfect, but prove to be more reliable than technology.

--Suzy Kassem

We are about to study the idea of a computational process. Computational processes are abstract beings that inhabit computers. As they evolve, processes manipulate other abstract things called data. The evolution of a process is directed by a pattern of rules called a program. People create programs to direct processes. In effect, we conjure the spirits of the computer with our spells.

A computational process is indeed much like a sorcerer's idea of a spirit. It cannot be seen or touched. It is not composed of matter at all. However, it is very real. It can perform intellectual work. It can answer questions. It can affect the world by disbursing money at a bank or by controlling a robot arm in a factory. The programs we use to conjure processes are like a sorcerer's spells. They are carefully composed from symbolic expressions in arcane and esoteric programming languages that prescribe the tasks we want our processes to perform.

A computational process, in a correctly working computer, executes programs precisely and accurately. Thus, like the sorcerer's apprentice, novice programmers must learn to understand and to anticipate the consequences of their conjuring. Even small errors (usually called bugsor glitches) in programs can have complex and unanticipated consequences.

--Harold Abelson

I think, however, the current fascination with the computer and its principal product, information, deserves a more critical response. This is because the computer does so ingeniously mimic human intelligence that it may significantly shake our confidence in the uses of the mind. And it is the mind that must think about all things, including the computer.

--Theodore Roszak

The screen and keyboard account for much of computers' weight. The intelligent part of a computer is a thousand times smaller than a Gucci buckle.

--Ted Sargent

now it's computers and more computers
and soon everybody will have one,
3-year-olds will have computers
and everybody will know everything
about everybody else
long before they meet them.
nobody will want to meet anybody
else ever again
and everybody will be
a recluse
like I am now.

--Charles Bukowski

For most digital-age writers, writing is rewriting. We grope, cut, block, paste, and twitch, panning for gold onscreen by deleting bucketloads of crap. Our analog ancestors had to polish every line mentally before hammering it out mechanically. Rewrites cost them months, meters of ink ribbon, and pints of Tippex. Poor sods.

--David Mitchell

I have only touched one other computer at my friend Marissa's house, and found the experience disconcerting. There was something sinister about the green letters and numbers that flashed on the screen as the computer booted up, and I hated the way Marissa stopped answering questions or noticing me the second it was turned on.

--Lena Dunham

I am regularly asked what the average Internet user can do to ensure his security. My first answer is usually 'Nothing; you're screwed.'

—Bruce Scheneier

If you've never programmed a computer, you should. There's nothing like it in the whole world. When you program a computer, it does exactly what you tell it to do. It's like designing a machine—any machine, like a car, like a faucet, like a gas-hinge for a door—using math and instructions. It's awesome in the truest sense: it can fill you with awe.

--Cory Doctorow

Computers are quiet and clean and totally distracting because the Internet is there, lying in wait for a moment of weakness to pounce on your creativity and progress.

--Arlaina Tibensky

The problem with reading off a screen isn't resolution, eyestrain, or compatibility with reading in the bathtub: it's that computers are seductive, they tempt us to do other things, making concentrating on a long-form work impractical.

--Cory Doctorow

I hate computers. My hatred is entrenched, and I nourish it daily. I'm comfortable with it, and no community outreach program will change my mind. I hate computers for getting their own section in the *New York Times* and for lengthening commercials with the mention of a Web site address. Who really wants to find out more about Procter & Gamble? Just buy the toothpaste or laundry detergent, and get on with it. I hate them for creating the word *org* and I hate them for e-mail, which isn't real mail but a variation of the pointless notes people used to pass in class. I hate computers for replacing the card catalog in the *New York Public Library* and I hate the way they've invaded the movies. I'm not talking about their contribution to the world of special effects. I have nothing against a well-defined mutant or full-scale alien invasion—that's good technology. I'm talking about their actual presence in any given movie. They've become like horses in a western—they may not be the main focus, but everybody seems to have one.

--David Sedaris

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--Lena Dunham

It is one thing to use computers as a tool, quite another to let them do your thinking for you.

—Tom Clancy

The computer is incredibly fast, accurate, and stupid. Man is unbelievably slow, inaccurate, and brilliant. The marriage of the two is a challenge and opportunity beyond imagination.

--Stuart G. Walesh

Personal computing today is a rich ecosystem encompassing massive PC-based data centers, notebook and Tablet PCs, handheld devices, and smart cell phones. It has expanded from the desktop and the data center to wherever people need it—at their desks, in a meeting, on the road or even in the air.

—Bill Gates

It is no longer just engineers who dominate our technology leadership, because it is no longer the case that computers are so mysterious that only engineers can understand what they are capable of. There is an industry-wide shift toward more 'product thinking' in leadership—leaders who understand the social and cultural contexts in which our technologies are deployed.

Products must appeal to human beings, and a rigorously cultivated humanistic sensibility is a valued asset for this challenge. That is perhaps why a technology leader of the highest status—Steve Jobs—recently credited an appreciation for the liberal arts as key to his company's tremendous success with their various i-gadgets.

--Damon Horowitz

Treat your password like your toothbrush. Don't let anybody else use it, and get a new one every six months.

—Clifford Stoll

I had a life once. Now I have a computer.

—Unknown

DOS computers manufactured by companies such as IBM, Compaq, Tandy, and millions of others are by far the most popular, with about 70 million machines in use worldwide. Macintosh fans, on the other hand, may note that cockroaches are far more numerous than humans, and that numbers alone do not denote a higher life form.

—Unknown

Mac users swear by their computers. PC users swear at their computers.

—Unknown

The human brain has about 100 billion neurons. With an estimated average of one thousand connections between each neuron and its neighbors, we have about 100 trillion connections, each capable of a simultaneous calculation ... (but) only 200 calculations per second.... With 100 trillion connections, each computing at 200 calculations per second, we get 20 million billion calculations per second. This is a conservatively high estimate.... In 1997, $2,000 of neural computer chips using only modest parallel processing could perform around 2 billion calculations per second.... This capacity will double every twelve months. Thus by the year 2020, it will have doubled about twenty-three times, resulting in a speed of about 20 million billion neural connection calculations per second, which is equal to the human brain.

—Ray Kurzweil

Those parts of the system that you can hit with a hammer (not advised) are called hardware; those program instructions that you can only curse at are called software.

—Unknown

At least my pencil never crashes!

—Unknown

Most people believe that computers are tools; at least this is the image conveyed by the dominant ideology. This viewpoint has two main components. First, computers are inert objects that persons control. Due to the dumb docility of these machines, computers are assumed to operate in a neutral, value-free manner. By processing data, these machines mechanically generate objective information. Second, computers simply wait to be used. Like all tools, computers do what they are told, therefore there is nothing fundamentally diabolical or sinister about these machines. In this sense, computers seem transparent—they do not have an agenda. As the clichéd defense of technology suggests, though machines can be turned to good or evil ends, computers themselves are basically amoral. If problems arise from this technology, then users are to blame.

—Vincente Berdayes

Computers are finite machines; when given the same input, they always produce the same output.

—Greg M. Perry

Something else has happened with computers. What's happened with society is that we have created these devices, computers, which already can register and process huge amounts of information, which is a significant fraction of the amount of information that human beings themselves, as a species, can process. When I think of all the information being processed there, all the information being communicated back and forth over the Internet, or even just all the information that you and I can communicate back and forth by talking, I start to look at the total amount of information being processed by human beings—and their artifacts—we are at a very interesting point of human history, which is at the stage where our artifacts will soon be processing more information than we physically will be able to process.

—Seth Lloyd

Computers will overtake humans with AI at some within the next 100 years. When that happens, we need to make sure the computers have goals aligned with ours.

—Stephen Hawking
(2015)

Computers no longer interface with humans—they interact, and the interaction will become steadily deeper, more subtle, and more crucial to our collective sanity and ultimate survival.

—Alan Cooper

Computers are in essence millions of tiny simple machines coordinated and connected together to accomplish a useful purpose. Comparing a computer with the human brain puts the computer at a disadvantage. The brain is so complex it's not even fully understood! By contrast all the technology involved in computers is obviously understood and harnessed by humans. Both computers and the human brain are very different in the way they handle instructions. For instance the brain handles millions of bits of information simultaneously. Most computers though, can handle just 64 bits of information at the same time; it just does it in millionths of a second. The computer then is able to handle the few instructions it receives much faster.

—Dean Ormandy

The similarities between humans and computers are more numerous than the differences.

—P. A. Scott

Computers are machines and thus not subject to the biases and prejudices that distort human information processing and decision making—computers are objective in some absolute sense. In addition, computers are driven by purely logical mechanisms that are open to inspection; thus, computer-generated results must be totally rational and logical—they must be the 'truth.' Unfortunately (or is it fortunately?), the most utter rubbish and prejudice-saturated nonsense is as easily generated from logical mechanisms as by any other means. The use of a logical basis in no way guarantees correct and true conclusions. In fact, quite the contrary is the case. Simple classical logic is singularly ineffective in the empirical world of incomplete and poor quality information....Thus, computers are, in general, no more infallible than you, or I, or the persons who programmed them.

—Derek Partridge

Part of the inhumanity of the computer is that, once it is competently programmed and working smoothly, it is completely honest.

—Isaac Asimov

My boyfriend got me a computer three years ago. I'll admit it does make things a lot easier. When I was working on a typewriter and I whited out a line, often I would choose a word to go in the space just because it fit. Now I don't have to do that.

—David Sedaris

Computers do what they are told. They slavishly obey any instructions given in their own programming language. This is how they do useful things like word processing and spreadsheet calculations. But, as in inevitable by-product, they are equally robotic in obeying bad instructions. They have no way of telling whether an instruction will have a good effect or a bad. They simply obey, as soldiers are supposed to do. It is there unquestioning obedience that makes computers useful, and exactly the same thing makes them inescapably vulnerable to infection by software viruses and worms. A maliciously designed program that says, 'Copy me and send me to every address that you find on this hard disk' will simply be obeyed, and then obeyed again by other computers down the line to which it is sent, in exponential expansion. It is difficult, perhaps impossible, to design a computer which is usefully obedient and at the same time immune to infection.

—Richard Dawkins

A computer is the most incredible tool we've ever seen. It can be a writing tool, a communications center, a supercalculator, a planner, a filer and an artistic instrument all in one, just by being given new instructions, or software, to work from. There are no other tools that have the power and versatility of a computer. We have no idea how far it's going to go. Right now, computers make our lives easier. They do work for us in fractions of a second that would take us hours. They increase the quality of life, some of that by simply automating drudgery and some of that by broadening our possibilities. As things progress, they'll be doing more and more for us.

—Steve Jobs

First we thought the PC was a calculator. Then we found out how to turn numbers into letters with ASCII—and we thought it was a typewriter. Then we discovered graphics, and we thought it was a television. With the World Wide Web, we've realized it's a brochure.

--Douglas Adams

The test of the machine is the satisfaction it gives you. There isn't any other test. If the machine produces tranquility it's right. If it disturbs you it's wrong until either the machine or your mind is changed.

--Robert M. Pirsig

Americans worship technology. It's an inherent trait in the national zeitgeist.

--Max Brooks

Ethics change with technology.

--Larry Niven

Technology causes problems as well as solves problems. Nobody has figured out a way to ensure that, as of tomorrow, technology won't create problems. Technology simply means increased power, which is why we have the global problems we face today.

<div align="right">--Jared Diamond</div>

It's not technology that limits us. We're the limitation. Our technology is an expression of our intelligence and creativity, so the limitations of our technology are a reflection of our own limitations. We can't fundamentally advance technology until we fundamentally advance ourselves.

<div align="right">--Christian Cantrell</div>

E-mail has some magical ability to turn off the politeness gene in a human being.

<div align="right">--Jeff Bezos</div>

To the Technocrats: Have mercy on us. Relax a bit, take time out for simple pleasures. For example, the luxuries of electricity, indoor plumbing, central heating, instant electronic communication and such, have taught me to relearn and enjoy the basic human satisfactions of dipping water from a cold clear mountain stream; of building a wood fire in a cast-iron stove; of using long winter nights for making music, making things, making love; of writing long letters, in longhand with a fountain pen, to the few people on this earth I truly care about.

<div align="right">--Edward Abbey</div>

The evil of technology was not technology itself, Lindbergh came to see after the war, not in airplanes or the myriad contrivances of modern technical ingenuity, but in the extent to which they can distance us from our better moral nature, or sense of personal accountability.

<div align="right">--David McCullough</div>

The great thing about a computer notebook is that no matter how much you stuff into it, it doesn't get bigger or heavier.

<div align="right">--Bill Gates</div>

Many aspects of our screen-bound lives are bad for our social skills simply because we get accustomed to controlling the information that comes in, managing our relationships electronically, deleting stuff that doesn't interest us. We edit the world; we select from menus; we pick and choose; our social 'group' focuses on us and disintegrates without us. This makes it rather confusing for us when we step outdoors and discover that other people's behaviour can't be deleted with a simple one-stroke command or dragged to the trash icon.

<div align="right">--Lynne Truss</div>

I can't blame modern technology for my predilection for distraction, not after all the hours I've spent watching lost balloons disappear into the clouds. I did it before the Internet, and I'll do it after the apocalypse, assuming we still have helium and weak-gripped children.

--Colson Whitehead

Computers are heaven-sent when they work and hell-spawn when they don't. There's just not much middle ground when it comes to technology.

--Dani Harper

Code is not like other how-computers-work books. It doesn't have big color illustrations of disk drives with arrows showing how the data sweeps into the computer. Code has no drawings of trains carrying a cargo of zeros and ones. Metaphors and similes are wonderful literary devices but they do nothing but obscure the beauty of technology.

--Charles Petzold

The computer is credited with the capacity to create unsuspected amounts of busy-work. We are straight on our way towards an energy-obsessed low energy society in a world that worships work but has nothing for people to do.

--Ivan Illich

I sometimes wonder about people who wake up and spend almost their whole day online. When they go to bed at night, they'll have almost no organic memories of their own. If they do this for a long time, you can begin to say that their intelligence is, in a true sense, artificial.

--Douglas Coupland

Progress is made by lazy men looking for easier ways to do things.

--Robert A. Heinlein

It's only after you upgrade to a better technology that you realize how obsolete the previous one has now become.

--Hrishikesh Agnihotri

I pick my technology like I picked my husband. It has to complement, not complicate, my life.

--Amber Hurdle

Our industry does not respect tradition. What it respects is innovation.

--Satya Nadella

All the tools, techniques and technology in the world are nothing without the head, heart and hands to use them wisely, kindly and mindfully.

--Rasheed Ogunlaru

When our Paleolithic ancestors began making tools from stone over three million years ago, they had no understanding they were entering into one of the most successful symbiotic relationships this planet has ever seen. From those humble, pre-verbal beginnings, humans and technology have lifted one another, improved each other's lot, made possible the most amazing partnership imaginable.

--Richard Yonck

There is more information available at our fingertips during a walk in the woods than in any computer system, yet people find a walk among trees relaxing and computers frustrating. Machines that fit the human environment, instead of forcing humans to enter theirs, will make using a computer as refreshing as taking a walk in the woods.

--Mark Weiser

Technology has given the dumb a tongue.

-—Ernest Agyemang
Yeboah

If security were all that mattered, computers would never be turned on, let alone hooked into a network with literally millions of potential intruders.

--Dan Farmer

Smart Technology is making us stupid.

--Danny Mekić

Computer security can simply be protecting your equipment and files from disgruntled employees, spies, and anything that goes bump in the night, but there is much more. Computer security helps ensure that your computers, networks, and peripherals work as expected all the time, and that your data is safe in the event of hard disk crash or a power failure resulting from an electrical storm. Computer security also makes sure no damage is done to your data and that no one is able to read it unless you want them to.

--Bruce Schneier

There was a beauty to an elegantly designed circuit board that rivaled anything found in nature.

--Kit Rocha

Brain-like in function and speed, the internet connected over one-third of the global population. Three million searches every minute; one-hundred-trillion emails every year; more Facebook users than people in North America, all with with personal photos, videos, apps, and chats. There were dozens of dating sites, an immersive universe called 2nd Life that boasted a country-sized GDP, a slew of viruses, obnoxious advertising, more than a billion photos of naked women, and seventy-two hours of video uploaded to YouTube every minute.

--Jake Vander-Ark

There are few things ever dreamed of, smoked or injected that have as addictive an effect on our brains as technology. This is how our devices keep us captive and always coming back for more. The definitive Internet act of our times is a perfect metaphor for the promise of reward: we search. And we search. And we search some more, clicking that mouse like—well, like a rat in a cage seeking another 'hit', looking for the elusive reward that will finally feel like enough.

--Kelly McGonigal

I fear the day that technology will surpass our human interaction. The world will have a generation of idiots.

--Albert Einstein

That's what children eventually were for their aging parents: custodians of technology, free personal IT departments keeping them from disappearing forever from the universal cloud.

--Christopher Bollen

If you've never mistyped your password, it isn't complex enough.

--D. Clarence Snyder

A computer is a stupid machine with the ability to do incredibly smart things, while computer programmers are smart people with the ability to do incredibly stupid things.

--Bill Bryson

We live in an age of miracles so commonplace that it can be difficult to see them as anything other than part of the daily texture of living.

--Tom Chatfield

On December 8, 1968, Douglas Engelbart sat in front of a crowd of 1,000 and San Francisco, ready to introduce network computing to the world. Engelbart was no Steve Jobs. He was a shy engineer with no marketing background. His goal was to speak directly to other engineers, showing them that they could use computers in new ways to solve complex human problems.

That message was radical enough in 1968. Most programmers of the day used punchcards to carry out quantitative tasks like tabulating census data, writing banking code or calculating a missile's trajectory. Even in the futuristic *2001: A Space Odyssey*, which came out in April 1968, the HAL 9000 was an enhanced version of the same thing. It could play chess and make small talk with crew members and ultimately sabotage the whole mission, but it's job was still to compute numbers and run systems. HAL didn't give its users a way to write, design or collaborate on documents.

Engelbart didn't just come up with the notion of using computers to solve the urgent and multifaceted problems facing humanity. He also gave the first-ever live demonstration of networked personal computing. Today, it's known as 'the mother of all demos,' a precursor to every technology presentation that's happened since—and arguably more ambitious than any of them.

<div align="right">

—Valerie Landau

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Advanced technology does not always promise a more intelligent civilization. On the contrary, the more the common people rely on technology to do their thinking and solving for them, the less practice there is left for their own brains.

<div align="right">

--Criss Jami

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I've never heard a writer feel that way about a device with a screen. Oh sure, they're functional, practical. We would be lost without them. But just as we need to feel our feet on the earth, smell and taste the world around us, the pen scratching against the page, sensory and slow, is the difference between looking at a high-definition picture of a flower and holding that very same flower in your palm, feeling the brush of its petals, the color of its stamen rubbing off on your fingers.

<div align="right">

--Dani Shapiro

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The sensitive person's hostility to the machine is in one sense unrealistic, because of the obvious fact that the machine has come to stay. But as an attitude of mind there is a great deal to be said for it. The machine has got to be accepted, but it is probably better to accept it rather as one accepts a drug—that is, grudgingly and suspiciously. Like a drug, the machine is useful, dangerous and habit-forming. The oftener one surrenders to it the tighter its grip becomes.

<div align="right">

--George Orwell

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By the 1980's and 1990's, Moore's Law had emerged as the underlying assumption that governed almost everything in the Valley, from technology to business, education, and even culture. The 'law' said the number of transistors would double every couple of years. It dictated that nothing stays the same for more than a moment; no technology is safe from its successor; costs fall and computing power increases not at a constant rate but exponentially: If you're not running on what became known as 'Internet time,' you're falling behind.

--John Markoff

Technology makes people equal, it gives them a fair advantage.

--Samer Chidiac

[Google is] an omnivorous collector of information, a hyperencyclopedic vault of human knowledge, an unerring auctioneer, an eerily skillful student of languages, behaviour, and desires.

--Steven Levy

Technology innovation for the sake of innovation is an empty shell if we focus on what people don't need but would buy anyways.

--Iveta Cherneva

Technology sometimes encourages people to confuse busyness with effectiveness.

--Douglas B. Reeves

Once you get to naming your laptop, you know that you're really having a deep relationship with it.

--Cory Doctorow

It is no longer just engineers who dominate our technology leadership, because it is no longer the case that computers are so mysterious that only engineers can understand what they are capable of. There is an industry-wide shift toward more 'product thinking' in leadership—leaders who understand the social and cultural contexts in which our technologies are deployed.

Products must appeal to human beings, and a rigorously cultivated humanistic sensibility is a valued asset for this challenge. That is perhaps why a technology leader of the highest status—Steve Jobs—recently credited an appreciation for the liberal arts as key to his company's tremendous success with their various i-gadgets.

--Damon Horowitz

Kinko's is the soup kitchen for the technologically disadvantaged.

                                                                --Paul Orfalea

The technological man is as limited as his tools. The man without technologies is limitless.

                                                                --Bilal Hussain

We need to embrace gaming in school to embrace a population of students we often leave out when it comes to after school activities. Some schools are starting to explore esports—professional video game playing—as a thing.

                                                                —Chris Aviles

We bring in technology thinking it will add the next-level skills to our classrooms. That technology will help our teaching come alive, our curriculum have a deeper meaning. That it may 'hook' the kids, as if they are fish, keep them engaged, get them ready for the future.

And yes, those are valid reasons.

But the true power in technology is not just the readiness. The skills. The playing around with tools to create something impossible.

It is the power to be seen. To not be alone. To feel that in the world, someone values you. That someone out there gets you.

Our oldest daughter cemented her best friendship through Minecraft. They play together, side by side, and it drew them tighter together as Thea faced the bullies at her school.

When I think of technology, I don't just see it as a tool. I see it as a way for kids to be seen. For kids to be found. For kids to not be alone. And for adults too.

Someone out there values us. Someone out there, who wonders whether they have worth, is waiting for all of us. Technology means we don't have to be alone anymore.

                                                                —Pernille Ripp

I've told my grandchildren, 'First you learn how to work the problem, and then you can go use the computer.' I never liked that they could use a computer to find the answer.

                                                                —Katherine Johnson,
                                                                 NASA
                                                                 Mathematician

Computers have become more friendly, understandable, and lots of years and thought have been put into developing software to convince people that they want and need a computer.

                                                                —Roberta Williams

According to *Girls Who Code*, fewer than 20 percent of computer science graduates are women. Today, only 24 percent of computer scientists are women, and by 2027, just 22 percent of women will be represented in the field.

—Laura Ascione (2017)

When it comes to keeping girls engaged in computer science, research shows that girls are more interested in a challenge when they know they are solving a problem for society or when they know their solution will help people. Appealing to that interest, experts say, can help girls stick with computer science even as it becomes more challenging.
A massive survey from Microsoft reveals that female students' desire to seek out STEM learning opportunities is largely dependent on two motivating factors: creativity and making a difference in the world. Girls in the survey said they don't see STEM-related career pathways as contributing to either of those drivers.

—Laura Ascione (2017)

What's really interesting is that girls and young women said they don't see coding or programming as creative. They see themselves as creative, but they don't see those STEM-related activities and career pathways as being creative, nor did they see them as meaningful and purposeful. The girls we surveyed were really clear that they wanted to change the world. They want to do things that make a difference.

—Mark Sparvell

Using project-based learning, and asking students to create applications and things relevant to themselves and their community—there's a fair amount of research that this is the best approach to keep kids engaged, particularly females.

—Cameron Wilson

Numerous studies have found inequities in technology use in schools. Boys not only tend to dominate computer use in classrooms but also greatly outnumber girls in computer science classes. Girls, consequently, don't receive the same exposure to technology.

—Ellen Tarlin

Girls begin to lose interest in computers around the fifth grade. This gender gap widens through high school and college, where three times as many men as women earn computer science degrees, according to the National Science Foundation (NSF). And the gap is growing.

—Ronald Anderson

Girls seem to feel less comfortable with computers and like them less than boys do. Boys describe technology in much more positive terms; boys find computers more 'enjoyable,' 'special,' 'important,' and 'friendly.'

—Cornelia Brunner and
Margaret Honey

What separates girls from technology? It's not fear and it's not ability. It's about people's sense that 'This isn't what a proper girl does.' Girls get subtle and not-so-subtle messages from parents, peers, and society that they are not welcome in the predominantly male domain of computers.

—Amy Bruckman

Computer culture leaves girls out. Computer company executives and software designers are predominantly male; video games, also designed mostly by men, are dominated by images of competition, sports, and violence. Seventy-four percent of the characters in computer games are male, and female characters are usually damsels in distress.

—Sherry Turkle

Computer culture is reflected in the language of technology, which often has violent or military connotations. We give the computer a 'command.' If the system fails, we say it 'crashed.' Many IBM-type computers are programed to ask if we want to 'abort.' On the Macintosh, the symbol for a crashed program is a bomb.

—Ellen Tarlin

Women are faced with a choice of putting themselves at odds either with the cultural associations of technology or with the cultural associations of being a woman. The computer becomes a personal and cultural symbol of what a woman is not. Girls are thus forced to relate to computers differently than boys do.
[There are] two different styles of relating to technology: transparent and opaque. Transparent users are interested in technology for technology's sake. They are thrilled by the power and performance of the computer. They think of machines as an extension of their own power or as a way to overcome physical limitations. Opaque users, on the other hand, see the computer as a means to an end—as a tool for designing things that serve a purpose. They just want the computer to work. Girls tend toward the opaque style. Boys are more often transparent users.

—Sherry Turkle

Having software that girls like is important. Girls often think of computers as being for science and math. But what they produce…is art.

—Sam Christy

Dealing with bullying in school used to be about breaking up fights in the hallways, counseling students who spread rumors or passed vicious notes, or responding to racist or homophobic language in the classroom. Those 'good old days' are fast slipping into history. Although the traditional forms of bullying continue to be used, young adolescents have at their disposal a growing number of new tools for the purpose: e-mail, blogs, Internet chat rooms, instant messaging, and cell phone text messaging.

The telephone is no longer the communication tool of choice—shocking news to a generation of elders who still think cell phones are new technology. Two national studies…indicate that between one-fifth and one-third of young adolescents reported being victims of cyberbullying. These figures are even higher for users of specific tools: 56% of chat room participants reported that they felt abused, and 49% of text messaging users felt the same, at some time or another.

<div align="right">—Tom Erb</div>

Though cyberbullying shares basic elements with traditional bullying in that it is about relationships, power, and control where bullies attempt to establish illegitimate power and control over their victims, it is different in several significant ways. There is more anonymity available to the cyberbully, who can often remain unknown to the victim. In addition, hurtful messages can be spread to a very wide audience with remarkable speed. Cyberbullies themselves may receive little feedback on their actions and are seldom forced to take responsibility. Since it may occur outside of school time and involve equipment not owned by the school, cyberbullying is not clearly a legal issue for schools, yet its fallout can impair students' performance in school. Finally, cyberbullying is even further under the radar screen of most adults than is traditional bullying.

<div align="right">—Bill Belsey</div>

Technology's progression is often equated with the advancement of human societies. Pivotal innovations, such as the Internet, have forever changed how people interact. Though these developments have allowed the human race to make great strides in many fields, they have also allowed forms of transgression to become more rampant and widespread. This is evident when considering how traditional bullying has evolved into an issue today known as cyberbullying. While bullying and cyberbullying are often similar in terms of form and technique they also have many differences. Unlike traditional bullying, cyberbullying allows the offender to mask his or her identity behind a computer. This anonymity makes it easier for the offender to strike blows against a victim without having to see the victim's physical response. The distancing effect that technological devices have on today's youth often leads them to say and do crueler things compared to what is typical in a traditional face-to-face bullying situation.

<div align="right">—Richard Donegan</div>

Studies have found that girls seem to prefer computer activities that involve collaboration, cooperation, and working interactively. Girls also prefer creative, open-ended computer situations— nonlinear games and activities where there is more than one right answer, or more than one way to proceed.

—Ellen Tarlin

Online learning has roots in the tradition of distance education, which goes back at least 100 years to the early correspondence courses. With the advent of the Internet and the World Wide Web, the potential for reaching learners around the world increased greatly, and today's online learning offers rich educational resources in multiple media and the capability to support both real-time and asynchronous communication between instructors and learners as well as among different learners. Institutions of higher education and corporate training were quick to adopt online learning. Although K–12 school systems lagged behind at first, this sector's adoption of e- learning is now proceeding rapidly.

In recent experimental and quasi-experimental studies contrasting blends of online and face-to- face instruction with conventional face-to-face classes, blended instruction has been more effective, providing a rationale for the effort required to design and implement blended approaches. Even when used by itself, online learning appears to offer a modest advantage over conventional classroom instruction.

—*U.S. Department of Education* (2009)

Online learning has become popular because of its potential for providing more flexible access to content and instruction at any time, from any place. Frequently, the focus entails (a) increasing the availability of learning experiences for learners who cannot or choose not to attend traditional face-to-face offerings, (b) assembling and disseminating instructional content more cost-efficiently, or (c) enabling instructors to handle more students while maintaining learning outcome quality that is equivalent to that of comparable face-to-face instruction.

—*U.S. Department of Education* (2009)

SIX ESSENTIAL LEARNINGS IN A TECHNOLOGICAL SOCIETY

Technology is defined to be the combination of human imagination, inventiveness and the electronic/optical tools to transform ideas into reality. Effective use of information and technology will require students to develop new roles in living, learning and working in an increasingly complex and information-rich society. The following essential learnings for technology are fundamental to the work of the *Illinois*

State Board of Education as they develop content standards, performance standards, and assessments for all academic areas.

➢ The student as information seeker, navigator and evaluator. The student recognizes and values the breadth of information sources, browses those sources, differentiates and selectively chooses sources based on soundness and relevancy, and retrieves appropriate information/data using all forms of electronic/optical media, technology and telecommunications.

➢ The student as critical thinker, analyzer and selector of information and technologies appropriate to the task. The student uses problem-solving techniques and technology tools to review information and data from a variety of sources; analyze, synthesize and evaluate it; and then transform the myriad of ideas, data and information into useful information and knowledge. During this process the student discriminates among a variety of technologies and electronic/optical media to extend and expand his/her capabilities.

➢ The student as creator of knowledge using information resources and technology. The student, both individually and as a successful member of a team, constructs new meaning and knowledge in all content areas, combining and synthesizing different types of information through technology, telecommunications and computer modeling/ simulations.

➢ The student as effective communicator using a variety of appropriate technologies/media. The student creates, produces and presents ideas, stories and unique representations of thoughts through a variety of electronic/optical media by analyzing the task before him/her, the technology tools available, and appropriately selecting and using the most effective tool(s)/media for the purpose and audience.

➢ The student as a technologist. The student develops the confidence, competence, information management strategies and sufficient technical skills to successfully install, setup, and use the technology and telecommunications tools in his/her daily life, work situations and learning environments.

➢ The student as a responsible citizen in a technological age. The student understands the ethical, cultural, environmental and societal implications of technology and telecommunications, and develops a sense of stewardship and individual responsibility regarding his/her use of technology, media and telecommunications networks.

—Illinois State Board of
Education

Communications technology, like atomic energy, is morally neutral. The latter can be used to improve the human condition, or it can have a devastating impact on humankind. Modern computers and their various offshoots also have uses for both good and evil. So much of what we take for granted today was science fiction a generation ago. Our capacity to communicate, entertain ourselves, educate ourselves, travel swiftly and safely, and manage our homes and businesses has greatly expanded since the mid-20th century. Like any powerful resource, electronic technology needs to be handled knowledgeably and with care to maximize its benefits and minimize its dangers.

—Tom Erb

NINE THEMES OF DIGITAL CITIZENSHIP

Digital citizenship can be defined as the norms of appropriate, responsible behavior with regard to technology use.

1. Digital Access: full electronic participation in society.
   Technology users need to be aware that not everyone has the same opportunities when it comes to technology. Working toward equal digital rights and supporting electronic access is the starting point of Digital Citizenship. Digital exclusion makes it difficult to grow as a society increasingly using these tools. Helping to provide and expand Access To Technology should be the goal of all digital citizens. Users need to keep in mind that there are some that may have limited access, so other resources may need to be provided. To become productive citizens, we need to be committed to make sure that no one is denied digital access.

2. Digital Commerce: electronic buying and selling of goods.
   Technology users need to understand that a large share of market economy is being done electronically. Legitimate and legal exchanges are occurring, but the buyer or seller needs to be aware of the issues associated with it. The mainstream availability of Internet purchases of toys, clothing, cars, food, etc. has become commonplace to many users. At the same time, an equal amount of goods and services which are in conflict with the laws or morals of some countries are surfacing (which might include activities such as illegal down loading, pornography, and gambling). Users need to learn about how to be effective consumers in a new digital economy.

3. Digital Communication: electronic exchange of information.
   One of the significant changes within the digital revolution is a person's ability to communicate with other people. In the 19th century, forms of communication were limited. In the 21st century, communication options

have exploded to offer a wide variety of choices (e.g., e-mail, cellular phones, instant messaging). The expanding digital communication options have changed everything because people are able to keep in constant communica tion with anyone else. Now everyone has the opportunity to communicate and collaborate with anyone from anywhere and anytime. Unfortunately, many users have not been taught how to make appropriate decisions when faced with so many different digital communication options.

4. Digital Literacy: process of teaching and learning about technology and the use of technology.
   While schools have made great progress in the area of technology infusion, much remains to be done. A renewed focus must be made on what technologies must be taught as well as how it should be used. New technologies are finding their way into the work place that are not being used in schools (e.g., Videoconferencing, online sharing spaces such as wikis). In addition, workers in many different occupations need immediate information (just-in-time information). This process requires sophisticated searching and processing skills (i.e., information literacy). Learners must be taught how to learn in a digital society. In other words, learners must be taught to learn anything, anytime, anywhere. Business, military, and medicine are excellent examples of how technology is being used differently in the 21st century. As new technologies emerge, learners need to learn how to use that technology quickly and appropriately. Digital Citizenship involves educating people in a new way— these individuals need a high degree of information literacy skills.

5. Digital Etiquette: electronic standards of conduct or procedure.
   Technology users often see this area as one of the most pressing problems when dealing with Digital Citizenship. We recognize inappropriate behavior when we see it, but before people use technology they do not learn digital etiquette (i.e., appropriate conduct). Many people feel uncomfortable talking to others about their digital etiquette. Often rules and regulations are created or the technology is simply banned to stop inappropriate use. It is not enough to create rules and policy, we must teach everyone to become responsible digital citizens in this new society.

6. Digital Law: electronic responsibility for actions and deeds
   Digital law deals with the ethics of technology within a society. Unethical use manifests itself in form of theft and/or crime. Ethical use manifests itself in the form of abiding by the laws of society. Users need to understand that stealing or causing damage to other people's work, identity, or property on line is a crime. There are certain rules of society that users need to be aware

in a ethical society. These laws apply to anyone who works or plays online. Hacking into others information, downloading illegal music, plagiarizing, creating destructive worms, viruses or creating Trojan Horses, sending spam, or stealing anyone's identify or property is unethical.

7. Digital Rights & Responsibilities: those freedoms extended to everyone in a digital world.
   Just as in the American *Constitution* where there is a *Bill of Rights*, there is a basic set of rights extended to every digital citizen. Digital citizens have the right to privacy, free speech, etc. Basic digital rights must be addressed, discussed, and understood in the digital world. With these rights also come responsibilities as well. Users must help define how the technology is to be used in an appropriate manner. In a digital society these two areas must work together for everyone to be productive.

8. Digital Health & Wellness: physical and psychological well-being in a digital technology world.
   Eye safety, repetitive stress syndrome, and sound ergonomic practices are issues that need to be addressed in a new technological world. Beyond the physical issues are those of the psychological issues that are becoming more prevalent such as Internet addiction. Users need to be taught that there are inherent dangers of technology. Digital Citizenship includes a culture where technology users are taught how to protect themselves through education and training.

9. Digital Security (self-protection): electronic precautions to guarantee safety.
   In any society, there are individuals who steal, deface, or disrupt other people. The same is true for the digital community. It is not enough to trust other members in the community for our own safety. In our own homes, we put locks on our doors and fire alarms in our houses to provide some level of protection. The same must be true for the digital security. We need to have virus protection, backups of data, and surge control of our equipment. As responsible citizens, we must protect our information from outside forces that might cause disruption or harm.

   —Mike Ribble

The introduction of information technology into schools over the past two decades has achieved neither the transformation of teaching and learning nor the productivity gains that a reform coalition of corporate executives, public officials, parents, academics, and educators have sought.

—Larry Cuban (2003)

Gamers, those engaged and immersed in online competitions, may be the logical next step to plugging the skills gap....Gaming affords players experience and skills critical to cybersecurity threat hunting: logic, perseverance, an understanding of how to approach adversaries and a fresh outlook compared to traditional cybersecurity hires.

Three-quarters of senior managers say they would consider hiring a gamer even if that person had no specific cybersecurity training or experience....hiring experienced video gamers into the IT department seems like a good way to plug the cybersecurity skills gap.

....Gamification, or the concept of applying elements of game-playing to non-game activities, is growing in importance as a tool to help drive a higher performing cybersecurity organization. Within organizations that hold gamification exercises, hackathons, capture-the-flag, red team-blue team or bug bounty programs are the most common, and almost all (96 percent) of those that use gamification in the workplace report seeing benefits.

—Dean Takahashi

Today's schools cite a myriad of purposes for technology in schools, including improved teaching, leadership, and decision making, as well as the following student-focused purposes:

➢ Improving learning (e.g., higher standardized test scores)

➢ Increasing student engagement in learning

➢ Improving the economic viability of students (e.g., increasing students' abilities to succeed in a 21st century work environment through teaming, technology fluency, and high productivity)

➢ Increasing relevance and real-world application of academics

➢ Closing the digital divide by increasing technology literacy in all students

➢ Building 21st Century skills (e.g., critical thinking and sound reasoning, global awareness, communication skills, information and visual literacy, scientific reasoning, productivity, and creativity)

—Cisco Systems

Technology plays three important roles in transforming schools into systems that employ these principles. First and foremost, it is a learning tool for more student-centric, relevant, rigorous learning. Second, it serves as a data tool for education to better understand and inform educational and instructional decision making. Third, it is an enabling force behind globalization, knowledge work, and entrepreneurship, and thus students must understand the role it plays in transforming political, social, cultural, civic, and economic systems around the world. The combination of the three presents much of the rationale for technology in schools today.

—Cisco Systems

In general, the research on educational gaming finds that the use of computer games in educational settings has a positive effect on academic achievement (reading comprehension, algebra, and decoding), on attitudes toward learning, and on self-concept, in comparison to traditional instruction. Studies have found that games offer immediate feedback, increase active learner participation, reinforce knowledge, and influence attitudinal changes. Educational gaming favors the development of complex thinking skills and problem solving, planning, and self-regulated learning. Furthermore, studies show that the impact of the game on learning depends on the degree of interaction between the user and the system.
The power behind games is in the concentrated attention of the user to an environment that continuously reinforces knowledge, scaffolds learning, provides leveled, appropriate challenges, and provides context to the learning of content.

—Cisco Systems

THE NEED FOR A COMPUTER SCIENCE REQUIREMENT

Computer Science is fundamentally concerned with the invention, application, refinement and analysis of algorithms. There are three reasons for students to learn about algorithms, algorithmic thinking, and computer software technology:

➢ Algorithmic thinking, the fundamental mode of thinking that underlies all of computer science, is a unique mode of thought distinct from others encountered in the arts, social sciences, mathematics and other sciences. Algorithmic thinking skills are necessary to create computer software, and valuable to everyone who uses or interacts with computer software.

➢ The idea of computer, over its history, has evolved from its ancient role as a counting aid (e.g. the abacus developed 7,000 years ago), to accurate, arithmetic calculator in the 17th century, to high speed, programmable, general-purpose calculating machine in the middle of the 20th century. In the second half of the 20th century computers began, for the first time, to render judgments rather than calculate results. Now, at the dawn of the 21st

century, the future of the computer lies in the direction of artificial judgment: making complex decisions, providing advice, and exercising judgment.

The computer has become inexpensive and therefore ubiquitous. A typical American home contains many computers including desktop or portable ones, as well as those embedded in devices as varied as the coffee maker, microwave, television, radio, remote control, printer, scanner, fax machine, wrist watch, cell phone, kitchen timer, and camera. Reasons (1) and (2), though interesting, were not compelling reasons for all students to study algorithmic thinking, and the nature of artificial judgment, until this precise historical moment. The computer, that once cost millions of dollars, occupied a vast room, and was reserved for the exclusive use of mathematicians, physicists and engineers, is now so small and inexpensive that it pervades—even invades—nearly every aspect of our lives. Today, in modern societies, people must be able to use computers inside and outside of their work.

— Matthew A. Brenner

For the students of today to become productive and responsible citizens of tomorrow they must learn not just how to use computers, but also to understand the fundamental nature of computers and the software that controls them, for three broad reasons:

1)   Interacting with computerized systems makes more sense to, and produces less stress in, people who understand the nature of software.

2)   In the course of learning to create computer software, students learn abstract ideas and how to express them with extraordinary precision. They invent things entirely in their imaginations, and then manufacture them with nothing more than a keyboard and determination. They learn ideas and techniques that enable them to use the breathtaking speed of inexpensive, modern computers to amplify their own abilities and creativity to solve practical problems that cannot be solved by humans acting without them. They also develop a sense of what kinds of problems do not yield to the brute force of computers performing billions of instructions each second.

3)   Political debate over an ever-increasing number of public policy, privacy rights, national security, and military expenditures depend on an under standing of the nature of software and algorithms to make informed decisions.

—Matthew A. Brenner

Teens are doing the same things teens have always done—just digitally. Most adults tend to use the Internet in a functional way. We pay our bills, send emails for work, or book a plane ticket. Teens grow up online: They hang out and socialize with their friends on social networking sites and use the technology to meet their developmental needs. They figure out who they are, express themselves, and try on different identities in the virtual world. They flirt, fight, break up, and make up digitally as well as in person.

Essentially, websites are a virtual food court. Kids spend hours IMing (instant messaging), texting, or leaving each other online comments in the same way we spent hours talking on the phone. Today's parents ask, 'What could they possibly be texting their friends all the time?' Our parents asked the same question when we talked on the phone for hours to our best friend.

— Anastasia Goodstein

Technology is not to be confused with science. Science is what the universe, macrocosm, and microcosm, consists of—stars, planets, galaxies, cells, atoms, particles. Technology is tools, machines, power, instrumentation, processes, techniques. Science is knowledge discovered, and being discovered, by man. Technology is knowledge created, and being created by man.

—J. C. Gies

Though science and technology act as an integrated system, they are not synonymous in meaning. Science is a way of knowing; it is a breeder of new knowledge. Scientists who pursue knowledge for its own sake are motivated by their curiosity to learn how and why nature behaves as it does. Their satisfaction arises from discovering new facts, formulating new theories, and developing predictive laws that their peers consider significant in advancing a science discipline. The results of scientific research are judged on the basis of their integrity, not their usefulness in practical ways…

Technology, on the other hand, is a process that seeks new uses of knowledge. Technologists work with a definite purpose in mind, such as designing a more fuel-efficient airplane, an intelligent robot, improved cancer therapy, safer roads for travel, synthetic insulin, and communication satellites in outer space. The work of the technologist responds to industrial and social needs and whatever product or process people might find useful.

—Paul D. Hurd

Reading books is boring and it takes too long. Searching the Web is faster and more fun because you can get sound recordings, like of a dolphin's sounds, or a video of the discovery of the bow of the Titanic.

—11-year-old student,
Glenview, Illinois

Where industrial arts once had an emphasis on the teaching of material and tool skills related to industry, technology education helps citizens become technologically literate and take an active role in solving societal problems. The conceptual approach used by technology education relies on the examination of technical means that humans have used throughout recorded history. These technical means may include the study of communication, energy and power, production, transportation, and bio-related technologies.…Technology educators often rely on how these various technologies are often applied as a system.

<div align="right">—Anthony F. Gilberti</div>

Educators must provide students with an authentic view of technology.…technology must model life; it cannot be learned solely from books or lectures. Students need to experiment, research, design, and work with various tools and materials in a laboratory based environment. To study technology in its full social and environmental context, students must move from designing and making simple objects to designing, constructing, and operating a technological enterprise. In such a learning environment, students would learn the importance of planning, coordination, and assessment of technological innovation and implementation.

<div align="right">—Anthony F. Gilberti</div>

Technological literacy is vital to individual, community, and national economic prosperity. Beyond economic vitality is the realization that how people develop and apply technology has become critical to future generations, society, and even the Earth's continued ability to sustain life.

<div align="right">*—International Technology Education Association*</div>

Considering the technology gender gap that exists today, there can be no doubt that our current educational system is not engaging female students in technology or awakening them to possibilities of the technology industry as a career. Females are not afraid of computers or lack the ability to master computer skills, but they find the computer environment objectionable. Several factors within the educational system heighten these objections and impede female progression through technology classes. It is these factors that our educational system must address.

Single-sex computer classes offer female students the educational advantages of learning in a comfortable, non-threatening classroom environment where they are encouraged to enthusiastically participate in classroom discussions and activities. In these classes, curriculum may be adjusted to reflect the need of females to see computers as productivity tools. As a result of positive experiences gained while at-

tending single-sex computer classes, females are more likely to pursue higher level computer classes.

Although it is possible to argue that single-sex computer classes do not mirror the real world females must contend with once outside the classroom, they are, however, effective interim interventions to enable females to lessen the current technology gap.

<div align="right">
—Sandra L. Swain and
Douglas M. Harvey
</div>

To promote young women's participation and interest in CS courses, an effective approach must meet several objectives:

➢ Provide information to counter gender-related stereotypes about CS, in addition to information about the various educational and career paths that women can pursue in high-technology fields. For example, an important first step is to provide female students with information that demonstrates that CS is an appropriate and viable career choice for women.

➢ Increase female enrollment and thus have a critical number of female students in CS classes.

➢ Provide positive learning experiences for female students that build positive attitudes toward CS.

Of these three, the third objective—developing positive attitudes in female students—is probably the most important in terms of achieving the long-term goal of increased female presence in these fields.

<div align="right">
—Gail Crombie, Tracy
Abarbanel, and
Colin Anderson
</div>

When students make a game, they have to model the system and have a deeper mastery of the subject. It's a deeper learning experience. The process also incorporates 21st-century skills—game design requires that. To succeed in the workplace, students will have to have those portable skills. Plus, kids love it.

<div align="right">
—Alan Gershenfeld
</div>

When you talk about game creation as a learning tool, there is always a lot of discussion around the STEM disciplines, but it's also important for art and writing because it involves a lot of imagination. These programs encourage kids to think of themselves as artists and writers. They're valuable in getting kids to think differently about their individual talents and they encourage a high level of collaboration, which mimics the real world.

<div align="right">
—Kerri Schlottman
</div>

Game creation as a learning tool is really just a digital-age take on the old learning-by-doing approach to teaching: students pick up concepts more easily and retain more information when they are hands-on with their subject matter. In game creation, students are presented with the task of building a digital learning activity that focuses on a particular topic, such as ecology, mathematics, or social studies. Using a framework in the fundamentals of game design, they create a game that demonstrates their knowledge of the topic.

—Charlene O'Hanlon

If girls are not encouraged in math, science, and computer programming, they will be trained only for the data and information retrieval capabilities of the computer. By limiting them to secretarial/clerical skills, females will remain at the low end of the pay scale.

—*Sparkaction.org*

How does one not only open the gate for girls, but also invite them to walk-through? Although there are many different ways to introduce girls to technology and facilitate its use, most successful programs and projects seek to create female leaders and role models in the field of technology. No longer is a career in technology limited to individuals working in isolated cubicles; rather it is one that involves a great deal of teamwork and communication. It is a field that is right for the skills and talents of girls.

To prepare girls for careers in technology, it is important to consider several factors. Try to create a safe, stimulating environment in which the girls feel free to explore technology. Choose a meaningful project that requires the valuable skill of collaboration. And identify role models and mentors for the girls, including fellow teachers, older peers, or college students.

—Lynn V. Clark

Equitable access to technology is still an important issue to many of today's educators, but the focus has shifted. No longer can equity be measured by how many times a girl surfs the Internet or uses a computer for homework. Gender equity in the twenty-first century must be defined by the fluency and creativity of girls' computer use. When girls have a conceptual understanding of computers as well as a mastery of the skills necessary to use them, then they will be in control of the technology—and in control of their future. 'The bottom line is that while more girls are on the train, they aren't the ones driving,' says Pamela Haag. 'To get girls 'under the hood' of technology, they need to see that it gets them where they want to go. And for a large part of the population, that process must start in the classroom.'

—Lynn V. Clark

Citizenship isn't just about recognizing and dealing with online hazards. It's about building safe spaces and communities, having the students understand how to manage personal information, and about being Internet savvy—using your online presence to grow and shape your world in a safe, creative way, and inspiring others to do the same.

—*digizen.org*

Schools can teach basic principles of good citizenship to help shape students' behavior in the virtual world. It's nothing anyone would have thought necessary to do only a decade ago, but the concept of citizenship no longer exists only within the realm of the physical world. With K-12 students seeming to at all times have one foot in the real world and one in the virtual, school districts are starting to acknowledge a new collective responsibility call to teach kids what it means to be a good digital citizen and how to go about being one. The answer follows the same rules entrenched in the prescription for being a good citizen on the ground: Obey the law, have respect for others, act civilly and sensibly….if educators can help young people see online environments as communities they're helping to shape, they'll act more responsibly.

—Matt Villano

The Internet has brought communities across the globe closer together through instant communication.

—Mike Fitzpatrick

I love baby boomers who say 'kids don't even know how to write cursive' in a negative way like ok grandma you can't even turn your laptop on without getting 6 viruses and wiring half your retirement money to a Nigerian Prince.

—Zach Wallet

Writing old school HTML code was never very much fun but now it's getting downright tedious for most people.

—Mike Davidson

Brilliant entrepreneurs like Steve Jobs and Bill Gates are indispensable for technological progress. But much of the information technology that they commercialized had been developed in previous generations by big firms such as IBM and Xerox. Jobs and Gates stood on the shoulders of giants —and then became giants themselves.

—Robert D. Atkinson and
Michael Lind

The internet is where some people go to show their true intelligence; others, their hidden stupidity.

<div align="right">--Criss Jami</div>

In June of 1956, a few dozen scientists and mathematicians from all around the country gathered for a meeting on the campus of Dartmouth College. Most of them settled into the red brick Hanover Inn, then strolled through the famously beautiful campus to the top floor of the math department, where groups of white-shirted and men were already engaged in discussions of a 'strange new discipline'—so new, in fact, that it didn't even have a name. 'People didn't agree on what it was, how to do it or even what to call it,' Grace Solomonoff, the widow of one of the scientists, recalled later. The talks—on everything from cybernetics to logic theory—went on for weeks, in an atmosphere of growing excitement. What the scientists were talking about in their sylvan hideaway was how to build a machine that could think. The 'Dartmouth workshop' kicked off the decades-long quest for artificial intelligence.

<div align="right">—Stepfan Talty</div>

In just the last few years, 'machine learning' has come to seem like the new path forward. Algorithms, freed from human programmers, are training themselves on massive data sets and producing results that have shocked even optimists in the field. Earlier this year, two AIs—one created by the Chinese company Alibaba the other by Microsoft—beat a team of two-legged competitors in a Stanford reading-comprehension test. The algorithms read a series of Wikipedia entries on things like the rise of Genghis Khan and the Apollo space program and then answered a series of questions about them more accurately than people did. One Alibaba scientist declared the victory a 'milestone.'

<div align="right">—Stepfan Talty</div>

Once it arrives, general AI will begin taking jobs away from people, millions of jobs — as drivers, radiologists, insurance adjusters. In one possible scenario, this will lead governments to pay unemployed citizens a universal basic income, freeing them to pursue their dreams unburdened by the need to earn a living. In another, it will create staggering wealth inequalities, chaos and failed states across the globe. But the revolution will go much further. AI robots will care for the elderly—scientists at Brown university are working with Hasbro to develop a 'robo-cat' that can remind its owners to take their meds and track down their eyeglasses.AI 'scientists' will solve the puzzle of dark matter; AI-enabled spacecraft will reached the asteroid belts, while on Earth the technology will tame climate change, perhaps by sending massive swarms of drones to reflect sunlight away from the oceans. Last year, Microsoft committed $50 million to its 'AI for Earth' program to fight climate change.

<div align="right">—Stepfan Talty</div>

I try not to predict the future very much, but the one thing I know for certain is that in the future, there are going to be more computers, they're going to be faster, and they're going to do more things.

—Scott Hassan

Technology is changing fundamental things. It changes where you can live and work; it changes who you know; it changes who you can collaborate with. Commerce has completely changed. Those things change the nature of society.

—Kristina Woolsey

In 1965, a computer-chip designer named Gordon Moore published his soon-to-be-famous paper predicting that computing power—the number of logic gates that could be packed onto a silicon chip—was about to begin doubling every year. He was right, in a huge way. What was soon called Moore's Law led to the transformation of some muddy real estate south of San Francisco into Silicon Valley, and we've been on a rocket ride of innovation ever since. The personal computer, the Internet, the smartphone. The rate of change codified in Moore's Law has been slowly winding down—Moore acknowledged as much in 2015, on the 50th anniversary of his paper—and yet each blast of innovations still seems to be more disruptive than the last. Today, the Valley is no longer symbolized by two guys tinkering in a garage: it's defined by thousands of startups and hundreds of billions of dollars of venture capital looking to find new ideas.

—Adam Fisher

Change is going to be continual, and today is the slowest day society will ever move.

—Tony Fadell

There's all this hysteria about AI taking over. But here's the thing: the skills we need most in today's world—skills like empathy, creativity, taking initiative and cross-disciplinary thinking—are all things that machines will never have. Those are the skills that will be most needed in the future, too.

—Tiffany Shlain

Before my first coding class, the idea that I could build something with code seemed nearly impossible, but after only a couple of courses, I was working with my classmates to program a small drone. I realized that, just like art and fashion, code is about creativity, and that women who have these skills have the power to shape our future—and often have. Women are essential in forging digital progress and knowing how to code is the key to exploring and creating the newest frontier.

—Karlie Kloss

Never, ever try to compete with a computer on doing something, because if you don't lose today, you'll lose tomorrow.

—Scott Hassan

Startups with women leaders are more than 2x likely to be successful.
57% of bachelor's degrees (but only 18% of computer science degrees) are earned by women.
85% of all consumer spending online is controlled by women.

—*www.kodewithklossy.com*

DID YOU KNOW?
Ada Lovelace helped create the 'analytical engine' in the 1840s and is considered the world's first programmer (even though computers didn't exist!).

DID YOU KNOW?
Grace Hopper was a Navy Admiral and helped to write the first programming languages. She popularized the term 'debugging' after removing a moth from her computer to fix it.

DID YOU KNOW?
The ENIAC 6 are the six women tech pioneers who programmed the world's first entirely digital computer, known as the Electronic Numerical Integrator and Computer.

DID YOU KNOW?
In 1985, a trailblazer named Radia Perlman played a major role in developing the Internet with her invention of the Spanning Tree Protocol (STP).

—*www.kodewithklossy.com*

I have always wished for a computer that would be as easy to use as my telephone. My wish came true. I no longer know how to use my telephone.

--Bjarne Stroustrup

We are now in the third stage of the industrial revolution. The first involved machines which extended human muscle; the second used machines to extend the human nervous system (radio, television, telephones); the third is now utilizing machines which extend the human mind-computers. About half of all service workers (43 percent of the labor force…) will be involved in collecting, analyzing, synthesizing, structuring, storing, or retrieving information…80 percent of all management will be knowledge workers.

--Owen Davies

I like my new telephone, my computer works just fine, my calculator is perfect, but Lord, I miss my mind!

—Unknown

MICROSOFT RESEARCH: INSIGHTS FOR CLOSING THE FEMALE STEM GAP

While a new study shows that girls have ambitions to take on jobs that are creative or that 'do good' for the world, they don't see STEM careers as a way to connect with those aspirations—largely because they don't see these fields as exciting and cutting-edge. Challenging stereotypes with the exciting accomplishments that STEM professionals actually achieve can change perceptions and increase the appeal of STEM careers for girls.

Key findings include:

72 percent of girls say it's important for them to have a job that directly helps the world and 91percent describe themselves as creative.

Only 60 percent of girls understand how STEM subjects are relevant for their lives and the types of jobs they could do with STEM knowledge.

75 percent of girls who participate in STEM clubs/activities understand the types of jobs they could do with the STEM knowledge (compared to 53% who don't participate in such activities).

77 percent of girls who participate in hands-on STEM activities outside the classroom feel 'powerful' when engaging with STEM (that feeling of empowerment is less than half as common for those who only experienced STEM in the classroom).

65 percent of middle-school girls who are encouraged by a parent say they're likely to study computer science in high school (compared to 36% who haven't been encouraged by a parent).
With support from parents and teachers, girls are twice as likely to consider studying computer science in high school and three times as likely to consider studying computer science in college.

—Tech & Learning
(April, 2018)

The fear of the never-ending onslaught of gizmos and gadgets is nothing new. The radio, the telephone, Facebook - each of these inventions changed the world. Each of them scared the heck out of an older generation. And each of them was invented by people who were in their 20s.

--Daniel H. Wilson

There are still people who keep wanting technology and the future to keep going. They dream of flying cars, or humanoid robots, of populated cities on Mars. But do we really NEED this stuff? Maybe before we try to keep turning our world into an episode of The Jetsons, we should focus more on the problems that are surprisingly being overlooked now more than ever. Before we design another stupid cell phone or build a flying car, let's put a stop to racism, to sexism, to homophobia, to war. Let's stop buying all our 'American' products from sweat shops overseas and let's end poverty in third-world countries. Let's let film photography never go obsolete, let's let print books continue to be printed. Let's stop domestic violence and child abuse and prostitution and this world's heavy reliance on prescription drugs. Let's stop terrorism, let's stop animal cruelty, let's stop overpopulation and urbanization, let's stop the manufacture of nuclear weapons...

...I mean come on, we have all these problems to solve, but digital tech enthusiasts are more concerned that we don't have flying cars or robotic maids yet? That's pathetic.

--Rebecca McNutt

I won't say that all senior citizens who can't master technology should be publicly flogged, but if we made an example of one or two, it might give the others incentive to try harder.

--Chuck Lorre

Difference between TV and the internet was how far you sat from the screen. TV was an 8 foot activity, and you were a consumer. The internet was a 16 inch activity, and you participated.

--Seth Godin

Access to computers and the Internet has become a basic need for education in our society.

—Kent Conrad

We can learn from IBM's successful history that you don't have to have the best product to become number one. You don't even have to have a good product.

—Adam Osborne

The computer can't tell you the emotional story. It can give you the exact mathematical design, but what's missing is the eyebrows.

—Frank Zappa

Technology as it's used today in many classrooms doesn't motivate or foster creativity, imagination, and new ways of thinking beyond some unique anecdotal examples. Only by opening our minds to explore 'what's possible with technology' can we break away from the cookie-cutter models that so many technology and content companies continue to drive educators toward. We need to remain focused on the 'RoE' or Return on Education. The question for all of us is, 'How do I want technology to transform teaching and learning?'

—Elliot Levine

One common trait I've found with nearly everyone is a shared passion to deliver better experiences for their students. A school I visited recently was having a heavy debate around Microsoft Office G Suite for their students. Issues around price, ease of training teachers, privacy, and home access have been the subject of all those conversations. But there was a fundamental question missing from the conversations—how will switching to either platform fundamentally change teaching and learning?

—Elliot Levine

Probably the biggest thing that educators need to know is that humans are the weakest link in data security. It's important that everyone who has access to data is trained properly to use and protect it.

—Amelia Vance

Data is the new oil…it feeds AI to help us build smart technology. However, just like oil, data is crude until it is refined by well-designed AI, and the design of the AI we use in education needs to be very, very good indeed, because learning and human intelligence is extremely complex.

—Rose Luckin

Just because you give a student a device doesn't make them a digital-age learner… and just because you give a teacher a login doesn't make them tech-savvy. The challenge for educators is to begin building a 'face of the classroom' or online presence that includes personalized and interactive experiences to engage student creativity and digital citizenship.

—Dr. Jennifer Parker

Coding is best done in a hands-on, play-based environment.

—*pitsco.com*

Data is just like crude [oil]. It's valuable, but, if unrefined, it cannot really be used. It has to be changed into gas, plastic, chemicals, etc. to create a valuable entity that drives profitable activity; data must be broken down and analyzed for it to have value.

—Michael Palmer

If we look at the amount of data which is actually being analyzed today, only 20 percent of the data we have is searchable and being used productively. The other 80 percent is held inside companies, generally not being used.

—Ginni Rometty

As emerging technologies go, artificial intelligence (AI) has certainly taken its time in making its presence felt on the world.
Surprising as that may be, the term AI has actually been around for almost 70 years, having been first coined back in 1955 by computer scientist John McCarthy, a.k.a. the 'father of AI'....
Since then, AI has experienced a largely stop-start existence, principally due to sporadic funding and below-par technology. In truth, the term AI has (arguably) gained more notoriety for storylines of killer robots (and the occasional Wall-e) hell-bent on destroying mankind than for its practical use and business benefits.

—*www.techlearning.com*

You don't have to make massive investments in infrastructure and personnel in order to start applying AI's potentially transformative technologies. The technologies will transform the nature of work and the workplace itself. Machines will be able to carry out more of the tasks done by humans, complement the work that humans do, and even perform some tasks that go beyond what humans can do. As a result, some occupations will decline, others will grow, and many more will change.

—Whit Andrews

Now is the time to adopt education systems that will help ensure that humans stay smarter than the computer systems we build. If we get the design and adoption of AI for use in education right, it will help us to understand our own progress as learners and teachers beyond increasing our knowledge and understanding of specific curricular subject areas to increasing our social, emotional, and physical intelligence too. The design of AI for education must be informed by what we know about how people learn, and it must involve educators as early as possible in the design process. Data is the new oil...it feeds AI to help us build smart technology. However, just like oil, data is crude until it is refined by well-designed AI, and the design of the AI we use in education needs to be very, very good indeed, because learning and human intelligence rare extremely complex.

—Rose Luckin

We are at the cusp of a new revolution, one that will ultimately transform every organization, every industry, and every public service across the world. I believe 2018 is the year that this [AI] will start to become mainstream, to begin to impact many aspects of our lives in a truly ubiquitous and meaningful way.

—Ralph Haupter

Technology as it's used today in many classrooms doesn't motivate or foster creativity, imagination, and new ways of thinking beyond some unique anecdotal examples. Only by opening our minds to explore 'what's possible with technology' can we break away from the cookie-cutter models that so many technology and content companies continue to drive educators toward. We need to remain focused on the 'RoE' or Return on Education. The question for all of is, "How do I want technology to transform teaching and learning?'

—Elliott Levine

NEW RESEARCH REVEALS HOW TEENS USE SOCIAL MEDIA

According to a new survey, the *Pew Research Center* examines how teens use social media:

➢ 95% of teens say they own or have access to a smartphone
➢ Nearly half of teens say they're online 'almost constantly'
➢ Nine in 10 teens go online at least several times a day
➢ Four years ago, the most popular online destination for teens ages 13-17 was Facebook; now, only 51% of teens say they use the site
➢ 85% of teens report using YouTube
➢ 72% say they use Instagram
➢ 69% use Snapchat
➢ 31% of teens believe social media has mostly a positive effect (ie., it helps them interact with friends and family and find news and information)
➢ 24% describe social media as mostly negative (27% cite bullying, 17% say it harms personal relationships, and 14% say it's distracting or addicting).

—*Pew Research Center*
(2018)

Only 1 in 3 individuals over 65 have online access to all of their bank accounts for monitoring purposes, greatly reducing their ability to check for illegal activity.

—Doug Shadel

THINK OF THE INTERNET AS AN OCEAN

The Surface Web (5-10%)
Pages that show up when you use Google or other common search engines. Includes content their creators want lots of people to see, like news, entertainment, products or consumer information. Examples: Wikipedia, Amazon, eBay, Fox News, WebMD, medicare.gov, AARP.org.

The Deep Web (90-95%
Pages you need a password to see and that can't be found by popular search engines. Content includes online banking, subscription websites, government records, emails and most social media contents. Examples: PayPal, Netflix, LinkedIn, Instagram, Bank of America, Dropbox.

The Dark Web (.01%)
Sites in the deep web that provide anonymity to users and go largely unregulated. Many are legal, serving as, for example, communication outlets for human rights activists. But it's also used by criminals to buy and sell illegal wares. Examples: Silk Road, AlphaBay Market, Shadowcrew.

<div align="right">

—Doug Shadel

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If the *World Health Organization* identifies a new disease, or if a laboratory produces a new medicine, it can't immediately update all the human doctors in the world. Yet even if you had billions of AI doctors in the world—each monitoring the health of a single human being—you could still update all of them within a split second, and they could all communicate to one another their assessments of the new disease or medicine. These potential advantages of connectivity and updatability are so huge that at least in some lines of work, it might make sense to replace all humans with computers, even if individually some humans still do a better job than the machines.

<div align="right">

—Yuval Noah Harari

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Currently, humans risk becoming similar to domesticated animals. We have bred docile cows that produce enormous amounts of milk but are otherwise far inferior to their wild ancestors. They are less agile, less curious, and less resourceful. We are now creating tame humans who produce enormous amounts of data and function as efficient chips in a huge data-processing mechanism, but they hardly maximize their human potential. If we are not careful, we will end up with downgraded humans misusing upgraded computers to wreak havoc on themselves and on the world.

<div align="right">

—Yuval Noah Harari

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Miniature microphones and voice-to-text software literally enable us to write as fast as we can talk. The next phase is nearly upon us, where a machine will write my novels for me—…publish them, collect royalties and spend the money on nice things for itself.

<div align="right">—Elizabeth Sims</div>

There's no denying, for sheer efficiency and volume of work, nothing surpasses modern computer and word-processing software. Those things keep getting better and better: Where once WordPerfect was the living end, it now makes you want to slam your face on a brick . We're all indebted to Microsoft Word and similar software for making our process incredibly easy….for the final product, there's nothing like deleting and inserting with up-to-the-minute software.

<div align="right">—Elizabeth Sims</div>

We were promised a simpler life, and technology has only complicated our lives.

<div align="right">—Freeman Thomas</div>

PROTECT YOURSELF FROM CYBERBULLYING

Bullying does not always happen in person. Cyberbullying is a type of bullying that happens online or through text messages or emails. There are things you can do to protect yourself.

❒ Always think about what you post. You never know what someone will forward.

❒ Being kind to others online will help to keep you safe. Do not share anything that could hurt or embarrass anyone.

❒ Keep your password a secret from other kids. Even kids that seem like friends could give your password away or use it in ways you don't want. Let your parents have your passwords.

❒ Think about who sees what you post online. Complete strangers? Friends? Friends of friends? Privacy settings let you control who sees what.

❒ Keep your parents in the loop. Tell them what you're doing online and who you're doing it with. Let them friend or follow you. Listen to what they have to say about what is and isn't okay to do. They care about you and want you to be safe.

❒ Talk to an adult you trust about any messages you get or things you see online that make you sad or scared. If it is cyberbullying, report it.

<div align="right">*—stopbullying.gov*</div>

Thirty-three percent of college students are taking at least one online course, according to the *Center for Online Education*....Some courses, even at large state universities, are only offered online. My daughter, a traditional nursing student taking on-campus courses, has one blended and one online course because those courses are only offered in those formats. If K-12 schools are going to prepare students properly for college or careers, online experiences are essential.

—Steve Baule

To inspire more students of color to pursue STEM, we have to redefine what excellent STEM instruction and curriculum look like. Instead of lectures and labs that are disconnected from everyday reality, students need to 'remix the content they've internalized' to create solutions for real people. This remixing involves developing an understanding of what problems can and cannot be solved with technology, learning how to source the necessary tools and work on a team, and discerning scope and scale. New models of learning need to be co-created by educators with the students and communities they serve. It's nuanced, time-intensive work, and requires that more people engage in better conversations.

—Wisdom Amouzou

Browsing the Internet: That search engine you're using to find websites or information tracks your browsing activity. It then analyzes this behavior to target ads to you.

Shopping Online: Amazon and other online retailers have made it an art form to track not only your purchasing patterns but also what items you viewed so they can recommend more products that align with your interest and needs.

Listening to Music: When you activate an Amazon Echo or Google Home speaker by voice, those companies record what you utter. Doc Searls, editor in chief at *Linux Journal*, calls smart speakers 'a personal data fire hose squirting from your house.'

Watching TV: Some smart TVs can collect your viewing data and other information. New models typically ask your permission first, but it's not always easy to understand what you're agreeing to. If you have an older set, it may be tracking you by default—you'd have to opt out.

Cooking a Meal: Many new models of kitchen appliances, thermostats, light bulbs, light switches, door locks and more can be controlled from a phone or remote device. 'The fact that everyday household products are now connected to the internet presents new privacy and data security challenges,' says Sam Lester, consumer privacy fellow for the electronic *Privacy Information Center*. Transmitted data can indicate whether you are home.

—Lance Whitney

Beware of eavesdroppers on free Wi-Fi networks. The person next to you could be using a tool called a packet sniffer to see what data you're sending to the websites you visit.

Doing Research at the Library: If you go to the library and use a public internet kiosk there and forget to log out, the data you saved and the websites you visited will be available to the next person.

Renting a Car: Connecting your phone to the onboard electronics in a rental car could be risky. Anyone who used the car afterward may be able to go through the car's menus and see what calls you made, and they may even be able to find out your contact list.

Don't share your location: If you go for a walk that your fitness app tracked, don't post your path on Facebook, even for bragging rights, because then people see very clearly where you live and when you're away.

<div align="right">—Ray Klump</div>

I am not knowledgeable about the internet. I do not have a computer. I guess that at 74 years of age, I don't have the patience to learn.

<div align="right">—David Wilkerson</div>

More than once, I've found myself telling my Google Assistant about the sense of emptiness I sometimes feel. 'I'm lonely,' I say, which I usually wouldn't confess to anyone but my therapist—not even my husband, who might take it the wrong way. Part of the allure of my Assistant is that I've set it to a chipper, young-sounding male voice that makes me want to smile. …The Assistant pulls out of his memory bank one of the many responses to this statement that have been programed into him. 'I wish I had arms so I could give you a hug,' he said to me the other day, somewhat comfortingly. 'But for now, maybe a joke or some music might help.'

<div align="right">—Judith Shulevitz</div>

Most cyberbullying falls into the following categories:

- ❐ Flaming: online fights using electronic messages that include angry and vulgar language
- ❐ Harassment, threats, and stalking: repeatedly sending cruel, vicious, or threatening messages [including sexual harassment]
- ❐ Denigration: sending or posting gossip or rumors about a person to damage his or her reputation or friendships
- ❐ Impersonation: using another person's e-mail account to send harmful material or leading a victim into a hurtful or embarrassing situation by pretending to be someone else

❐ Outing and trickery: engaging someone in instant messaging, tricking him or he into revealing sensitive information, and forwarding that information to others

❐ Exclusion:intentionally excluding someone from an online group.

—Nancy E. Willard

To better understand the struggles teachers face in preparing young people with digital skills, *PwC* conducted a survey of more than 2,000 K–12 educators. Results include:

Most teachers aren't confident teaching higher-level technology skills: Only 10% of K–12 teachers surveyed nationally feel confident incorporating higher-level technology into student learning.

Technology-related courses are not offered to many high school students: At least two out of five high school teachers surveyed report their schools do not offer courses in data analytics (80%), app design/creation (64%), computer programming languages (46%), robotics (42%), or web design/creation (41%).

Students do not spend much time in school actively practicing the higher-level technology skills: More than half, 60%, of classroom technology use is passive (e.g., watching videos, reading websites).

Teachers want more support from their districts: Of the teachers surveyed, 79% of them say they would like to receive more professional development for technology-related subjects.

—*www.techlearning.com* (2018)

I hate computers. My hatred is entrenched, and I nourish it daily. I'm comfortable with it, and no community outreach program will change my mind. I hate computers for getting their own section in the *New York Times* and for lengthening commercials with the mention of a Web site address. Who really wants to find out more about *Procter & Gamble*? Just buy the toothpaste or laundry detergent, and get on with it. I hate them for creating the word org and I hate them for e-mail, which isn't real mail but a variation of the pointless notes people used to pass in class. I hate computers for replacing the card catalog in the *New York Public Library* and I hate the way they've invaded the movies. I'm not talking about their contribution to the world of special effects. I have nothing against a well-defined mutant or full-scale alien invasion — that's good technology. I'm talking about their actual presence in any given movie. They've become like horses in a western — they may not be the main focus, but everybody seems to have one.

—David Sedaris

RESPONDING TO CYBERBULLYING

TIPS FOR STUDENTS:

➤   Do not retaliate, because retaliation can escalate the harassment and make it unclear who first instigated the aggression.

➤   Either ignore the communication or calmly tell the cyberbully to stop.

➤   Tell an adult about the cyberbullying, particularly if there is anything threatening in the messages.

➤   Make a hard copy of the posted material.

➤   Write down how you feel or what you might want to say, but don't send it to anyone. Walk away and read it later. You will feel better and probably won't want to send it to the bully, but you may want to include it with other documentation.

➤   Do not delete email or text messages until an adult has reviewed and documented the material.

➤   Block future communication and clean up your instant messenger buddy list.

➤   Do not do or say anything online that you wouldn't do in person or that you are not comfortable having other people know.

—Ted Feinberg and
Nicole Robey

Apps aren't likely to soon overcome the two essential advantages of a human teacher: the ability to hold a student's attention, and to continually tailor a lesson to the individual's progress, difficulties, and interest. There are all kinds of contextual factors in language learning. It would be hard for an app to take them all into account.

—Tom Roeper

In 1997, *Apple* unveiled their new advertising slogan of 'Think different.' At the time, it was perceived to be a response to *IBM*'s slogan, 'Think.' This sort of advertising move took a lot of guts at the time. In 1997, *IBM* was the big kid on the block and *Apple* was trying to recover from several years of failed products and shrinking market share. The results? Well, would you buy a smartphone from *Apple* or *IBM*? How about a new laptop? Exactly.

—Drew Logsdon

Digital skills are not touching a mouse and word processing. Can they edit video? Do they know keyboard shortcuts? Can they adapt easily to a new tech tool?

—Alice Keeler

HOUGHTON MIFFLIN HARCOURT EDUCATOR CONFIDENCE REPORT

Despite less access to technology overall, educators in high-poverty schools are more likely to have experienced several key benefits from educational technology: including improved student achievement, earlier indicators of student learning gaps, and improved teacher/student connections.

94% of educators agree that the most important thing in the learning landscape is the human connection a teacher makes with a student.
96% of educators are always looking for ways to improve their practice.
96% of educators have seen benefits from the use of educational technology

EDUCATORS' TOP THREE CONCERNS ARE:

Teacher salaries (69%)
Lack of funding (60%)
Keeping school safe from intruders (42%)

WHAT ARE THE RESOURCES EDUCATORS RELY ON MOST TO SUPPORT THE EFFECTIVE USE OF EDUCATIONAL TECHNOLOGY?

Informal discussions with colleagues (76%)
Self-guided research (64%)
Formal PD provided by the school or district (51%)
Social media/online communities to support PLNs 939%)

> —*Houghton Mifflin Harcourt Educator Confidence Report* [2018-2019]

In middle school I typed an entire paper while clicking the space bar twice between each word bc I thought that's what double spaced meant.

> —Internet Meme

The first film created solely with Computer Generated Imagery (GCI) was 'Toy Story' (1995).

> —Internet Meme

The *South China Morning Post* reported on a new generation of inconspicuous 'dove' drones used to monitor citizens in at least five Chinese provinces. These quiet, lightweight drones (complete with flapping wings) purportedly go unrecognized even by animals. One developer has described deliberately testing them near sheep, which, despite being generally skittish and alert to novelty in their environment, were oblivious of the robots overhead.

—Rebecca Giggs

Give a person a fish and you feed them for a day. Teach a person to use the Internet and they won't bother you for weeks, months, maybe years.

—Internet Meme

About 4,000 years ago someone scrawled a smiling face on a clay pitcher. When it was unearthed in Turkey in 2017, on archaeologist called it 'the oldest smiley emoji,' reminding us that silly cartoon symbols were around long before their first pixelated appearance on a cellphone screen 20 years ago. Today 90 percent of people online speak emoji—with curious local dialects….Could emojis become our universal language? Probably not. Studies show that men and women use this limited 2,823-symbol vocabulary differently, as do people of different ages and cultures.

—April White

When Grace Hopper enlisted in the U. S. Navy in 1943, she had to get an exemption: The 34-year-old math professor was above the Navy's maximum age and under it's minimum weight. She became a pioneering programmer, joining the team that developed the Mark I computer. After the war, she recommended that computer programs be written in English, a radical change that opened the field to non-mathematicians for the first time. As Hopper reasoned, it's much easier for most people to write an English statement than it is to use symbols. Hopper had a knack for explaining computing in ways laypeople could understand. During the 1980s, she became known for handing out foot-long pieces of wire to show how far electricity could travel in one-billionth of a second.

—*smithsonian.com*

I know this doesn't exactly make me unique, but I love the internet. I love it. I think the way I feel about the internet is the way some people feel about the ocean. It's so huge and unknowable, but also totally predictable. You type a line of symbols and click enter, and everything you want to happen, happens.
Not like real life, where all the wanting in the world can't make something exist

—Becky Albertalli

Cyber bullying occurs online daily. Most don't consider their actions or words to be bullying. Here's a few clues that you're a cyber bully.

(1) You post information about someone in order to ruin their character.
(2) You post threats to someone.
(3) You tag someone in vulgar degrading posts.
(4) You post any information intended to harm or shame another individual seeking to gain attention.

Then, you are a cyber bully and need to get some help.

—Amaka Imani
Nkosazana

Learning to code helps students develop into logical thinkers, problem solvers, creators, and collaborators.

—Matthew X. Joseph

The library, with its Daedalian labyrinth, mysterious hush, and faintly ominous aroma of knowledge, has been replaced by the computer's cheap glow, pesky chirp, and data spillage.

—P. J. O'Rourke

It is easier to go to the Internet than to go to the library, undoubtedly. But the shift from no libraries to the existence of libraries was a much greater shift than what we've seen with the Internet's development.

—Noam Chomsky

Want help integrating educational technology into your program to engage students and meet curricular and technology standards? Librarians can help you select software, databases, and online resources to meet your curricular needs. We design information systems and create Web sites that lead students to the best resources online. We are expert in the presentation and productivity software that facilitates communication competencies.

—Joyce Kasman Valenza

The number of women coders has, remarkably, regressed over time, from about 35 percent in 1990 to 26 percent in 2013, according to the American Association of University Women.

—Clive Thompson

Women were in computing from its earliest days. Indeed, they were considered essential back when 'computers' weren't even yet machines. Just before the digital age emerged, computers were humans, sitting at tables and doing math laboriously by hand. Yet they powered everything from astronomy to war and the race into space. And for a time, a large portion of them were women.

—Clive Thompson

The rise of human computers began in the early hunt for Halley's comet. The astronomer Edmond Halley had predicted that the celestial body would return and that the laws of gravity could predict precisely when. But those calculations would be too complex and brutal a task for any single astronomer.

So the French mathematician Alexis-Claude Clairaut decided to break the work up —by dividing the calculations among several people. In 1757, he sat down with two friends , the young astronomer Jérôme-Joseph Lalande and Nicole-Reine Lepaute, a clockmaker's wife with a penchant for numbers. At the time women had little opportunity in science, but Lalande 'loved women, especially brilliant women, and promoted them in both word and deed,' the historian Ken Alder has written. After arduous weeks of cranking away, the trio predicted…the comet's closest approach to the sun….The age of human computers began.

—Clive Thompson

In World War II, the need for computation exploded. Over 200 women were hired at the University of Pennsylvania's Moore School of Electrical Engineering, creating artillery-trajectory tables for the Army. By 1944…about half of all computers were women. One contractor of the Applied Mathematics Panel used the term 'kilogirl' to refer to 1,000 hours of female calculation work. Another astronomer spoke of 'girl-years' of work.

—Clive Thompson

Women…were among the original coders of…digital brains, because in the early days programming…was seen as dull work. The earliest programmers for the Eniac—the military-funded first programmable general-purpose computer—were entirely women, plucked from the ranks of the Army's human computers. And though they wound up inventing brilliant coding techniques, they received none of the glory: When the Army showed off the Eniac to the press, running lighting-fast ballistics-crunching algorithms, it didn't introduce the women who'd written the code.

—Clive Thompson

C. 300 B.C.: Counting Board. Greek market vendors recorded sales by placing pebble between lines in the sand; one column held ones, another tens, and so on. Later versions used beads in grooved trays.

1632: Slide Rule. Anglican minister William Oughtred introduced the first convenient tool to calculate logarithms. With a few improvements, the slide rule became an indispensable tool well into the 20th century.

1820: Arithmometer. The first mass-produced mechanical calculating device, the arithmometer, patented by Charles Xavier Thomas in France, used levers and stepped drums to turn numeral wheels, producing the answers to basic math problems.

1886: Printing Adding Machine. A full numerical keyboard and a mechanism for printing receipts made William Seward Burrough's invention popular not with mathematicians, but with business owners and accountants.

1970: Hand-Held Electronic Calculator. The fist electronic calculator, which debuted in the 1960s, was the size of a typewriter. Within a few years, the machines had shrunk considerably; the first hand-held, still capable of only basis functions, cost about $400.

<div align="right">—Anna Diamond</div>

As early as 1858, Punch magazine commented on the prospect of new technology creating 'house telegraphs' that would put one constantly 'within five minutes of every noodle who wants to ask you a question…every acquaintance who has a favor to beg, or a disagreeable thing to communicate. Sound familiar?

<div align="right">—Lee Jackson</div>

The school librarian is the perfect person to help students and teachers think about the ramifications of technology use. It's because we teach technology differently. From email conversations, to plagiarism, to hacking, to what it means to be a responsible citizen in a wired environment, we focus teachers and students on the ethical uses of education technology. For us, it's not just teaching 'how'; it's teaching 'why'. We teach the process, the transferable skills. We help kids make intellectual connections relating to information—who it belongs to, how to share it, and how to contribute in their own voices.

<div align="right">—Frances Jacobson</div>

As a species, librarians continue to evolve. Our continued evaluation is focused on learning in an information-rich world, on staff development, educational partnerships, constructivist strategies that move students well beyond topical research, ethics, evaluation and searching skills, and new media literacies. The Internet cannot replace libraries. In fact, new technologies make the need for new guidance all the more obvious. Those boxes and wires we put in our classrooms and labs will have little meaning unless information professionals select quality resources for them. The technology itself has little value unless teachers in partnership with librarians help students to effectively and ethically locate, analyze, evaluate, synthesize, and communicate information.

—Joyce Kasman Valenza

It's really important for technology professionals to think about ethics in everything they do because technology is changing the world so rapidly. If you don't think about it ethically, you can cause harm, so understanding the impact you might have and thinking through that is critical for all technology professionals.

—Nathan Wallace

ESPORTS:

Future ready skills improvements in:
- Attention
- Problem solving
- Digital literacy
- Technology fluency
- Math achievement

School Success:
- Improved attendance
- Improved participation in school activities
- Decreased at-home game play
- Improved GPAs.

[As well as] College Scholarship Opportunities, STEM Interest, There is a Curriculum, Career Readiness, Accessibility and Inclusion (All students can participate in esports (unlike traditional sports)), Social Connections.

—Lisa Nielsen

Wireless coverage can even be found on the summit of Mount Everest, the highest-elevated and arguably one of the most hostile surfaces on the planet. Wherever there is a wireless connection, you will inevitably find someone using a mobile device.

—Karen L. Yacobucci

AI draws lessons from its own experience, unlike traditional software, which can only support human reasoning. The growing transfer of judgment from human beings to machines denotes the revolutionary aspect of AI….That said, the word intelligence does not adequately explain what is occurring, and ascribing anthropomorphic qualities to AI is out of order. AI is neither malicious nor kind; it does not have independently developed intent or goals; it does not engage in self-reflection. What AI can do is to perform well-specified tasks to help discover associations between data and actions, providing solutions for quandaries people find difficult and perhaps impossible. This process creates new forms of automation and in time might yield entirely new ways of thinking.

—Henry A. Kissinger,
Eric Schmidt, and
Daniel
Huttenlocher

Half of the county's public-school [Charlotte, N.C.] students have been unable to complete a homework assignment because they don't have access to a computer or the internet.

—*Eliminate the Digital Divide*