

The Journey Inside

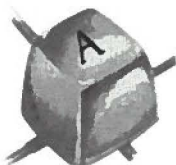
A joint publication of Intel Corporation and the International Society for Technology in Education (ISTE).

Inside This Issue

- 2 Questions & Answers
- 3 We Need Your Help
- 4 Is This Your Future?
- 5 How to Adopt a Used Computer
- 5 Students in Action
- 6 Has Your Computer Got a Cold?
- 7 Teacher's Corner Update
- 8 Additional Travel Guides From ISTE



How a Keyboard Works



Observing adult learners taking their first computer course is fascinating. In their role as a student they display an unease that is not present in other things they do. Beginners usually exhibit some hesitation in just entering the room. This unease is magnified in their reluctance to sit in front of a computer, especially if the monitor display is already active. However, once they actually get seated and are organized in front of the computer, you see an immediate change.

When adult students look down they begin to relax. They have spotted the keyboard. You can see the relief on their faces. Suddenly they feel that maybe a computer isn't all that strange. Here is something they already know. All the keys are organized to match a typewriter. Many adults took typing in high school. And, if they didn't, they at least recognize the keyboard. Yes, a few keys look strange, but all the familiar letters and numbers in the Qwerty arrangement are there as well.

Keyboards Versus Typewriters

However, once any student ventures past the obvious similarity of the Qwerty—the first six letters on the top left letter row—the differences between the computer keyboard and the typewriter quickly outweigh the similarities. In addition, these differences will force changes in the way the keyboard is used. The rules of word processing are vastly different than the typing rules that remain ingrained in their minds.

The differences arise from the very nature of the computer keyboard. A com-

puter keyboard, after the initial engaging of a key, is an entirely electronic device. This means that the Qwerty organization scheme, established to actually slow the typist so the metal bars carrying the letters wouldn't jam, isn't really necessary. But, even though other schemes have been tried, the Qwerty approach prevails.

The computer keyboard is an efficient input device allowing users to communicate with their computer. The keyboard accepts the familiar alphanumerical symbols the user understands and provides a means of translating the input into binary code the computer understands. And, this occurs at a speed that is beyond belief.

Striking a Key

What exactly occurs when your finger strikes a key on the keyboard? Suppose you strike the key displaying an A. First of all, if that is the only key used, the actual input is a lowercase letter *a* rather than what is shown on the plastic key. To input a capital letter A, the user would have to use the Shift key at the same time (or have the Caps Lock key engaged).

Let's trace the action for the small letter *a* first. Every action that occurs after the initial key stroke is electronic in nature. Underneath the visible keys of the keyboard can be found a grid of wires—placed horizontally and vertically under the keys themselves. Each key is poised above an intersection of two wires forming this grid. A special computer chip installed in the keyboard constantly scans the grid row by row, thousands of times a second. Rows are scanned rather than columns since there are only a few rows and changes in the state of the electricity's movements can be quickly detected.

Once the scan reveals a change in the state of a circuit in the row, the chip

ISTE Board of Directors

1996-97



Officers

David Brittain, *President*
MGT of America (FL)

David Moursund, *Executive Officer*

Executive Board Members

Lynne Schrum, *President Elect*
University of Georgia-Athens (GA)

Terrie Gray, *Secretary*
Chico Unified School District (CA)

Terry Killion, *Treasurer*
Jefferson County RI School District (CO)

Cheryl Lemke
Illinois State Board of Education (IL)

Gwen Solomon
The Well Connected Educator Online Journal (CA)

Board Members

Kathryn Edwards Price
Apple Computer, Inc. (CA)

Paul O'Driscoll
Salem-Keizer Public Schools (OR)

Chip Kimbal
Lake Washington School District (WA)

Carla Schutte
Moton Elementary School (FL)

Neal Strudler
University of Nevada, Las Vegas (NV)

Harriet Taylor
Louisiana State University (LA)

Michael Turzanski
Cisco Systems (MA)

Peter Wholihan
Saints Peter & Paul Catholic School
(Virgin Islands)

The Journey Inside (ISSN 1080-0093) is a quarterly newsletter published by Intel Corporation in conjunction with the International Society for Technology in Education (ISTE). ©1997 Intel Corporation. ISTE is a nonprofit membership organization for technology-using educators. ISTE publishes *Learning and Leading With Technology* (formerly *The Computing Teacher*), *Journal of Research on Computing in Education*, and *ISTE Update*, as well as eight special interest periodicals and educator-developed books and courseware. For more membership information, call the Order desk at 800-336-5191 (US & Canada) or 541-302-3777 (International), or fax 541-302-3778.

*All other brands and names are the property of their respective owners.

Questions & Answers



Q I know that digital information is stored on a CD-ROM and on my hard drive. Is there any difference in the way the information is stored and read on these two devices?

A These devices store information in digital form—as binary information—in very different ways.

A CD-ROM uses a laser to produce an extremely intense and focused light to write and read the information. To record information, the laser light creates pits and lands—indentations and flat spots—in a single spiral band on the reflective layer of the CD-ROM. When reading, light is reflected from the surface of the platter. The amount of light reflected to the detector from a land is much greater than the amount of light reflected from a pit. A CD-ROM translates light intensity into a pattern of 0s and 1s.

The hard drive is a magnetic storage device. A random pattern of iron particles within a magnetic film coating is placed on the surface of the platter. To record data, current in the read/write head lets the head act as an electromagnet. For each 0 or 1, two bands of particles are used. The first band is magnetized in the same direction regardless of which digit is being recorded. To record a 1, the second band in the bit is magnetized with the poles reversed. If the current does not reverse, the second band matches the first and a 0 is represented.

During the reading process, no electricity flows to the read/write head. Instead, the tiny iron particles produce a current as the read/write head moves over the platter. The direction of the current depends on the direction the particles were magnetized. When the iron particles have a change of alignment, the current changes direction and a 1 is read. If no change is detected, a 0 is read.

Q I thought my new 2.1 Gig drive was the answer to my file storage problems. The drive easily mounted to my Power Macintosh* and I started moving my files from the internal drive. Is something wrong? Why does a file on my 500 MB internal drive get bigger when I move it to the new drive?

A Storage on a computer is usually referred to as a volume. A volume might be a hard drive, a partition of a hard drive, a Zip* drive disk, an optical disk, or a floppy disk. Your computer begins to interact with the volume by setting up a way to store and locate files so they can be easily located.

The Macintosh Hierarchical File System (HFS) is efficient but does have some limitations. Each numbered section it creates can be at most 512 bytes. So, any given file may occupy one or more of the blocks. In addition, the HFS system can only create 65,536 such blocks. The larger the volume, the larger any such block will be. For a volume size of 1.4 MB (a high-density floppy) the minimum file size is .5 KB. For a 730 MB volume, the minimum file size is 11.5 KB. And, on a 2,200 MB volume, the minimum file size is 34.5 KB.

Because of this method, your computer works with the volume to determine the size of the allocation blocks. The larger the volume, the larger any such block will be. So, even though your file still contains the same amount of data it did on your small internal drive, there is more space reserved for holding the data. Partition your drive so that your computer sees several small volumes rather than one 2.1 Gig volume. You can make four volumes of about 500 MB. Just select partition sizes that will work conveniently for you and your growing files can be kept in line.

We Need Your Help

The staff responsible for creating this newsletter wants to make sure that it continues to provide useful information and meets your needs. If you have a need for specific technology or education topics, please tell us.

If you would like to contribute an article to our newsletter, please let us know. Articles written by guest writers, especially those sharing classroom suggestions, are always well received by readers. If you feel unsure about your writing skills, relax. Putting any writing into publishable form is a team effort.

To submit a suggestion or to tell us about an article you would like to write, please post a note in the Faculty Room newsgroup (http://cs.intel.com/Intel/corporate_information/faculty_room/threads.htm) or drop a line to:

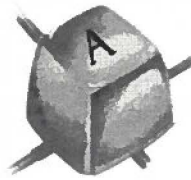
Dr. Irene E. Smith
ISTE
480 Charnelton Street
Eugene, OR 97401
smithire@oregon.uoregon.edu

Reminder

We want to make sure that you continue to receive our quarterly newsletter. Therefore, we would like to take this opportunity to remind you to please respond to our reply card. Please provide your current address and let us know if you prefer to receive *The Journey Inside* newsletter in paper format or would be willing to view the newsletter online via the Teacher's Corner Web site. This will help us to ensure that you continue to get the information you need.

Note: If the reply card is not returned, your name will be removed from the mailing list for the paper format of the newsletter. ✪

Thanks.



Continued from page 1

switches to a scan of the columns. Since the position of each key is unique, the chip is able to identify, record, and transmit the location of the depressed key. This information is referred to as a key code or scan code.

The photo shows the keyboard lifted from its plastic case. The long black rectangle to the left of the cable is the keyboard microprocessor. Other circuit components such as capacitors, resistors, diodes, LEDs, and connecting wires can be seen. If you turn the keyboard over, the lines from the circuits being used in the input steps are visible.



The inside of a keyboard.

The BIOS (Basic Input Output System) chips inside the computer receive the key (scan) code transmitted by the keyboard chip. After sending a message back to the keyboard to let the keyboard chip know that the location can be deleted, the BIOS chip uses a look-up table or scan code table. This look-up table provides the needed information for your input letter *a* to be received by the microprocessor in a form that it can use. Each key location is matched to a particular alphanumeric symbol that has been given a binary code equivalent. For those of you familiar with the ASCII character set, the standardization of the contents in the look-up table means the key strokes on every computer using ASCII will have the identical binary representation.

The look-up table translates the key code or scan code into the 0s and 1s that make up the binary code used by the computer. In this particular example, the key code is assigned a unique combination of 0s and 1s representing

the small letter *a*. For each key stroke, or key stroke combination, the combination of 0s and 1s is unique. The computer now contains your input in binary form. The BIOS chip is ready to share the information with the application or operating system you are using as you work.

But wait. You can actually see the result of your keystroke displayed on the monitor, right? And, you aren't looking at a series of 0s and 1s. The microprocessor has sent the binary information along to a character-generating chip that is able to activate the monitor by indicating which pixels should be used to produce the small letter *a*. To speed things up, this chip uses a table that pairs the binary information it receives with a predefined character shape so the correct combination of pixels is called by a very short code. And how long did it take? No time at all it seems.

An Incredible Tool

This very simplified explanation of a generic keyboard's steps may help you to appreciate that your computer keyboard is an incredible tool. Oh yes, the capital *A*? The addition of the special Shift key added to the location key code provides the BIOS chip with a different combination of 0s and 1s. So, unless you goofed, the microprocessor receives the correct binary code and the monitor displays the character you intended.

And, aren't you just a bit curious? Can you walk away without knowing just what combination of 0s and 1s is used for *a* and which combination represents the capital *A*? If you can, farewell. If you can't, here it is. Small letter *a* becomes 0110 0001 while *A* becomes 0100 0001 in binary code.

Thanks to Jeanne Gillo for suggesting this particular article. ✪

—Dr. Irene E. Smith
ISTE

Is This Your Future?

No, don't panic. The date below is not an error. The samples below are examples to help you and your students get started with a fun and useful expansion to the activities in Unit 6 of *The Journey Inside: The Computer*. Looking forward and speculating on "what if" is something that can be enjoyed regardless of age or background. Having students think about the technology they already use and consider changes they might face in the near future is worthwhile.

An instructor at the University of Oregon introduces technology to a large group of students each quarter. One of the assignments she gives is to write a paper that addresses the issue of technology in the future. Students must base their work on what they have been studying and supply references.

Rise and Shine 2025 Style

A gentle sound gradually makes its way into Chris's mind. Chris? Chris?

Chris turns over to face the wall. Chris? Chris?

The voice is coming from the small computer pad sitting on the chair beside the bed. Chris had instructed his agent to make sure that at 8:00 am, he was given a gentle wake-up call. Two days earlier, the agent had made the choice of waking Chris up with the old fashioned alarm clock that had been mentioned in science class. Chris was still upset by the rude awakening he had received when the alarm started sounding and wouldn't quit until he touched the right button on the top of the holographic image of the clock. Chris didn't mind the odd joke his agent played on him but that one was pushing the limit. Chris didn't like to wake up anyway and feeling like he was under attack by the enemy hadn't been a good start to his day.

Chris responded to his agent with a croaky "Yes" and then sighing tried to burrow deeper into the covers. The

room gradually became lighter and a gentle breeze began. Music that began as a soft prelude gradually increased in tempo and volume. The bed itself was getting cooler as the temperature of the electronic mattress and blankets adjusted to the agent's instruction to prepare for daytime. Chris groaned. This wake-up was done just right but it was still an effort. He hated to get up in the morning.

Tabs and More Tabs

I looked down at the small device on my jacket. Right. The message said to check in with Dad. I had just walked into my room when the buzzer of my lapel computer had caught my attention. The connection to Dad was set up on the red tablet. Now, where was it?

I moved the shirt off the chair.

There was the direct connection to *Roadster Magazine* I subscribed to and yes, a new article was in. But, later. Another tablet sat on the floor beside the desk. I had been talking with my teammate in Japan last night and left the tablet open so she could forward her work. We were just about finished with a joint project that would complete the requirements for our online research course. It had been fun. And, even though I could now say "Good Morning" in Japanese I was sure glad the tablet could translate everything else. We never took any notice that we couldn't speak the other person's language. The translators in the tablet were great and I never noticed any delay.

I looked on the shelves over my desk. A tablet with the notes from the music class, a tablet connected to my mother on vacation in Mexico, and a tablet showing that my sister was still in Hawaii. But Dad? But, there was the buzzer again. "Dad? Where are you?" I muttered. As I contemplated the mess of my room and the problem facing me, an irritated voice behind me said "You will find the tablet you need under the bed." Turning, I noticed my desktop computer monitor was flashing. "If you had asked earlier you

could have saved a lot of time. Now move. Your Dad is late for a meeting."

I dropped to my knees. Sure enough. The missing tablet at last. As I responded, my Dad's image came into view and he started to laugh. "Couldn't locate me again?" he said.

The Assignment

The final paper asks each student to write a "scenario" that describes a "day in the life" of a high school or college student in the next generation. The student to be described will live 20 to 25 years from now. The paper is to include the student's personal life, their academic and/or learning environment and experiences, and their social life. It is to be written like a story or diary, not like a formal paper.

Suggestions

The ideas behind this assignment are applicable regardless of grade or knowledge level. And, younger students often exceed older students in terms of creativity and imagination. Be very clear about the expectations of the assignment and what grading criteria will be used. Encourage students to use visual information to support their text. If you have students doing hypermedia projects, have them include sound and animation to help illustrate their ideas.

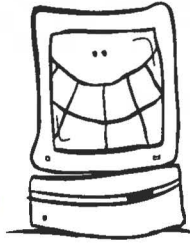
If you do not have enough computers for students to do this as an electronic document, then the old fashioned tools work just fine. Students can easily add pictures by making use of old catalogs or magazines.

If you and your students take the time to enjoy this activity, please share with others. Submit one or two of the projects that your class considers the very best. If possible, *The Journey Inside* newsletter will try to include a sample in upcoming issues.

Thanks to Dr. Sharon Yoder, Senior Instructor at the University of Oregon, for sharing a great idea with *The Journey Inside*. ☺

—Dr. Irene E. Smith
ISTE

How to Adopt a Used Computer



Older Intel386™, Intel486™ and Macintosh* computers don't have the horsepower to run today's demanding multimedia educational software, but they still have a role to play in the classroom. If you're looking for computers to teach keyboarding and basic skills such as file management, or to have text-oriented Internet access, then a used computer might just do the trick. An older model computer may also be put to work collecting and processing print jobs from multiple computers hooked up to it.

Your school can adopt a used computer free, or for modest processing charges, from a wide range of groups working to redistribute used computer equipment. To start your search try one of these organizations:

- Computer Re-Use Network (803-889-8247). Schools wishing to receive computers from this organization must demonstrate 501 (c) (3) nonprofit status in order to qualify.
- Computer Recycling Center (412-268-8609). This group donates computers to schools with a priority to those involved in job training and tutoring.
- National Christina Foundation (203-622-6000). One of the oldest organizations in this field, this group matches companies and individuals interested in donating computers and related equipment to nonprofit organizations or schools that serve people with disabilities in the U.S. and abroad.
- Computer Recycling Project (415-695-7703). Puts surplus computers in schools and nonprofit organizations that otherwise would not have access to this technology.
- The Detwiler Foundation (619-456-9045). Refurbishes and supplies used computers to K-12 schools in California.

In addition to contacting these and other related groups, there may be other options for you to try. Read the tips found in the Computer Recycling Project's Web site (<http://www.wco.com/~dale/crp.html>). Contact the Information Systems Manager at your nearest hospitals. Many of the computers in hospitals must be frequently upgraded. They may have older computers gathering dust in storage. Try the same tactic with local businesses with more than 30 employees. The surplus departments of your state, city or county governments may have a program to donate computers to schools.

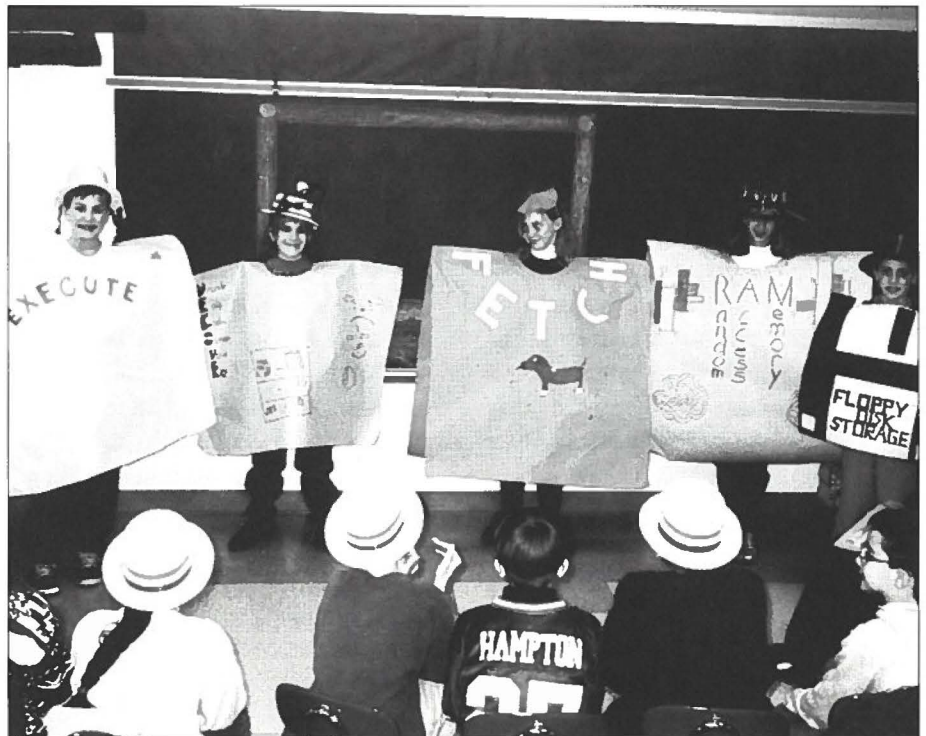
Got any other ideas? I'd like to know. Send e-mail to ralph_bond@ccm.jf.intel.com. I'll share your comments with other teachers via Intel's Teacher's Corner Web site (<http://www.intel.com/intel/educate>). ☺

—Ralph Bond
Technology Literacy Manager
Intel Corporation

Students in Action



Students show their own version of warm air showers and bunny suits. Orchard Home School, Rio Rancho, New Mexico.



Learning new vocabulary is fun for these fifth grade students shown modeling their word costumes created to help them connect new words and meanings. Fogelsville Elementary School, Allentown, Pennsylvania.

Has Your Computer Got a Cold?

It's easy to spot a student with a virus. A cough and runny nose are nature's signals that someone is coming down with a bug. Wouldn't it be great if your classroom computers would tug on your sleeve and ask for a tissue when they started to feel under the weather?

Despite their millions of transistors and enviable brain power, this isn't possible. It's up to you to give them an added layer of technology to detect and destroy those pesky computer infections.

While all viruses are annoying, most of them are ultimately harmless. Some viruses, however, can destroy your data completely. To protect your computers and your sanity, you need to know the enemy and establish a strong defense.

Inside Computer Viruses

A computer virus is a program written by people who get some kind of pleasure knowing their skill in coding can unleash chaos and destruction.

Computer viruses come in a bewildering array of shapes and sizes. Most fall into one of three categories: boot sector, file infections, and application-specific macro viruses. These viruses are designed to do goofy things to word processing, spreadsheet, and other programs.

A computer virus can enter your computer in many ways. The virus may arrive via your Internet connection, through e-mail exchanges or by sharing a floppy disk. Sometimes a virus arrives directly from a new application.

Computers need specific instructions to start, to wake up and to figure out who they are and what resources they own such as the type of processor, the size of their hard disk, and where to find everything. This boot-up information can be found on floppies or on the hard disk. A boot sector virus ("sector" being the area on a floppy or hard disk where this vital information resides)



corrupts the wake-up call and gives your computer partial amnesia.

File infections attack the operating system and any program that does work, such as a word processor, game or spreadsheet. They hunt down and mess up files with .exe, .com, .sys, .bin and .ovl extensions.

Healthy Habits

Here's a simple five-step plan to keep your computers healthy and virus free:

1. Buy and install a virus scanner program. Virus scanning programs like McAfee's Anti Virus Scan*, On Technology's Macro VirusTrack* 6.0, or ThunderBYTE's Anti Virus* Utilities can search and destroy viruses daily, weekly or every single time you turn on a system.
2. Scan all shared floppies and files downloaded from the Internet. Never admit foreign floppies or files into your hard disk without first sending them through the virus scanner's examining room for a complete screening.
3. Arm your home computer with a virus scanner. If you shuttle floppies to and from school, or send e-mail back and forth, you need protection at home. If your students take floppies to and from school, send a note home asking parents to obtain and use a virus scanner.
4. Remove floppies from a computer before rebooting. Some viruses like to hide on your hard disk waiting

for a floppy to hitch a ride on. These parasites may never do anything to the host computer (a clever way of hiding from the user) but do their dirty tricks exclusively from floppy carriers. If you start a computer using an infected floppy, the virus may turn around and strike the host.

5. Keep your virus scanner up to date. Virus outlaws never sleep. New infections pop up every day. Registered users of a commercial virus program can usually go to the Web site of the company that produced the product and download updates with new vaccines designed for the latest diseases.

Check out these Web sites for more information on computer viruses and products to fight them:

- National Computer Security Association's 1996 Computer Virus Prevalence Survey (<http://www.antivirus.com>)
- McAfee products (<http://www.mcafee.com>)
- On Technology—access the home page at <http://www.on.com> and <http://www.on.com/antivirus/avindex.htm> for the page dedicated to their PC anti-virus software
- ThunderBYTE products (<http://www.thunderbyte.com>). ☛

—Ralph Bond
Technology Literacy Manager
Intel Corporation

Teacher's Corner Update

Don't forget to visit the Teacher's Corner on Intel's home page on the World Wide Web (www.intel.com/intel/educate). The Teacher's Corner provides some great resources to help you make the most of *The Journey Inside: The Computer* technology education curriculum. New ideas are continually added to the *Idea Notebook* to provide creative and fun ways to enhance the lesson plans. Take a moment and check out the *Idea Notebook* to see helpful hints shared by other teachers using *The Journey Inside* program. Use the simple online form to submit your own creative ideas.

On the Teacher's Corner is a new area called *Homework Help in Cyberspace*. This area provides links to virtual libraries and research services available on the World Wide Web. This collection of links is a great sampler of online sites that contain a variety of reference materials and education resources. *Homework Help in Cyberspace* can help you and your students become familiar with Web researching fundamentals and search engines.

Take a moment to check out *I Can Do That: A Look at Jobs at Intel* for a first-person glimpse into high-tech careers. Nearly 40 profiles of Intel employees in careers ranging from a fab manufacturing technician to the Intel webmaster are included. You and your students can learn what these careers are all about; what background, education and skills are useful as preparation, and what the future holds in each person's career. Explore *I Can Do That* and help your students prepare for a high-tech career.

Explore the Inner Workings of a Microprocessor

Be sure to visit the virtual museum exhibit of *How Microprocessors Work* at the Teacher's Corner. This interactive exhibit will take your students through all of the steps a microprocessor under-



The Teacher's Corner: www.intel.com/intel/educate/

takes to solve a simple equation. This engaging exhibit takes students through the steps via exciting animations and detailed explanations. The virtual museum also provides classroom activities to reinforce some of the concepts. For example, use the Binary Art activity to help students understand place value in the binary number system relative to the decimal number system. *How Microprocessors Work* is also an excellent supplement to the microprocessor unit in *The Journey Inside: The Computer* kit. The virtual museum exhibit is based on the existing exhibit *How Microprocessors Work* at the Intel Museum in Santa Clara, California.

Meet Your Colleagues in the Faculty Room

Take a moment to stop by the Faculty Room newsgroup on the Teacher's Corner. This is a great place to post a question about *The Journey Inside: The Computer* program or trade information with other educators. Simply click the "post" button to contribute to an ongoing discussion or to ask a question.

Custom News For You Correction

In the last issue of *The Journey Inside* newsletter we gave the wrong Web address for the *Custom News For You* feature on Intel's home page on the World Wide Web. The correct address is: http://www-pwn.intel.com/cwn/HOME_Corp.htm. You can also get to this area from Intel's home page (www.intel.com) by clicking on the *Custom News For You* icon.

The *Custom News For You* program allows you to create your own custom

news page on Intel's home page. You can see the latest news and developments from Intel that are of interest to you. Simply choose your favorite topics, and every time you visit your custom news page, you'll see the most recent information on Intel products and events in the areas you choose. Be sure to select the Information For Students and Teachers



Custom News For You:
http://www-pwn.intel.com/cwn/HOME_Corp.htm

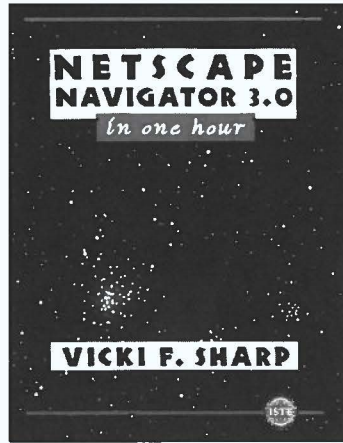
category to stay informed of the latest updates to the Teacher's Corner.

By registering for *Custom News for You*, you will also receive *Info@Intel*—the monthly e-mail companion to the news page service. This electronic newsletter will keep you informed of new Web information in your specific categories. Sign up today and take advantage of this great information tool. ✪

—Diane Clark
Intel Corporation

Additional Travel Guides From ISTE

Helpful tips to navigating as you journey on the Web using *Netscape Navigator* 3.0*.



Sail on the Web with confidence and control.

Journey safely and easily using *Netscape Navigator 3.0*.

Use the information in this book to steady the winds and demystify the power of Netscape Navigator.

Fourteen easy lessons will earn you your very own Mariner's License for Web Cruising.

Netscape Navigator 3.0 In One Hour
by Vicki F. Sharp

Phone **1-800-336-5191**—ISTE's customer service department—and have a customer service representative complete your charge card order (Visa, MasterCard, Discover).

intel[®]

**P.O. Box 7620
Mt. Prospect, IL
60056-9960**

**Do Not Forward
Address Correction Requested
Return Postage Guaranteed**

**BULK RATE
U.S. Postage
PAID
Intel Corp.**