Chapter 3

Grazing the Net: Raising a Generation of Range Free Students

This chapter first appeared as an article in FNO in 1994 and then again in the September, 1998 issue of Phi Delta Kappan. The theme of this chapter is the value of raising young people to think, explore and make meaning for themselves.
Gathered around a classroom computer monitor, three students are exploring the Internet — a global network linking them to vast databases, immense archives, rich art collections and millions of users.

Is this a good thing for schools?

The potential is amazing. An impressive information harvest is just within our grasp. Suddenly we might have all the cultural treasures and the best ideas of human civilization available within a simple mouse click (provided someone digitizes and shares them.)

Schools across North America are rushing to network. Governments and corporations hasten forward with grant support, advice, encouragement, pressure and products. The Internet is sold as the bridge to the future. Few dare to raise concerns or to challenge the royal tailors as weavers run cable from classroom to classroom.

The "wired school" is all the rage.

Access to the Electronic Highway becomes a priority. Networking schools becomes a goal in itself. For some it

Eighteen Years Later

When I first wrote this article, the promise of the Internet to transform classrooms, schools and learning was trumpeted far and wide, and yet three decades later we see little progress in the USA with regard to student comprehension skills, knowledge or writing as measured by the National Assessment of Educational Progress.

Failure to address and fund professional and program development is largely the reason for these dismal results along with a tendency toward technology for the sake of technology.
becomes an obsession. Bill Gates has compared the rapid development of the Internet to the California Gold Rush of 1849. Some of us remember the miners who returned empty handed.

Billions are diverted from roofing projects, libraries and art programs to bring schools "online."

Is it really worth all the money and the bother?

It is time for educators to ask tough questions about this so-called electronic "miracle."

**Will we see dramatic increases in student achievement to justify this investment?**

In many cases — those districts which fail to clarify learning goals and fund professional development — the answer will be "No!"

There is no credible evidence that networks improve student reading, math or thinking skills unless they are in service of carefully crafted learning programs which show students how to interpret information and make up their own minds.

In the best cases — with the right program planning and robust professional development — schools will use these new tools and resources in ways that will improve student performance on high stakes state tests.

This article will show how schools may take advantage of these electronic networks to raise a generation of **free range students** — young people capable of navigating through a complex, often disorganized information landscape while making up their own minds about the important issues of their lives and their times.

The same skills that allow students to make up their own minds will serve them well on Life’s tests as well as increasingly challenging state tests.

*Those districts that stress information literacy and strategic reading are more likely to see results than those who get swept up in the latest fad and gimmicks.*
The first step toward a sound program is to think of students as infotectives.

What is an infotective? . . . a student thinker capable of asking great questions about data (with analysis) in order to convert the data into information (data organized so as to reveal patterns and relationships) and eventually into insight (information that may suggest action or strategy of some kind).

An infotective solves information puzzles with a combination of inference skills and new technologies. The problem solving that often follows the detective work requires synthesis (invention) and evaluation (careful choices from lists of options). An infotective is a skilled thinker, researcher and inventor.

Infotective is a term designed for education in an Age of Information. In the smokestack school, teachers imparted meanings for students to digest, memorize and regurgitate. In Information Age schools, students make the meaning. They puzzle their way through piles of fragments - sorting, sifting, weighing and arranging them until a picture emerges.
These same skills produce high performance on the increasingly challenging state tests of reading comprehension and problem solving. As state standards require more and more inferential reasoning, state tests are asking students to "create answers" rather than "find answers."

For decades, schools showed students basic problem patterns and asked them to memorize solutions. This approach will no longer suffice. Students are expected to handle the unexpected and the unfamiliar.

Infotectives perform well on demanding comprehension tests, but they also make the kind of workers and family members we need to face the challenges of the next decade and beyond.

**Issues of Reliability and Adequacy**

We must also give students the tools to overcome the weaknesses of the new information sources.

The extensive information resources to be found in cyberspace are both a blessing and a curse. Unless students possess a toolkit of thinking and problem-solving skills to manage the inadequacies of the information landfills, yard sales, gift shops and repositories so prevalent on the "free Internet," they may emerge from their shopping expeditions and research efforts bloated with techno-garbage, information junk food or info-fat.

Schools must teach students to graze and digest the offerings thoughtfully in order to achieve insight. They must also guide young people away from undue reliance upon the "free Internet." Students will learn that a printed book or a "pay for service" electronic information source will often prove more reliable and efficient than the Internet.

Towns, universities and schools are learning that they must maintain robust libraries and print collections even in this time of electronic abundance. The new information landscape requires literacy skills well beyond those needed in previous times, and learners soon find that digital sources are insufficient for many questions and topics.
To be successful with this venture, we must emphasize the development of questioning skills, and we must replace topical research with projects requiring original thought.

Questioning may be the most powerful technology we have ever invented and can give to our students. Questions are the tools required for us to "make up our minds" and develop meaning.

Unless we are connecting with the Internet for mere edutainment, student questioning must be intense before, during and after visiting cyberspace.

We must teach students to start their explorations with essential questions in mind. They then develop a rich web of related questions that organize and direct the search for insight.

Essential questions spawn inquiries that often extend over a month or a lifetime — questions worth asking, that touch upon basic human issues — investigations that might make a difference in the quality of life — studies that might cast light in dark corners, illuminating basic truths.
Once they have listed pertinent questions, we must teach students how to conduct a thorough research study. Questioning persists throughout all stages of such an inquiry as students seek pertinent information — data that will cast light upon (or illuminate) the essential question.

**Sample Research Question (Secondary)**

"Imagine that you and your partners have been hired as consultants by the states of Washington and Oregon to recommend new policies to stem the decline of the salmon runs during the past decade. Use the Internet, as well as books, newspapers, interviews and all other appropriate resources, to identify useful practices already tested around the globe, and then determine the applicability of these practices to the particular conditions and needs of the Northwest. How might these strategies be improved? Create a multimedia report for the two governors sharing specific action recommendations as well as the evidence sustaining your proposals."

Unfortunately, schools have traditionally neglected the development of student questioning skills. According to Hyman (1980), for every 38 teacher questions in a typical classroom there is only one student question. Schoolhouse research, sadly, has too often fallen into the "go find out about" category. Topical research ("Go find out about Dolly Madison.") requires little more than information gathering.

We must move past projects that are little more than searches for answers to simple questions. We must stop asking for the educational equivalent of fast food. No more trivial pursuit.

Instead of asking elementary students to find out all they can about a particular state or nation, for example, we should be asking them to make a choice.

"Where should your family relocate?"

They compare and contrast several states or cities — sifting, sorting and weighing the information to gain insight, to make a decision or to solve a problem.

**Sample Research Question (Elementary)**

"Imagine that your parents have been given job offers in the three cities: New Orleans, Seattle, Chicago. Would be Seattle be better than New Orleans or Chicago for my family?"
Seattle and Chicago. Knowing of your access to the Internet, they have asked you to help them decide which city will be the best for the family. Before gathering your information, discuss and identify with them the criteria for selecting a home city. Create a persuasive multimedia presentation showing the strengths and weaknesses of each city on the criteria your family considers important.

Conducting the old topical research with electronic information is a bit like pedaling a tricycle on the Interstate. To mix metaphors, classic school research projects (finding out about a particular state) are too much like shooting at sitting ducks. In an age of information abundance (or glut), they may be quasi-suicidal for teachers. Be ready for hundred page research papers that have been downloaded, cut and pasted with relatively little reading, thought or synthesis.

Topical research in this new Information Landscape is the enemy of thought. We are beginning to see a New Plagiarism (Chapter Nine) that is simply the old plagiarism abetted by a much more powerful electronic shovel. Stealing other folks’ ideas and intellectual property has become much easier. Packaging a paper with a slick appearance has also been simplified.

This decade is the Age of Glib. Volume passes for understanding. Surface is preferred to depth. Even adult thinkers (reporters, pundits and commentators) indulge in sound bites, mind bytes, eye candy and mind candy.

If we insist that research focus upon essential questions or questions of import, we may have an antidote to the New Plagiarism and the Age of Glib. When we pose questions that require fresh thought, our students must make answers, not simply gather them.
We can create classrooms that hum with purpose and meaning.

As we approach the new century, we see a new kind of classroom emerging. The "wired" classroom differs dramatically from classrooms of the smokestack era. Given rich information and global communications, students spend their time quite differently. There is no "front" in the wired classroom. The teacher is rarely a "sage on the stage." There is much more facilitating, more supporting, more encouragement and fewer lectures.

One of the best models available to structure the learning in this new kind of classroom is called Engaged Learning.

According to Plugging In, we can judge our classrooms "Engaged" when we witness the following indicators:

**Engaged Learning Indicators**

- Children are engaged in authentic and multi-disciplinary tasks
- Students participate in interactive learning
- Students work collaboratively
- Students learn through exploration
- Students are responsible for their learning
- They are strategic

When this article was first written, there were wires everywhere, but in this century, many schools have moved to wireless networks.

Sadly, it matters little if you are wired or unwired, connected or disconnected if the purpose of the learning task is inconsequential.

Models like Engaged Learning were all the rage for a few years but did not have sticking power. Why does that happen so often in education?

One of the best models available to structure the learning in this new kind of classroom is called **Engaged Learning**.

According to Plugging In, we can judge our classrooms "Engaged" when we witness the following indicators:
The teacher in this classroom often acts as a "guide on the side."

The teacher is on the move, checking over shoulders, asking questions and teaching mini-lessons for those who need a particular skill. Support is customized and individualized. The "guide on the side" sets clear expectations, provides explicit directions, and helps to keep the learning reasonably well structured and productive.

**Guiding the Investigation**

Actions associated with the guide are:
- circulating
- validating
- moderating
- redirecting
- facilitating
- diagnosing
- disciplining
- moving
- motivating
- encouraging
- fascinating
- suggesting
- guiding
- questioning
- monitoring
- clarifying
- modeling
- trouble-shooting

While this kind of activity echoes the classrooms of John Dewey and the Progressives, it differs in the level of structure provided and the richness of the information available. There is more structure, more guidance and a higher level of expectation. There is also far more data to process than ever before.

The ultimate goal is the development of self-directed learners and free-range students, but the path toward that goal is "paved with good intentions and much scaffolding." The presumption is that independent learning emerges following an investment in skill development over time.

When the Internet first came to schools in the mid 1990s, there was much talk of "surfing the Net," but most teachers quickly learned that surfing was little better than strolling through the Mall. Schools with significant access have moved to more challenging and rigorous experiences requiring research and reasoning.
We need to identify and teach literacy skills.

The Internet poses a difficult challenge . . .

How will voyagers know when they have found Truth? Answers are a dime a dozen. Insight, on the other hand, is rare. Without some grounding in literacy, we may raise a generation rich in data, facts and information but lacking in wisdom.

Success in cyberspace requires many of the following skills:

• **Framing essential questions**
  
  If "the question is the answer," we would expect our students to recognize the important questions of life without waiting for someone else to supply them. They must also be able to state these questions in their own words.

• **Identifying subsidiary questions**
  
  Great questions spawn countless related questions that suggest an Internet path for the researching team. Question webbing is a powerful mapping tool to guide Internet voyages. Each voyage will probably suggest new questions as the unknowns become
better known. The better the searching, the more the question web expands.

• **Planning a cyberspace voyage**

While it is seductively easy to plunge right into the search for information, advanced planning can save a huge amount of time and speed one toward information that is pertinent and helpful. Mapping out questions is the first stage. Then comes the development of "telling questions" — questions that contain particular elements to produce results as effectively as a "smart bomb."

"How has the FBI violent crime rate changed in the past decade?"

"The question contains specific data as well as a source. With these tools in hand, the learner may now take advantage of a guide book or an search engine such as Google to pass directly to an authoritative source such as the Web site for the Federal Bureau of Investigation rather than wandering about the entire Web.

• **Collecting on the run**

Because it is too easy to download hundreds of articles and pages without reading them or thinking about them, the info-ective becomes highly skilled at gathering just the pertinent information. The info-ective collects the most important clues and files them in an organized manner that makes retrieval and synthesis easier at a later time. The info-ective usually outgrows a word processor for note taking and opts for a program like *Inspiration* or *Smart Ideas* that will support more powerful searching, sorting and manipulation of data.

Wise gathering pays handsome dividends when it comes time to make sense out of the research. Being selective early on means far less time will be required later when it comes time to sort, to sift and to screen the mountains of data.
• **Changing course**

The journey may lead up blind canyons and sometimes prove frustrating. Effective exploration may require the energy and flexibility of a pinball jumping and bouncing around at incredible speed. Preferably, altering course will be strategic, as the learner watches for trends and tries building theories about where to look, taking advantage of **convergence** to identify the most likely spots to "drill for oil."

• **Exploiting serendipity**

Even though our culture often conspires to protect us from surprise, much of the power of the Internet comes from helping us to escape the boxes within which we live. We have carefully screened out information most of our lives. We are too often the prisoners of our cultures, our educational experiences and our biases. The Internet can set us free. It can also drown us in garbage. We can show students how to welcome the gifts of **serendipity**.

• **Asking for help**

Ranging through dozens of different information sources, the searcher often encounters conflicting and confusing command structures. To prevent gridlock and wasted time, it makes sense to browse the help menu of these sources early in the game.

Many visitors employ Internet search engines without ever reading the help menu in order to learn the syntax (rules for how to type things) or the advanced features that would make their searching more effective. The extra time spent learning these features will save a hundred fold in what would otherwise become lost time.

Unfortunately, Google hides help and makes it hard to find [Advanced Search](http://www.google.com), wanting users to surrender to their assistance — a dangerous trend outlined in “[Escaping the Filter Bubble](http://www.escapingthefilterbubble.com).”

• **Asking for directions**

It makes sense to have several Internet guides at the ready and a friend to call when lost. No need to start from scratch. No need to wander in the desert.

• **Screening and compacting garbage**

TQM (Total Quality Management) has not reached the Net. There is little quality control. Newsgroups overflow with loquacious pedantry and bias masquerading as informed opinion. In smokestack schools students were sometimes urged to reach out toward big page numbers. A good report was a long report. Now it is so easy to download and then cut and paste hundreds of pages of text into a report that it becomes
important to cull the essential, meaningful and reliable data. The garbage is set aside, compacted and discarded. The student establishes criteria for reliability and applies them to separate wheat from chaff. Key action verbs: choose, pick, select, separate, sift, and single out.

**Sorting data**

In the process of collecting data, students must begin organizing and re-organizing the data in order to find patterns and relationships. This process is the foundation for analysis and synthesis. Key action verbs: align, arrange, array, assort, catalog, categorize, class, classify, cluster, compile, file, grade, group, layout, line up, list, order, organize, outline, pigeonhole, place, position, prioritize, program, rank, stack, tabulate. Associated tasks: bracket, collate, compare, contrast, correlate, equate, liken, match, and relate.

**Analyzing data**

As the data is collected, screened and sorted, the student keeps questioning in order to convert the data into insight. The student approaches understanding — "the big picture" — by undertaking many of the following actions: clarify, interpret, construe, deduce, derive, educe, gather, glean, infer, interpret, surmise, examine, probe, and unravel.

**Navigating in the dark**

It is no accident that many boat-chartering companies refuse to allow their customers to navigate in the dark. Darkness shifts perception and creates confusing illusions. A vast percentage of the visual cues upon which the casual sailor relies to guide the vessel are eliminated and replaced by a much more challenging system of lights.

At times, the Net provides rich cues to guide one through the shallows and shoals. At other times, it seems like sailing in the dark. Ironically, most essential questions bring us into contact with darkness and the unknown. We often seek illumination for those aspects of our lives that prove most frustrating. The simple answers, the conventional wisdom and the easily accessible recipes are often poor substitutes for the insights that emerge from night sailing. The best navigators learn to sail by the stars.

**Navigating in the mud**

When sailors misread the ebbing tide, they may feel the sudden resistance of soft, sucking mud. The Internet offers its own information mudflats - vast expanses of soft data and opinion that can bog us down and slow our search for truth.
Students must learn to skirt these shoals unless they are prepared to dig deeply and carefully.

**• Scanning from the crow’s nest**
Maintaining perspective is paramount. While conducting research we can be trapped in the day-to-day survival activities occurring at the deck level. We are too close to the action to see the patterns. "Climbing the mast," means stepping outside and above the activities to see them with distance and perspective. The crow’s nest allows us to look beyond the ship to ask questions about the challenges and tasks that lie ahead. It means keeping the big picture and the essential questions in mind.

**• Creating fresh answers and insight (synthesis)**
Students must remember that research is meant to produce new ideas. This development of fresh answers may be the most difficult task of all.

Smokestack schools often required little more than the collection and re-hashing of old ideas and discoveries. Students were rarely challenged to develop original insights.

Now the research "game" has changed dramatically. Intrigued by an authentic question, students find themselves sorting and sifting through the data they have collected, arranging and rearranging the jigsaw pieces and fragments until some picture emerges. They are "on their own." No one shows them the picture on the puzzle box.

There are at least three types of thinking that mix dynamically in a triple-decker combination. All three levels operate concurrently and recursively (like the cat chasing its tail).

**• Envisioning — What is possible?**  
One type of thought involves conjuring. Identifying possibilities and exploring the unthinkable. "How could things be changed or made better?" The students conceive, conjecture, fancy, imagine, project and visualize. Envisioning lifts the product and outcome of the thinking beyond past practice and old thinking. The thinker leaps out of the box of everyday, ho-hum thinking. Of course, grazing the Internet lends itself especially well to the encouragement of such flights of fancy. The Net provides excursions, journeys, safaris, sallies, and treks. Envisioning is the source of originality. It provides the energy for change. Cognitive dissonance.

**• Inventing — What needs to be done?**  
This thinking requires the translation of possibilities into actualities. The imaginative play of the previous type of thinking must be grounded in reality. What might actually work? What is a sensible version of that possibility? This is the stage at which innovation is born. The student concocts new solutions to problems or coins new ideas and general principles. The research team may hatch a whole
new action plan, fabricating and formulating initiatives to clean up local streams. Perhaps the thinking may advance to the development and testing of prototypes before engineering a final product.

**SCAMPERING and Rearranging — "What if we switch this around?"
**
The foundation for the two previous functions is the rearranging of the ideas, information and fragments gathered during the research process.

One model for such synthesis is SCAMPER (Osborne), with each letter standing for a strategy.

- **S** = substitute
- **C** = combine
- **A** = adapt
- **M** = modify, magnify, minify
- **P** = put to other uses
- **E** = eliminate
- **R** = reverse

For this aspect to produce results, the other two aspects must be operating concurrently, as they supply the pressure and cognitive dissonance which inspires creation. The student arranges, blends, combines, integrates, tests, and adjusts the thought fragments until new pictures emerge.

**• Suggesting and testing hypotheses**

"What if . . . " thinking helps to propel and inspire mindful, purposeful research through the Net. The student learns to brainstorm multiple explanations and possibilities and then sets out to see which have the most explanatory value.

**• Opening one’s mind**

Fundamental to the creation of new knowledge and insight is the process of suspending bias, challenging assumptions and noting premises. The researcher understands that the final product of the search will be made up of three related elements: assumptions, evidence and logic. Ideas have at least three major aspects that can usually be modified and improved:

*Ideas are based upon premises of one kind or another.* Many people come to their ideas (judgments or conclusions) without ever explicitly examining the premises that lie underneath those conclusions. Premises are basic beliefs that serve the same purpose for an idea as the foundation of a building or the roots of a tree. Sometimes our thinking comes to us already packaged without our even knowing which premises and assumptions lie below the surface, but an open mind knows that all such premises must be re-examined with
Ideas are based upon evidence. Many of our ideas emerge from experience. We collect data, look for patterns and seek laws to help us predict the future. Unfortunately, we all too often collect evidence selectively. An open mind looks at the quality of its evidence with the same dispassionate attitude it applies to its premises and assumptions. The open mind asks, "What evidence do I need to gather? Do I know enough? Has anything changed since I last gathered evidence? Is there new data? Is my data complete?"

Ideas are based upon logic. Our conclusions and ideas should flow from logical connections between our premises and our evidence. The open mind keeps asking of its ideas, "Is this logical? Does this make sense? Does this follow from the evidence I gathered? Have I identified all the key factors?"

• Seeing what’s missing
At times, the enormity of the data cascading into our computers creates the false impression that we have fully explored some topic. Experience shows that even when we have mountains of data, we may have missed really important articles or data because we encountered one of the following problems:

1. Flawed search strategies. We pick the wrong search term. Hitting few articles, we conclude that little has been written on that topic. Perhaps if we replace "instructional technology" with "educational technology" we will hit a rich vein of literature. We learn to doubt the efficacy of our search words and use a thesaurus liberally.

2. Biased sources. Even though we would like to believe otherwise, some groups and some aspects of history are systematically avoided or ignored. Imagine a version of U.S. history that never uses the word "broken" in the same paragraph as "treaty." Many sites on the Internet are there because someone has "an ax to grind."

3. Infoglut. There may be thousands of pages of data that are irrelevant. Conducting a Google search with the term "Mayflower" the searcher discovers more than 3 million Web pages. It turns out that many of those pages are devoted to restaurants and hotels.

4. Wrong Source. Some of the most important information and thinking available to our culture has not been digitized. Other chunks are available only at a price. If you want the best thinking of a medieval monk, you may want to read a hard cover book. If you want the best

One brave daffodil rises before all the others . . . a lovely anomaly.
thinking of an investment guru, you may want to buy a subscription to her online journal.

**• Recognizing anomaly**

Cyberspace provides a rich offering of anomalies (American Heritage Dictionary: deviation from the normal or common order or form or rule; abnormality). These anomalies can be a great source of inspiration and invention during times of rapid change. They are outstanding events. They stand as extra-ordinary. They are, by definition, out of the box. They may be glimpses of our futures. Students can be taught to seek, capture and examine such irregularities, remembering that penicillin was discovered because of a laboratory error that grew a mold by accident. The Internet may offer many powerful accidental discoveries.