From 1987-2008, the Teacher Research program supported teachers in all subject areas as they examined how their students learn. The program considered various approaches to classroom inquiry that focused on the teachers’ observations and reflections. Throughout the year, teachers developed a research question to pursue, collected and analyzed student work related to their research question, and wrote a report of their studies. The Teacher Research Program provided opportunities for teachers to reflect on their teaching, to look at how their students learn, and to share their discoveries with other teachers. To support teachers who continue to do teacher research on their own, REEd is making the Facilitator’s Handbook available online.

**Getting Started, Finding a Question**  
Suggestions for Getting Started

*Critics, Creators and Crones: Unleashing the Writer Within*

Critic/Creator/Editor

Excerpt from *If You Want to Write*

Pre-Writing Activity: The Open-ended Writing Process

Seven Rules for Free-Writing and Free-Writing Activity

Procedures for Directed Free-Writing

Finding a Question

Charting the Research Journey

Prompts to Help Refine or Find a Research Focus

Getting Started and Finding Questions

“How to Refine a Research Question”

Framing Research Questions

Advice from Veteran Teacher Researchers
Suggestions For Getting Started

1. Keep a teaching journal for at least one week and preferably longer. Set aside some time at the start or end of the school day to write in this journal, reflecting on what you have noticed in the classroom. There is no specific format for this kind of writing; you may choose to keep a journal, a diary, or a record of observations. If keeping this kind of record is new to you, try timed practice writing for about ten minutes a day: put your pen to paper and keep your hand moving, writing about the things that happened in your classroom. If you get stuck, write, “I remember in class today...” and just keep going. After several days of this kind of reflection, reread your journal entries and look for what surprises or intrigues you. See if there are some patterns in your concerns or delights that bear further inquiry.

2. Brainstorm a list of things that you wonder about in your classroom. Write down at least ten things and don’t censor your list. Make an appointment to get together with a teaching colleague to talk about your list. (We suggest meeting off school grounds—for lunch on a weekend or at your favorite café after school. Treat yourself to a comfortable and inviting environment in which to explore and research your agenda!) As you sip some tea or share a meal, talk through your list. We find that just airing possibilities with a trusted colleague can help you focus on the area that really intrigues you.

3. Be specific in your concerns. Many teachers reject their first questions or needlessly broaden them. They don’t always believe that their concerns are worthy of study. “What works well in writing workshops?” is a question we have been presented with more than once by teacher-researchers. This is a monumental question, too global for anyone to frame. But when we are presented with specific questions by teacher-researchers, like “How are Julie’s perceptions of her role in writing response groups changing overtime?”, the question is often followed by, “But I know that’s not important enough to study.” For too long, educational research has tried to answer big questions with short-term, large-scale questions that ignore the complexity of teacher and student interactions. Your research will probably start from a different point-individual students and their needs in your classroom. The more specific you are, the easier it will be to develop research procedures.

4. Once you have narrowed your area, write down your question, considering it a first draft. Don’t worry yet about how it is framed; just get it down on paper as a question. Write it as fully as you need to, as a whole paragraph if necessary. Give yourself permission to play with it, writing it in several different ways until you have all the information you want included in it. Now, read it again. Does it still intrigue you? Are you still itching to investigate this area? If the answer is no, look over your process and see where you lost your enthusiasm. Make sure you get that aspect back into your draft before you move on to the refining stage.

5. When you are ready to focus your question, look back over the sample question in this chapter. Try beginning yours in the same way: “What is the role of...? How do...?” “What procedures...?” “What happens when...?” You may find that you need to make adjustments for your own particular question, but these stems are often a good first step.

6. Our final advice is the most important: Give yourself the time you need and the permission to modify your question as you continue your investigation. Carry poet Rainer Maria Rilke’s advice with you as you begin your endeavor: “Be patient toward all that is unsolved in your heart and try to love the questions themselves.”
When I first started teaching writing, in one of those happy moments of accidental discovery that I've come to love, I gave my students a series of journal questions on their own internal critics, mostly to help them engage with the content of an essay by Virginia Woolf. Their responses were staggering; suddenly students who had trouble stumbling through a paragraph were writing pages of passionate prose! After that, I always started the quarter discussing these critics and the creativity they cover.

The Critic

Often, I begin by having students describe their most hated reader, the person you would least like to have read anything that you have written. This might be a real life person--your sixth grade English teacher who humiliated you in front of the whole class or your uncle Fred who used to make fun of you; or it might be a fictional character who combines the worst qualities of several real-life critics (someone who might have the face of that sixth grade English teacher but the wit of your uncle Fred); or it might be a purely fictional person whose voice lurks behind your shoulder and criticizes your every move. I've also asked students to describe their worst experience with writing or expressing themselves, and then to reflect on the person responsible for that experience. Last spring, when I tried these prompts with a group of teacher-researchers at the Spring Supper Seminar, they generated the following picture of their own internal critic: egotistical, pompous, sarcastic, prejudiced, stifling, condescending, narrow-minded, rigid, controlling, judgmental, critical, altogether too much like a marine drill sergeant.

Such a critic focuses on shoulds and insists on perfection, often uttering words of discouragement—“this must be perfect,” “Why bother,” “nothing is good enough,” “do you think anybody else will be interested?” I think every student I've ever encountered has had some version of the voice of I’m-not-enough--whether it came from being constantly compared to an older brother, or from being criticized by a stern parent or praised by an overprotective one, or from starting much behind others in the pursuit of a second language, or just from growing up in a culture that always emphasized product over process. Though they originate to protect you from future harm or humiliation, through time critics become grim jailers, determined to suppress your real vitality. Often these voices are dominant enough that you can mistakenly think they're the only ones you have inside, and often they're so little talked about you may think that you're the only one to have felt their sway. However, if we can learn to listen to them and to talk back, they will subside, and the rest of us--the part that really has something to say--gains strength.

The Creator

Brenda Ueland, a wise writer who wrote a lot about writing, once wrote: “Everybody is talented because everybody who is human has something to express...Everybody is original, if he tells the truth, if he speaks from himself. But it must be from his true self, and not from the self he thinks he should be...” Luckily, writing makes a beeline to this true self.

To imagine this creative spirit in a tangible way, maybe start by remembering a time when you were little when you really had fun, when your play seemed all absorbing and magical, when you felt most free, most yourself, most alive? Or maybe describe an activity where you feel totally absorbed, at one with what you are doing. Don’t feel compelled to find an esoteric activity--what you could describe could be as simple as cooking onions, or planting pansies, or kicking a soccer
ball around. Or, maybe imagine a place that gives you a sense of home or belonging, whether it be a mountain stream, a city street, a beloved room, or a book. Discussing the Creator at the supper seminar, after having written to the above prompts, teachers came up with the following attributes: free, endorphin-driven, in the groove, in rhythm, absorbed, content, taken away, transported, overwhelmed, productive, surprised, joyous, natural, unique, transcendent, creative.

When you first begin to imagine your Creator, you may find it shy, or distrustful, or even angry for having been locked away. It will need the safety to record thoughts and feelings honestly and at first confusedly, slowly coming to trust that writing is a way of expressing, clarifying, exploring, discovering. This is why step one, and perhaps the only step that everyone seems to agree on, is to write, write a lot, write often and without pressure. The journal is the creator’s playground or jewel-mine; banish the critic from its pages and record everything the critic says to you as you write, attempting to engage it in dialogue, rather that letting it have the last word. Remember that any useful part of the critic can be invited back at a later date when you turn to editing.

One of my students expressed the hope of finding her Creator, and learning to talk back to her Critic, like this:

I feel new and fragile when I think of myself as a writer. I feel unsure but expectant as if I am sprouting wings that look like they should work, have worked hesitantly a few times before, but are still too unfamiliar to rely on. They are still a little wet, but the excitement and power they give me through their very presence and potential make them dryer and stronger as I flex them in mock flight. Who knows? With exercise and practice, I may become skilled with these new wings, but there is still the self-doubt. The penguin, ostrich and dodo in me hiss, ‘You too are a flightless bird; it’s not a skill, it’s a gift. Either you are or you aren’t...’

I will wave my journal pages and good papers at these birds, scattering them by yelling, “I am too a writer.” I will push these birds ahead of my pen, tweaking their pin feathers if they don’t move out of the way. I will shut them up with the approval of the class and of others who read my work. Finally out of exhaustion, the birds will drop one by one or scurry in fear as they see my wings growing strong and powerful through repeated use.

Recognizing critics (and birds) is one of my most important strengths. They are cowards and cannot act if you are staring them down.

Especially fragile at first, the voices of creativity may also be in need of an ally.

The Crone

We all have in us a Voice of Wisdom that knows deep things about Life. We are given numerous rewards for forgetting it, though often it will find us in our dreams. The more we listen to it, the more it will speak.

You may think of this voice as the voice of the wisest Elder you have known, whether it be teacher, coach, grandparent, or a kind of composite figure that borrows virtues from several. It may be the grandfather you had, or the one you wished you’d have had. It may be the part of you--the dancer, the potter, the cook--who understands one process extremely well. It may resemble the person you know who seems most wise about Life. Writing from these prompts, the teachers last spring thus described their crones: supportive, accepting, forgiving, respectful, honest, listening, questioning, tough, demanding, fair, encouraging and patient.

The Crone may push you to do your best, but in a gentle, non-threatening way; it always listens with deep sympathy and perception to what you may be trying, however falteringly, to say. It stays loyal to what you are trying to create--even when the going gets tough.

Most importantly, this voice is patient.

It knows that all acts of Creation take time and energy and even waste. It understands some basic things about Life: that to go anywhere worthwhile you must go through confusion first--and the joy is really in the journey; that the growth of anything important takes a long time; that letting
a field lie fallow is sometimes the best way to ensure future fertility and that yanking up daffodils prematurely never helped them to grow.

In more practical ways, this voice can be trained to become the loyal editor, so in my writing courses I often call it by that name, and do what I can to offer it the skills it needs to lovingly improve whatever the creator may spew its way. The Editor can take in—joyfully—new and necessary tools to shape and polish what you want to craft; it can help you to recognize inspiration, to establish meaningful relationships between some of the pieces of your experience, and to make choices for what to pursue, what to develop and what to delete. It conceives bridges between self and world; the Creator without an Editor may be wildly creative, but utterly unable to communicate.

The secret to success may be timing: let the Creator write without judging prematurely; but count on the Editor to be able to have the patience and skill to refine when you come back to what you've written with a clear head. Another of my students wrote:

Telling me over and over again, 'You can't write, you're going to get another C,' my watcher convinced me that no matter how hard I tried, I would never be a good writer. However, things began to change. I learned to block my watcher out when I began to write. Journal writing helped my creative self to come out. Letting my mind wander, allowing my hand to move the pen across the page, thinking of new ideas, digging up old memories, I was allowed not to be bogged down with watcher things such as sentence structure, form, style, transitions and over all themes.

Later, my watcher, Ms. Chevious, came back into the picture; however, this time she was playing under my rules. We came to an agreement and decided to work together. After I wrote out the first draft on my own, just to get my ideas out on paper, Ms. Chevious would step in to help for the second draft. Saying 'What do you mean by this? Expand this. Add a scene here, What is the underlying theme of all of your ideas?' Ms. Chevious would help me to effectively organize my paper. Then together we would complete third draft, fourth draft and so on until we were both satisfied with our papers.

All people have critics, and when you overthrow one there's often another around the corner, so critics change over time. As one critic disappears, another may take its place. This doesn't mean that you labored for naught; it simply means that there may be another battle down the line—and one you'll be more prepared for once the first battle has been won.

All people are creative and can be brought closer to their creativity.
And writing helps.
CRITIC/CREATOR/EDITOR
Some Writing/Drawing Prompts:

Write out (or even draw a picture of) your critic, your creator, and your editor.

To contact your critic:
• Describe your most hated reader, the person you would least like to have read anything that you have written. This might be a real life person—your sixth grade English teacher who humiliated you in front of the whole class or your uncle Fred who used to make fun of you; or it might be a fictional character who combines the worst qualities of several real-life critics (someone who might have the face of that sixth grade English teacher but the wit of your uncle Fred); or it might be a purely fictional person whose voice lurks behind your shoulder and criticizes your every move.
• Describe your worst experience with writing or expressing themselves, and then to reflect on the person responsible for that experience.

To imagine the creator:
• Start by remembering a time when you were little when you really had fun, when your play seemed all absorbing and magical, when you felt most free, most yourself, most alive.
• Describe an activity where you feel totally absorbed, at one with what you are doing. Don’t feel compelled to find an esoteric activity—what you could describe could be as simple as cooking onions, or planting pansies, or kicking a soccer ball around.
• Imagine a place that gives you a sense of home or belonging, whether it be a mountain stream, a city street, a beloved room, or a book. Reflect on what you feel when you are in this place.

To imagine a benevolent Editor:
• Describe the voice of the wisest Elder you have known, whether it be teacher, coach, grandparent, or a kind of composite figure that borrows virtues from several. It may be the grandfather you had, or the one you wished you’d have had. It may be the part of you—the dancer, the potter, the cook—who understands one process extremely well. It may resemble the person you know who seems most wise about Life.

As though you’re writing a scene from a play, write out a dialogue between your critic and creator.
Just don’t let the critic have the last word.

Keep a Journal!!!
And develop within that journal the habit of talking back to your critic. Write, “Right now my critic is saying ____ , but I’m going to ignore him.” Tell your critic it doesn’t matter what you say in your journal and banish him from its pages. Assure yourself that you can enlist the Editor’s help at a later point.

Look for the circumstances (however seemingly insignificant or quirky) where your Creator seems most at ease:
In the early morning when your mind is clear, or late at night when the workday’s over; in a quiet room or a bustling coffeehouse; listening to Mozart, or to a baseball game, or to the crickets in the distance; using a word processor, or a purple pen or a mechanical pencil.

Let your Creator write a poem to your Critic, beginning, “No I will not…”
In the middle, pivot, and start writing, “I am ----, I am ----, I am ----.”
Everybody Is Talented

Everybody is talented because everybody who is human has something to express. Try not expressing anything for twenty-four hours and see what happens. You will nearly burst. You will want to write a long letter or draw a picture or sing, or make a dress or a garden. Religious men used to go into the wilderness and impose silence on themselves, but it was so that they would talk to God and nobody else. But they expressed something: that is to say they had thoughts welling up in them and the thoughts went out to someone, whether silently or aloud.

Writing or painting is putting these thoughts on paper. Music is singing them. That is all there is to it.

Everybody Is Original

Everybody is original, if he tells the truth, if he speaks from himself. But it must be from his true self and not from the self he thinks he should be. Jennings at Johns Hopkins, who knows more about heredity and the genes and chromosomes than any man in the world, says that no individual is exactly like any other individual, that no two identical persons have ever existed. Consequently, if you speak or write from yourself you cannot help being original.

So remember these two things: you are talented and you are original. Be sure of that. I say this because self-trust is one of the very most important things in writing and I will tell why later.

This creative power and imagination is in everyone and so is the need to express it, i.e., to share it with other. But what happens to it?

It is very tender and sensitive, and it is usually drummed out of people early in life by criticism (so-called “helpful criticism” is often the worst kind), by teasing, jeering, rules, prissy teachers, critics, and all those unloving people who forget that the letter killeth and the spirit giveth life. Sometimes I think of life as a process where everybody is discouraging and taking everybody else down a peg or two.

You know how all children have this creative power. You have all seen things like this: the little girls in our family used to give play after play. They wrote the plays themselves (they were very good plays too, interesting, exciting and funny). They acted in them. They made the costumes themselves, beautiful, effective and historically accurate, contriving them in the most ingenious way out of attic junk and their mothers’ best dresses. They constructed the stage and theater by carrying chairs, moving the piano, carpentering. They printed the tickets and sold them. They made their own advertising. They drummed up the audience, throwing out a drag-net for all the hired girls, dogs, babies, mothers, neighbors within a radius of a mile or so. For what reward? A few pins and pennies.

Yet these small ten-year-olds were working with feverish energy and endurance. (A production took about two days.) If they had worked that hard for school it probably would have killed them. They were working for nothing but fun, for that glorious inner excitement. It was the creative power working in them. It was hard, hard work but there was no pleasure or excitement like it and it was something never forgotten.

But this joyful, imaginative, impassioned energy dies out of us very young. Why? Because we do not see that it is great and important. Because we let dry obligation take its place. Because we don’t respect it in ourselves and keep it alive by using it. And because we don’t keep it alive in others by listening to them.

For when you come to think of it, the only way to love a person is not, as the stereotyped Christian notion is, to coddle them and bring them soup when they are sick, but by listening to them and seeing and believing in the god, in the poet, in them. For by doing this, you keep the god and the poet alive and make it flourish.

How does the creative impulse die in us? The English teacher who wrote fiercely on the margin of your theme in blue pencil: “trite, rewrite,” helped to kill it. Critics kill it, your family. Families are great murderers of the creative impulse, particularly husbands. Older brothers sneer at younger brothers and kill it. There is that American pastime known as “kidding,” — with the result that everyone is ashamed and hang-dog about showing the slightest enthusiasm or passion or sincere feeling about anything. But I will tell more about that later.
You have noticed how teacher, critics, parents and other know-it-alls, when they see you have written something, become at once long-nosed and finicking and go through it gingerly sniffing out the flaws. AHA! a misspelled word! as though Shakespeare could spell! As though spelling, grammar and what you learn in a book about rhetoric has anything to do with freedom and the imagination!

A friend of mine spoke of books that are dedicated like this: “To my wife, by whose helpful criticism...” and so on. He said the dedication should really read: “To my wife. If it had not been for her continual criticism and persistent nagging doubt as to my ability, this book would have appeared in Harper’s instead of The Hardware Age.”

So often I come upon articles written by critics of the very highest brow, and by other prominent writers, deploring the attempts of ordinary people to write. The critics rap us savagely on the head with their thimbles, for our nerve. No one but a virtuoso should be allowed to do it. The prominent writers sell funny articles about all the utterly crazy, fatuous, amateurish people who think they can write.

Well, that is all right. But this is one of the results: that all people who try to write (and all people long to, which is natural and right) become anxious, timid, contracted, become perfectionists, so terribly afraid that they may put something down that is not as good as Shakespeare.

And so no wonder you don’t write and put it off month after month, decade after decade. For when you write, if it is to be any good at all, you must feel free,—free and not anxious. The only good teachers for you are those friends who love you, who think you are interesting, or very important, or wonderfully funny; whose attitude is:

“Tell me more. Tell me all you can. I want to understand more about everything you feel and know and all the changes inside and out of you. Let more come out.”

And if you have no such friend,—and you want to write,—well then you must imagine one.

Yes, I hate orthodox criticism. I don’t mean great criticism, like that of Matthew Arnold and others, but the usual small nigbling, fussy-mussy criticism, which thinks it can improve people by telling them where they are wrong, and results only in putting them in strait-jackets of hesitancy and self-consciousness, and weazening all vision and bravery.

I hate it not so much on my own account, for I have learned at last not to let it balk me. But I hate it because of the potentially shining, gentle, gifted people of all ages, that it snuffs out every year. It is a murderer of talent. And because the most modest and sensitive people are the most talented, having the most imagination and sympathy, these are the very first ones to get killed off. It is the brutal egotists that survive.

Of course, in fairness, I must remind you of this: that we writers are the most lily-livered of all craftsmen. We expect more, for the most pee wee efforts, than any other people.

A gifted young woman writes a poem. It is rejected. She does not write another perhaps for two years, perhaps all her life. Think of the patience and love that a tap-dancer or vaudeville acrobat puts into his work. Think of how many times Kreisler has practice trills. If you will write as many words as Kreisler has practiced trills I prophesy that you will win the Nobel Prize in ten years.

But here is an important thing: you must practice not perfunctorily, but with all your intelligence and love, as Kreisler does. A great musician once told me that one should never play a single note without hearing it, feeling that it is true, thinking it beautiful.

And so now you will begin to work at your writing. Remember these things. Work with all your intelligence and love. Work freely and rollickingly as though they were talking to a friend who loves you. Mentally (at least three or four times a day) thumb your nose at all know-it-alls, jeerers, critics, doubters.

And so that you will wok long hours and not neglect it, I will now prove that it is important for yourself that you do so.
Pre-Writing Activity:
The Open-Ended Writing Process

“To begin the sea voyage, do a nonstop free-writing that starts from wherever you happen to be. Most often you just start with a thought or a feeling or a memory that seems for some reason important to you. But perhaps you have something in mind for a possible piece of writing: perhaps you have some ideas for an essay; or certain images stick in mind as belonging in a poem; or certain characters or events are getting ready to make a story. You can also start by describing what you wish you could end up with. Realize of course that you probably won’t. Just start writing… If you have special trouble with that first moment of writing—that confrontation with a blank page—ask yourself what you don’t want to write about and start writing about it before you have a chance to resist. First thoughts. They are very likely to lead you to what you are needing to write.

Keep writing for at least ten or twenty or thirty minutes, depending on how much material and energy you come up with. You have to write long enough to get tired and get past what’s on the top of your mind. But not so long that you start pausing…

Then stop, sit back, be quiet, and bring all that writing to a point. That is, by reading back or just thinking back over it, find the center or focus or point of those words and write it down in a sentence… Skip a few lines and write it down. Underline it or put a box around it so you can easily find it later…

You have now gone through a cycle that consists of nonstop writing and then sitting back to probe for the center. You have used two kinds of consciousness: immersion, where you have your head down and are scurrying along a trail of words in the underbrush; and perspective, where you stand back and look down on things from a height and get a sense of shape and outline.

Now repeat this cycle. Use the focus you just wrote down as the springboard for a new piece of nonstop writing... Perhaps you just take it and write more about it... Perhaps ‘what comes next’ is what follows logically. Perhaps the next thing is what comes next in your mind even though it involves a jump in logic. Perhaps the next thing is a questioning or denial of what you have already written… Stand out of the way and see what happens.

Whatever kind of jump it is, jump into a second burst of nonstop writing for however long you can keep it up.”

Seven Rules for Free-Writing
Adapted from Natalie Goldberg’s Wild Mind

1. “Keep your hand moving. When you sit down to write, whether it’s for ten minutes or an hour, once you begin, don’t stop. If an atom bomb drops at your feet eight minutes after you have begun and you were going to write for ten minutes, don’t budge. You’ll go out writing. What is the purpose of this? Most of the time when we write, we mix up the editor and creator. ...If you keep your creator hand moving, the editor can’t catch up with it and lock it. It gets to write out what it wants.”

2. “Lose control. Say what you want to say. Don’t worry if it’s correct, polite, appropriate. Just let it rip.”


4. “Don’t think. We usually live in the realm of second or third thoughts, thoughts on thoughts, rather than in the realm of first thoughts, the real way we flash on something. Stay with the first flash.”

5. “Don’t worry about punctuation, spelling, grammar.”

6. “You are free to write the worst junk in America.”

7. “Go for the jugular. If something scary comes up, go for it. That’s where the energy is. Otherwise, you’ll spend all your time writing around whatever makes you nervous. It will probably be abstract, bland writing because you’re avoiding the truth. Hemingway said, ‘Write hard and clear about what hurts.’ Don’t avoid it. It has all the energy. Don’t worry, no one ever died of it. You might cry or laugh, but not die.”

Free-Writing Activity
From Natalie Goldberg’s Wild Mind

“Write every day for ten days in a row. Do not reread anything you have written for those ten days until two weeks later.

Then sit down in a comfortable chair and have a soft heart and read with interest and compassion what you have written. Underline sentences that stand out. Use those sentences as first lines for future writing practice. Put parentheses around sections you like. Develop those sections, if you want, not by reworking them but by reentering them with more timed writing practice.

And be brave. Let some of the good writing go. Don’t worry. There’ll be lots of it over time. You can’t use all of it. Be generous and allow some of it to lie fallow. What a relief! We can write well and let it go. That’s just as good as writing poorly and letting it go. Just let go.”
13 Procedures for Directed Free-Writing
From WRITING WITH POWER, SECOND EDITION by Peter Elbow,
copyright 1981 by Oxford University Press. Used by permission of Oxford University Press, Inc.

FIRST THOUGHTS: “Just put down as fast as you can all the thoughts and feelings you happen to have about the topic... If it seems to you that you don’t have any first thoughts, you are mistaken. It is because you aren’t listening or accepting them.”

PREJUDICES: “What are your biases in the area of your topic?... You aren’t trying to think carefully, you’re trying to let your own prejudices run rampant without any censorship so you can see more clearly what they are... Writing down your prejudices also helps you generate new ideas and insights...”

INSTANT VERSION: “It would be a miracle to turn out a final version of any extensive writing task in half an hour. But it’s worthwhile pretending to pull off this miracle. Simply deny the need for research thinking, planning and turn out a kind of sketch of your final piece—an instant projected version. You’ll have to pretend you know things you don’t know. Act as though you have made up your mind where you’re uncertain, make up facts and ideas, and leave out large chunks (perhaps symbolizing these omissions with little boxes). But by doing so you can will yourself into producing a quickly written final version.”

DIALOGUES: “If you discover that instead of having one clear prejudice you have two or three conflicting feelings, you are in a perfect position to write a dialogue. Give each of the feelings a voice and start them talking to each other... Just pick the speakers, get them talking, and see what they do say...”

NARRATIVE THINKING: “If your topic is confusing to you—if for example you find your mind shifting from one thought to another or from one point of view to another without any sense of which thought or point of view makes more sense—then simply write the story of your thinking.”

STORIES: “...start by letting stories and incidents come to mind and jotting them down very briefly; good stories and bad ones, typical stories and unusual ones, funny stories and, best of all, stories that somehow stick in your mind for reasons you cannot pin down... Many wise people do their best thinking by telling stories. Learn to trust yourself. Learn that the stories and events that intrigue you in connection with your topic will end up useful to you later.”

SCENES: “Stop the flow of time and take still photographs. Focus on individual moments.”

PORTRAITS: “Think about you topic and see what people come to mind. Give thumbnail portraits of them...”

VARY THE AUDIENCE: “Write about your topic to someone very different from the real audience of your paper. If your audience is sophisticated, try writing to someone very unsophisticated, perhaps to a young child. If the audience is someone you don’t know, write to a close friend. If the audience has a definite point of view about the topic, write to someone with the opposite view.”

VARY THE WRITER: “Write as though you were someone whose view on the topic is very different from your own... If you are analyzing a particular policy, pretend to be someone affected by it. If you are writing about a particular person... it is enormously fruitful to be that person and write a self-portrait or self-analysis.”

VARY THE TIME: “Write as though the topic were in a different time.”

ERRORS: “Write down things that are almost true or trying to be true; things that you are tempted to think or that others think but you know are false; dangerous mistakes. ‘People only take care of things they own.’ ‘John is essentially lazy.’ ‘Revolutions are always part of progress.’ Writing these down lessens the static in your head.”

LIES: “Write down quickly all the odd or crazy things you can come up with... Writing down as many lies as you can as quickly as you can gives you glimpses of your unconscious mind. ...even if you cannot draw any conclusions from reading back over the nonsense you have written, the process of writing it all down serves to clear some of the fog in your mind that was confusing or slowing down your thinking. You often end up with renewed energy.”
FINDING A QUESTION


32 Living the Questions

There are a number of strategies you can use to guide yourself through the process of “figuring out the question.” I’ll explore some of these with attention toward helping you integrate your research and teaching.

Can your available resources—your daily work and the wonderings that arise from it. Though questions are informed by the theories we bring to our work—personal theories and theories we’ve read from others—they are most commonly born from our day-to-day experiences with students. Glenda Bissex (1987) writes that teacher research begins not with a hypothesis to test but more with a wondering to pursue. Begin by paying attention to these wonderings. Adopt your first research tool—a journal—where you can record the queries that arise during the day. Don’t worry that they are always framed as questions. Include the things that surprise, concern, or delight you. After a week or two, go back and reread your jottings. Are there themes of interest that emerge?

List questions about the area of interest you discovered. You’ll probably find it easier to generate a list of related questions before writing one inclusive one. I have a general interest in how teachers learn to teach writing. In thinking about that broad question, I wrote a series of smaller questions. How does a teacher’s own writing affect his or her teaching? How does a teacher’s history of learning to write affect his or her development as a teacher? What do the shifts look like in teachers’ thinking as they make pedagogic changes? What supports teachers’ growth as they implement a new approach? What hinders? What kind of talk do teachers trade about the teaching of writing? How does it impact their daily actions? Why do some teachers make the shift to a process approach more easily than others?

Examine your list of generated questions. In generating this list of questions, I’m careful that each one is genuine. I don’t want to ask a question that leads me to document something I already know to be true. For instance, I can pretty much answer the question, What happens when a writing process approach is mandated in a school? My experience leads me to a fairly knowledgeable hunch about the answer. There is, however, much I
can pursue about the topic. I am genuinely interested in understanding what conditions support teachers’ implementation of a mandated approach.

I also want to read my questions to see if they can be answered. The best research questions often begin with the words what or how. Why questions ask you to trace the source of a phenomenon. You can develop a hypothesis as to why something occurs, but to conclusively identify the source is virtually impossible. By contrast, what and how questions lead you toward descriptions of phenomena. These are more easily documented and identified.

You can work with a why question to envision the what and how questions that compose it. Consider my question, Why do some teachers make the shift to a process approach more easily than others? This requires me to look at teachers who have made the shift. What specific changes have they had to make in their practices in order to do so? What problems do they encounter? How do they work through these problems? I may also want to look at teachers who have not made the shift. What factors contribute to their rejection of the approach? What do teachers say in defense of making change? If I can begin to describe the actual process teachers take either toward or away from a direction of change, I may be able to speculate about why some teachers make the shift and others do not. Then again, I may not. Regardless, I will have some interesting descriptions to inform my future work.

**Force yourself to write a succinct what or how question.** I’ve chosen this one: What are the stories teachers tell about their own experiences learning to write? I’m not sure the question is just right yet, but it points me in the direction I want to go. I want to explore the impact of a learning history on a teaching present. So I’m beginning small. This question allows me to start at a decisive point, gathering stories from a selected group of teachers. As they tell their stories, I suspect they will reflect on the meaning they bring today and the ways in which the stories affect their teaching. Beginning with a small focused question will often lead you toward a bigger one. The data I uncover from this question will likely lead me to understand other factors that have an effect on how teachers learn to teach writing.

**Practice tunneling in on your question.** Don Graves (1994) uses the term tunneling to describe the process of anticipating the kinds of data you will need in order to answer the question. This procedure can help you fit your question to the natural structures of your classroom.

One teacher-researcher phrased the question, What is the effect on student writers when their teachers publicly demonstrate their own literacy? In order to answer that question a series of smaller questions will need to be addressed. Notice how each of these questions is written in order to point exactly to the place she will look to gather the data. What literacy demonstrations does the teacher present in the classroom? (This involves observing and recording visible acts of literacy.) What student perceptions exist about the teacher’s use of writing? (You can get at
this by talking with students. Some of this talk will naturally occur during writing conferences.)

What literacy acts do students engage in? (Again, this information can be collected through observation and gathering actual products. If you have the task of taking surveys on your class job chart, students can share the responsibility of documenting the kinds of reading and writing that occur throughout the day.)

This teacher will need to define for herself exactly what constitutes an act of literacy. Since she is looking at the effects on writers, not simply writing, she will also want to understand the ways in which students define literacy. This process of tunneling is another way to test the feasibility of pursuing the question. If it is difficult to see where the data to answer a question lie, then you can be fairly certain the question will be difficult, if not impossible, to pursue.

Be aware of the impact a research question will have on your students. I remember Nancie Atwell sharing the effects her interest in journal writing had on her students’ work. She describes the scene in September when she was eagerly writing notes of interest about the thinking students recorded in their reading journals. By June students were beckoning her with reading journal in hand: “C’mere. This is really interesting!”

Students will inevitably pay attention to whatever you’re choosing to attend to. If you are looking at the way in which students are affected by a teacher’s own literacy, you can be certain that your question will ensure they pay attention to that literacy. My question about the stories teachers tell is bound to orient a teacher toward the histories she brings to her teaching.

Think of your question as a grow light. When shined upon your students, you should see them flourish. Here is where the potential effect of teacher research on student learning is made most visible. Capitalize on it when you decide your area of inquiry. If you want to see improvement in peer conferences, ask a question that will allow both you and the students to pay attention to this aspect of the day. If you want more successful writing in science journals, shine the grow light in that direction. One teacher-researcher I know did just that with the questions, What kinds of writing do eight- and nine-year-olds write in science learning logs? and In what ways do their entries change when they are shared in large class-size groups and small response groups? Research should not be an appendage to your teaching. When carefully thought through, it can be a teaching strategy that helps you realize the learning goals you and the students have set for the year.

One way to ensure that your research supports such learning is to spend ample time in the process of question posing. Don’t rush to state a question so your research can begin. Figuring out the question is an important part of the research. Once you’ve arrived with a question ready to pursue you will look back and see that you are already deeply involved in the work of conducting a classroom-based inquiry, one that will guide the learning of both you and your students.
How would you now define your topic? What question(s) are you trying to answer?

What first drew you to your topic? Why were you interested in this topic?

What do you see as the major stages of your research? (e.g. Stage 1: teaching a certain lesson, looking at student papers in response to that lesson, looking at test scores. Stage 2: Redesigning the lesson, looking again at student work, etc.)

For each of the above stages, write about:

• What you did.
• What data you collected.
• What this data shows.
• Questions raised
• Significance—conclusions to be drawn
Prompts to Help Refine or Find a Research Focus

If you have some kind of an idea:
Write about your area of interest: what have you done already, why are you interested? What do you really care about most? What’s the heart of your interest? (refer to prompts if needed)

If you’re clueless:
• I’m very curious about why my students find it so difficult to ___ to ___ and to ______. Maybe it would help to ___ to ___, and to ________.
• This year, I’m going to try a new approach to ___, and I’m wondering how students will respond and how I can document their responses.
• I’ve been noticing this pattern in my students’ work: ______. I’m curious about why ____, why _____. and why ________, and if ___ , if ________, and if ________.
• This year, I’m really struck by _____ (name of particular student), and I’m wondering why _____. and why _____, and why ____
• Looking back over this past year, I see these areas of progress: _______. What can I do next year to build on this? What will I tinker with and change? How might I monitor the effects of these changes.

Once you have an idea from above:
Write about the kinds of data you might find helpful to collect and examine. What kinds of data speak to you most? What kinds of data seem most connected to your deepest purpose and interests?
GETTING STARTED & FINDING QUESTIONS

SOME BASIC RULES:
*Do whatever possible to KEEP WRITING. Don’t judge.
*If you lose your train of thought
  • do a lap around the hallway, but don’t talk to anyone
  • write a funny answer to one of the questions
  • write about one of your favorite “teaching moments”
*If you think a question is stupid or misguided, either skip it or write about why.
*If you get going on writing and I interrupt you, ignore me; stay loyal to whatever has a pulse.

Write on any of the following prompts.

FILL IN THE BLANKS:
• I know I’m a successful teacher if my students begin to ----, to ----, and to ----.
• When I think of STUDENT NAME, I wonder why ----, why----, and why------.
• I really wish I could get my students to ----, to ----, and to ----.
• In order to learn how to do XXXX better, my students will have to learn how to ----, how to ----, and how to ----.
• I’m curious why some students have so much difficulty with----, with ----, and with----. Maybe it would help to ----, to ----, and to----.
• In order to get my students to learn ------, I’m really tempted to -----, to ----, and to ------.
• I most want my students to learn how to ----, to ----, and to -------.

SOME PROMPTS—write on whichever ones interest you:
• Write more on any of the above sentences you liked.
• Looking back over last year, what were key areas of student progress? What ideas do you have for building on that this year? What were areas that you felt needed improvement? What ideas do you have for approaching those in a different way?
• Which student has most captured your interest this year—whether for his/her struggle, needs, attitude, progress, or lack of progress.
• What unaddressed needs do you see in the students you teach. What ideas do you have for addressing those needs?
• What problems have surfaced in the way students are grasping your content area? What ideas do you have for approaching those problems?
• What skills are your students most in need of—what ideas do you have for helping with that?
• What new methods are you tempted to try this year? (Where’d these ideas come from?) How could you go about implementing them? What would you do to monitor your progress?
HOW TO Refine a Research Question

Start with four core principles:

1. Ask only real questions. Don’t do research to confirm teaching practice you already believe is good or bad. Ask questions whose answers you are not sure about.
2. Avoid asking yes/no questions.
3. Eliminate jargon.
4. Avoid value-laden words or phrases.

For example, the question might begin as follows:

Do LD/ADHD students engage in meaningful discussions during literature circles?

The final answer to this question, a yes or no, won’t get at key issues of how/why/when these students are involved in talk. There is also the sense that the researcher is setting out to prove a preconception—either he supports certain students being in these groups, or he doesn’t.

First, change the research question so that it is open-ended:

What happens when LD/ADHD students engage in meaningful discussions during literature circles?

Next, underline any words that are jargon and rewrite them so that any reader could understand what you mean:

What happens when LD/ADHD students engage in meaningful discussions during literature circles?

The definitions of LD (learning disabled) and ADHD (attention deficit hyperactivity disorder) are debated even among educators and would likely be unknown to a lay reader. Literature circle refers to a specific curricular innovation that is defined differently among teachers.

The revised research question becomes

What happens when students identified with special needs engage in meaningful discussions during reading instruction?

While identified with special needs and reading instruction are much broader, they are terms anyone can understand, and they can still be defined more specifically in the actual study.

Finally, underline and change any value-laden words that would require explanation for readers:

What happens when students identified with special needs engage in meaningful discussions during reading instruction?
Part of the goal of this research will be to get at how the teacher and her students define meaningful. This word needs to be cut from your research question so that the values the researcher shares with her students, and the values that might divide the classroom community, can emerge from the study.

But it is a terrific exercise for any researcher to consider the ideals lying beneath value-laden words. When refining your research question, try to brainstorm on your own how you define words like meaningful, and also ask students to define what makes a literature discussion meaningful. By ferreting out value-laden words in your research question and subquestions, you can begin to get at your biases and preconceptions before the study begins.

The final refined research question becomes:

What happens when students identified with special needs engage in discussions during reading instruction?

Another important aspect of these teachers’ research questions is the focus of the study—their students. Often, questions in the initial raw stage center on our work as teachers. High school teacher Denise Sega warns against falling into this trap when she tells the genesis of her own research question:

When I began the work that led to my article “Reading and Writing about Our Lives,” my original research question asked how I could motivate a group of uninterested students to learn. What could I do to help them achieve? However, as my work progressed, I realized that I was not the center of the study—the students were. This sparked the concept of collaboration, refocusing my reflection to see how we—the students and I—could discover a new way to learn together, rather than my deciding on a way to teach. It was this idea of collaboration that led to more meaningful research and discoveries than I ever would have found alone. (1997,174)

Like Li’s questions mentioned at the beginning of this chapter, your research questions may come from a glimpse of something out of the corner of your eye that intrigues you. They might burst forth from students who keep you up at night, observations that surprise you, tensions in your class, or from individual students that just plain mystify you. Here is a list of questions that teachers we know are pursuing:

How can parents help set student goals and assess their child’s growth?

What are the patterns of engagement during group work in my math classes?

What happens when Title I students are incorporated into regular classroom literacy groups?
How do reading response journals serve as a tool to help students become more thoughtful readers?

What happens when students use self-reflection in science as a means of assessing growth?

How does role playing affect first-grade writing?

How will home-school communication journals influence the student-parent-teacher collaboration?

What happens when I encourage Sheila to voice her opinions and insights?

How does math literature influence the oral and written communication of math concepts?

How can a child with severe physical impairments demonstrate reading ability? (special education with a child who is wheel-chair bound and cannot speak)

How does the use of storytelling help students connect to historical information?

What happens when I parallel a movement workshop to a writing/reading workshop?

What effect do the artwork and other artifacts posted on the walls of my middle school art room have on my students’ art literacy?

In my two-way bilingual class, what happens to Spanish language usage by my “English experts” when they have focused Spanish lessons for English-only speakers?

In what ways might participation in deliberately designed rites of passage provide teenagers a clearer passage into adult life?

How does incorporating writing and art into science instruction affect female attitudes toward science?

How does self-esteem affect creative expression in writing groups?

What happens when choice and collaboration become an integral part of the fifth-grade science curriculum?

What are the changing attitudes of my students toward French language and culture as they acquire French as a second language?

What questions do my first-grade students ask one another during writing time?

These questions show that any curriculum, grade, or concept is open to exploration by teacher-researchers. What matters isn’t how experienced you are—it’s how willing you are to ponder questions with no easy answers.
Framing Research Questions

During our Facilitators’ meeting in the fall of 1999, the challenging process of forming research questions was, of course, one of our discussion topics. At the meeting Jamie Button at Alta Mesa Elementary in Redding mentioned a very useful resource she picked up from a presentation at a past Voices conference by Alexa Hauser, Director of the Bay Region IV Professional Development Consortium. With Alexa’s permission we have published it here. Since forming and framing research questions is a year-long process, these may assist you in nailing down the one(s) that make it into your research paper.

Examples of Research Question Frames
by Alexa Hauser
Bay Region IV Professional Development Consortium

The Following list of question frames came from teacher research abstracts. Each frame is followed by a question asked by a teacher researcher. They were originally collected to experiment with formation, usefulness, and bias of research questions. Select several to use for trying to frame your own research question from different angles.

• Are there advantages to... as opposed to...?
  Are there advantages to teaching a whole class with a wide range of math abilities through the use of manipulatives as opposed to teaching by ability grouping?
• Can using... lead to...?
  Can using a tape recorder in the initial stages of the writing process help a hostile non-writer to overcome his complete disinterest in the subject?
• Does... improve...?
  Does high teacher expectations improve student performance?
• Does... increase...?
  Does writing in math increase mathematical understanding?
• Does... matter in...?
  Does tracking matter in verbal growth?
• Do... understand...?
  Do third and fourth graders understand place value?
• How can...?
  How can reading and writing be successfully merged in a seventh grade language arts class?
• How can I...?
  How can I encourage my student to read?
• How can we use... to...?
  How can we use the writing/reading portfolio to prepare students for the ultimately inevitable “authentic assessment” and why should we bother?
• How can students...?
  How can students learn to make the transition from invented to conventional spelling?
• How do I...?
  How do I develop a writing program which meets ESL spelling deficiencies?
• How does... affect...?
  How does keeping portfolios affect both teacher and student behavior?
• How effective is/are...?
  How effective are student partners in the revision process?
• How might... help...?
  How might one-to-one teaching help a teacher understand a learner?
• How much... is necessary...?
  How much sheltering is necessary in mathematics for the English as a second language (ESL) population in high school?
• ...which worked, which didn’t, and why?
  Integrating mathematics into another subject: Which problems worked, which didn’t and why?
• In what ways did/does... affect...?
  In what ways did the Persian Gulf War in 1981 affect students and their ability to learn?
• What are the advantages and disadvantages of...?
  What are the advantages and disadvantages of using the lay reader program in high school English classes?
• What effect does... have on...?
  What effect does active involvement in creating rubrics that define quality have on a child’s writing?
• What happens when students...?
  What happens when seven and eight year olds are expected to complete involved integrated tasks which allow them to show what they can do as readers, writers and thinkers?
• What is the correlation between... and...?
  What, if anything, is the correlation between prewriting and good final drafts?
• What is the impact of...?
  What is the impact of environment on students’ behavior and self-esteem?
• What is the importance of...?
  What is the importance of student ownership in student writing and writing memories?
• What ways do students...?
  What ways do students communicate?
• Why are students...?
  Why are students reluctant to write?
• Would... lead to...?
  Would reflecting about the task of writing lead to greater active student participation in the curriculum of their English class and a desire to strive for truly “personal best”?
If I knew then what I know now...
Advice from Veteran Teacher Researchers
(collected at a Supper Seminar)

FINDING A QUESTION
**if you wait the question will come: don’t force questions...just relax and tune in to your true questions and what is really important to you.
**keep question defined so that you do not collect too much data

KEEPING A JOURNAL
******keep a journal more faithfully
*don’t wait till the last minute to write
**write questions you have rather than worrying. Write as often as possible, every day, even a little. Ideas will be generated. Trust the process—but keep writing!!/Relax, put down what you see and what you are learning. Just let it come together.
**write down ideas as they pop into your mind/record as you go along—you’ll never know what you can use. Just write.

WRITING THE PAPER
***write the introduction after the paper
***write in chunks—not all at once—don’t wait for divine inspiration
***revise, revise, revise; rewrite, rewrite, rewrite; drafts are important!

COLLECTING DATA
**student work is illuminating
****SAVE STUDENT WORK
**collect more data and look for ways to keep it organized
*data is not just numbers
*ask the students!
**pose questions for surveys carefully, try not to give them “the answer”

GENERAL
*just do it!
*don’t panic
*TR is a way to document what we find out about our work
Research Design and Working with Data  52 - 70

   Tentative Research Plans and Timeline
   Worksheet for Planning your Teacher Research Study
   Ideas for Data Collection, Organization, and Analysis
   Data, Data, Data
   Filling Your Data-Bucket
   Data Analysis Worksheet
   “How to Cook Your Notes”
   Number Sense
   Statistical Tests to Analyze Your Data

Alternative Methods to Data Collection, Analysis, and Presentation  71-72
### Tentative Research Plans and Timeline

*adapted from*
Teacher-Researchers at Work, by Marion MacLean & Marian Mohr, Copyright © 1999, Reprinted with permission of the National Writing Project and Marion MacLean & Marian Mohr.

<table>
<thead>
<tr>
<th>September</th>
<th>What is research? What is Teacher Research? What are the expectations for this project? Where do research questions come from? What is my research question?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begin Research Log</td>
<td></td>
</tr>
<tr>
<td>October</td>
<td>How do I find out more about what interests me? How do I look at what I’m curious about? What is data? What does it tell me? How do I revise my research question?</td>
</tr>
<tr>
<td>Begin Data Collection</td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>Where does the data lead me? What else do I want to know?</td>
</tr>
<tr>
<td>Data Collection</td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>What questions are emerging from the data? What is my research question now? What does the data mean?</td>
</tr>
<tr>
<td>...and Analysis</td>
<td></td>
</tr>
<tr>
<td>December</td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>Looking at my data as a whole, what is my research question now and what do I think I’ve learned?</td>
</tr>
<tr>
<td>Complete Major Data Collection</td>
<td></td>
</tr>
<tr>
<td>February</td>
<td></td>
</tr>
<tr>
<td>Begin Draft Writing</td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>As I write, what am I learning? How can I best show what I have learned? Where are the gaps in my research?</td>
</tr>
<tr>
<td>April</td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>What can I say at this point, I’ve learned? What questions do I want to study further</td>
</tr>
<tr>
<td>Deadline Draft of Research Report</td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>How can I communicate my process and findings for audiences other than myself?</td>
</tr>
<tr>
<td>Revising and Editing</td>
<td></td>
</tr>
<tr>
<td>Deadline for Report</td>
<td></td>
</tr>
</tbody>
</table>

© University of California, Davis
# Worksheet for Planning Your Teacher Research Study

<table>
<thead>
<tr>
<th>Research Component (possible writing prompts)</th>
<th>Done/To Do:</th>
<th>Time frame</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>setting and background</strong> Describe the research setting. What assumptions or observations are motivating your research?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>research question/issue</strong> What are you interested in finding out about? Consider whether your question is researchable. Try framing your question in different ways.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>design of the study</strong> Describe your research plans. What steps/activities are key to your investigation?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>data sources and analysis</strong> What information are you collecting, using, generating? How are you organizing and looking at it? Specific examples?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>results</strong> What did you find (are you finding) out?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>conclusions</strong> Findings, new questions, theory building, ideas,… Why is this important? So what?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>sharing in response groups</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>revising your paper</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>other</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Teacher Research Papers are Due June 30
Ideas for Data Collection, Organization and Analysis
Generated during the Facilitators’ Planning Institute, 2000

This set of notes was generated during a discussion at the Facilitators’ Planning Institute, 2000. Facilitators were asked to share activities and ideas they have used or would consider using with teachers in their groups to help identify, collect, sort, and analyze data. Contributors include: Brenda Borge, Troy Burke, Will Carlton, Pam Castori, Jim Carvalho, Jeff Gammon, Mary Klehr, Bill Lundquist, Kim McGreevey, Janet Papale, and Edna Shoemaker.

IDENTIFYING POSSIBLE DATA SOURCES:

• Early on as a writing prompt, ask each member to share a student success story. Ask what data would need to be collected to document this success.

• Have students write responses to questions about the class, the learning process, etc. Share the responses with your teacher research group and discuss what questions could arise from the information and what kind of data could be collected for this question.

• Following is a list of some possible data sources:

| Test Scores |
| Classroom Observations/Field Notes |
| Oral Language Samples |
| Teacher Talk |
| Curriculum-based Assessments |
| Journal Entries/Research Log |
| Surveys/Questionnaires |
| Student Work (Products, Folders or Portfolios) |
| Photos |
| Interviews |
| Parent Comments/Survey |
| Time on Task |
| Video or Audiotapes |
| Student Talk |
| SAT 9 |
| API |
| District Assessments |
| Administrative Impact/Policies |
| Classroom Records |
| Memories |
| Charts or Graphs or Categories or Lists |
| Time Sequences |
| Written Comments by Students About Their Work |
| Systems for Data Collection from Teacher Researchers at Work by Marion S. MacLean & Marian M. Mohr |
| Process Tracing |
| Case Study of a Class |
| Focus Groups |
| Recurring Themes |
| Data Reviews |
| Quotation Data |
| From Data to Question to Data, etc. |
| Simple Lists |

STRATEGIES FOR ORGANIZING AND ANALYZING DATA AT TEACHER RESEARCH MEETINGS:

INDEPENDENTLY:

• Read through data without making any notes/comments. Afterwards consider: What themes seem to appear? If I could sort these data, how would I sort them? Pick a few to start with. Using different colored highlighters go through the data again and code by theme.

AS A GROUP:

• Assign “focus” days for each member of the group, once research questions have been established. Teachers should know their focus date well in advance and either bring data (copies of student work/ surveys/etc.) or give samples to the facilitator ahead of time to copy for them. For these sessions:

  √ Ask each teacher to re-state (or rewrite) their research question and explain why s/he selected this type of data to help answer that question.
√ Each teacher could pre-write, “What will I see in the data that tells me about student learning?” Be very specific, e.g. “the students consistently and clearly connect the activity with an essential understanding” or “the students mostly use periods at the ends of their sentences.”

√ Have the whole group take a cursory look at the data (student work samples, journal entries, surveys, whatever) and ask questions for clarification, e.g. what was the assignment, what had they already learned? Have the teacher make notes of these questions and their answers.

√ Read through data once without making any notes/comments. Then, consider: What themes seem to appear periodically across the process? If I could sort these comments, how would I sort them? Pick a few to start with.

√ Let the whole group examine the data more carefully on their own. What does the work say about the student (learning process, understanding of content, learning style, anything)? What can the student do/understand? Infer? Use Post-Its to make comments—it’s a good way to keep track of what you think about the data as you look review it. What does it show? Have each researcher organize the data in ways that make sense to them.

√ Let the teacher ask other group members to help choose which excerpts are most useful for the research question and which are most interesting/compelling.

√ Look for patterns. Ask the group if they see any patterns. Have the group put the data into three piles. Let the group brainstorm about the linear organization and then discuss other possible ways to organize the data. Using different colored highlighters go through the data again and code by theme, or cut up comments and physically sort them into piles.

√ Let the teacher reflect on whether the data actually answered the question, or if new questions have arisen, or if the data helped to re-focus the question.

√ After reviewing a set of data ask: are there new insights about the students?

WAYS TO INVOLVE STUDENTS IN DATA COLLECTING/ANALYSIS

• Have students read, comment and analyze each other’s writing, using the research question as a base.

• Interview/tape students as they talk to other students. For example, what was the conversation between Devon and the friend he asked to listen to his draft and between Aaron and those classmates with whom he shared?

• Let members of the group pick one student’s quotations and write a brief “dialogue” with that student. Have the author of the teacher research do the same, but in a more extended way—and see how they match... (This might provide insight on to the context needed, adequate length of quotation, etc.)

WRITING ABOUT DATA COLLECTION AND ANALYSIS

• Schedule time to write about data collection and the processes used to analyze the data during at least two teacher research meetings.

• Set a rough draft due date (and ACCEPT ANY LEVEL OF COMPLETION).

• Take drafts and read-around, attaching on sticky notes any questions generated.

USING OUTSIDE RESOURCES

• Seek outside resources—CRESS, books, internet sites, etc.—for comparison, direction, affirmation, etc.

• Encourage the researchers to find an outside resource on their topic and to compare the resource’s data or theories to theirs. Schedule a time when your group can collectively get on the internet to search out additional resources pertinent to their studies.
DATA, DATA, DATA
Ideas from October 2003 Facilitator’s Meeting

Imagining Data Sources
Have teachers ask themselves “what do you know and how do you know it?” The “how” part is the data. From that point on, have teachers brainstorm all the ways in which they have constructed their knowledge of something.

Charting Progress Session by Session
• For each session complete the following matrix:

<table>
<thead>
<tr>
<th>My Classroom—any changes?</th>
<th>Focus update: questioning your question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Update: development</td>
<td>New Observations</td>
</tr>
<tr>
<td>Reflections</td>
<td>Summary</td>
</tr>
</tbody>
</table>

• For each meeting, have tasks that each person must do that relate to their projects.

Collecting Data
• Schedule a day to share data or a case study. Make this date concrete so teachers have to have something to share.
• Instead of trying to keep data on a whole class, choose data from five of less students, to reduce the amount of work.
• Have students start portfolios that are kept in the classroom, possibly in crates. Have students put a weekly sample (a quiz, writing sample, artwork, and their reflection). This is a really good source of data for you to start looking at, and the students are giving you feedback as well. As your question begins to focus, then so can what you collect and their reflections.

Processing Data with TR Groups—3 Alternatives
• Collect as much data as possible on a potential problem/question without analyzing it until the TR meeting. Make the discoveries with others.
• Present the data without interpreting any of it. Then let other researchers read and interpret the data. (The presenter is silent). Finally, the presenter presents his interpretation to see how it compares with the other interpretations.
• Present the data to the group and let people talk freely about what they are doing so people can ask them questions that prompt thinking and so that new insights come up while they talk.

Sharing Written Work
• For a journal entry or draft of a paper: send to group in advance so others will have time to respond during the group meeting. Have a follow up session to look at ways of analyzing data.
FILLING YOUR DATA-BUCKET
Methods for Reflecting and Writing
About Your Observations of Student Writing and Your Work with Standards

Option one
Shatzman and Strauss propose a tripartite journal structure that is divided into Observational Notes, Methodological Notes (which includes questions like “I don’t get this, I need to .....), and Theoretical Notes (which is really a start at analysis, at understanding your observations and other data). You could translate these titles into

<table>
<thead>
<tr>
<th>What I Observed</th>
<th>What I Need to Do Further</th>
<th>What I Think or Conclude</th>
</tr>
</thead>
<tbody>
<tr>
<td>What I Observed about Student Writing &amp; Standards</td>
<td>What I Need to Do Further to Learn More about Student Writing &amp; Standards</td>
<td>What I Think or Conclude about Student Writing &amp; Standards</td>
</tr>
<tr>
<td>What I Observed about My Teaching &amp; Standards</td>
<td>What I Need to Do Further about My Teaching &amp; Standards</td>
<td>What I Think or Conclude about My Teaching &amp; Standards</td>
</tr>
<tr>
<td>What I Observed about Standards</td>
<td>What I Need to Do Further about Standards</td>
<td>What I Think or Conclude about Standards</td>
</tr>
</tbody>
</table>

You could use this tripartite structure for some of your reflections and writing about your initial work with Focus on Standards, or you can try one or several of the following variations:

<table>
<thead>
<tr>
<th>What I Observed</th>
<th>What I Need to Do Further</th>
<th>What I Think or Conclude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Five things I know about X</td>
<td>Five things I need to learn about X</td>
<td>Ways I can find out what I need to know</td>
</tr>
</tbody>
</table>

Or fill in a tripartite square of your own devising that fits your needs for reflection and writing:

<table>
<thead>
<tr>
<th>What I Observed</th>
<th>What I Need to Do Further</th>
<th>What I Think or Conclude</th>
</tr>
</thead>
<tbody>
<tr>
<td>What I Observed</td>
<td>What I Need to Do Further</td>
<td>What I Think or Conclude</td>
</tr>
</tbody>
</table>

Option two
If you’re not currently in a reflective mode, the following tripartite structure can help you start to record some observations and nudge you towards reflection:

| Five things I know about X | Five things I need to learn about X | Ways I can find out what I need to know |

Option three
Or you may want to record your thinking about your information-gathering process:

| How I gathered data about X | What more I need to learn about X | Ways I can gather data to learn what I need to know about X |

Option four
For those of us more accustomed to directing our reflection and writing through prompts, consider responding to a combination of the following questions:

- What changes in emphasis have there been in terms of what I teach?
- What changes have there been in terms of how I teach?
- What new kinds of activities or approaches have I tried to engage my students?
- What changes have I made in response to the standards?
- What changes have I made in response to my students’ writing weaknesses or needs?
- What changes have I made in response to a test or assessment? Which test(s)?
- What writing gains have my students made? The students I am following more closely? Does their work illustrate the gains they have made?

**Option five**

Write a letter to a teaching friend describing and explaining your initial work with Focus on Standards (and perhaps about your plans for future work). Note: you can use some of the questions in “Option four” to structure your letter, if need be.

**Option six**

A dramatic variation of option five: Write an imaginary dialogue between yourself and a teaching friend (or several friends) about your initial work with Focus on Standards (and perhaps about your plans for future work).

**Option seven**

Reflecting about and writing from a student’s perspective: In “The Way Writing Works” Tom Romano writes about writing in a classroom through the fictional voice of a student. Either invent your own student or select a student whose work you followed this past year and write about your writing instruction in your classroom through this student’s voice, getting at some of your beliefs about writing that shape how you teach writing as well as some of your thoughts about writing and standards. Think about having your student refer to some of your actual writing assignments to frame your narrative; if you select an actual student you might also draw upon some of that student’s writing experiences. Feel free to follow Romano’s structure: “My teacher’s a real writing nut…” and take it from there.

**Writing Options for Next Year’s Work with Focus on Standards**

1. **Describing activities in your classroom**

Observe and record; take photographs of your classroom and students if necessary and write descriptive paragraphs of what you are seeing. You see your classroom scene daily, so you may have to force yourself to see it with fresh eyes. Here’s how Mike Rose describes activity in a classroom in Hattiesburg, Mississippi:

   “OK,” said Susan. “We need the micropipette.”
   
   Amy began to read: “Place one small drop of red blood-antigen complex onto the middle of the microscope slide.
   
   “OK, got that,” Amanda replied, reaching for the test tube that held the blood-antigen complex. “But wait, let’s move the slide a little closer.” The girls bunched in over the slide, and the talk came quickly.
“Let me do the blood, OK?”
“Like that, right?”
“Put a little more.”
“Oh, ugh!”
“Did Miss Sullivan say to use it all?”
“Yeah. What comes next?”

Susan, Amy, and Amanda were conducting an experiment in Aleta Sullivan’s human anatomy and physiology class. According to the scenario Ms. Sullivan had given them, they were members of a team from the Centers for Disease Control trying to figure out the cause of a violent illness affecting students who had just returned from an archaeological dig. Based on their results, they would have to make suggestions about the various actions the CDC might take. Then they were to write an essay assessing the validity of their procedure and the possible role human error might have played in their results. How to you establish confidence amid uncertainty? A dinosaur skeleton and an inflated shark hung above them; ferns grew moist in glass cases around them; off to the side a skeleton leaned forward from its post, skull cocked slightly, like a quizzical Mr. Bones.

Possible Lives, p. 285

Periodically schedule jotting down some descriptive notes and later writing a descriptive paragraph about your classroom and students when they are working on something related to your research. Doing so will help keep your observing eyes fresh.

2. Recording critical conversations
When that telling conversation with a student or someone else occurs, write it down so that you have the words and the details to use six months later. Don’t trust yourself to remember—because teachers daily are inundated with a welter of details that often overwhelm memory capacity.

3. Reflecting throughout the year
Periodically schedule a writing session in which you ask questions and speculate about answers concerning your research question.

4. Reflecting with your Focus on Standards group and gaining feedback
Do some exchange writing with colleagues in your FoS Group. E.g., you could write each other letters about what you are doing and learning, complete with questions that your colleague could answer. Or you could write a letter to a friend who is not part of your FoS Group, explaining your work on standards. You may already do such sharing through “talk” in your FoS Group, but talk is ephemeral and often more incomplete than writing is.

7. Analyzing your data (early rather than only at the end of the year)
Write about your data. Respond in writing to what you’re seeing in your students’ writing, to conversations, to observation notes, to surveys, to interviews, to questionnaire results.

8. Writing during group meetings to gain feedback/response
Start each FoS meeting with a writing prompt that is appropriate for where the group is in the investigative process. You could collectively create this prompt at the close of each previous meeting. Keep the prompts creative and varied. E.g., you could be tasked to choose 3 different journal entries and write about how they connect or about what patterns they reveal.
Data Analysis Worksheet

Research Question:

<table>
<thead>
<tr>
<th>Data</th>
<th>Ideas about what the data means in terms of the research question</th>
<th>Other interesting things</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Anthropologists refer to two types of field notes—"raw" and "cooked." Raw notes are just what you've written, as quickly as possible, without any analysis. Cooked notes are the analysis of these raw materials.

One simple scheme for cooking involves codes developed originally by the famed anthropologist Levi-Strauss (adapted by Corsaro 1981). We recommend the use of three of these codes:

- **PN** personal notes
- **MN** methodological notes
- **TN** theoretical notes

**Personal notes** include any information relevant to your mood, or that of the class. Events like an argument before school with a colleague, or a child vomiting in class ten minutes before you began notetaking, will affect the notes you take, and it's good to include these to jog your memory later about why the notes might be unusual on that day.

**Methodological notes** include any questions or statements about how you're doing your work. They might be statements like "I should put a tape recorder by the science center to get those interactions" or "Maybe students should keep logs of questions asked during literature discussions."

**Theoretical notes** include any hunches about patterns, or why events are occurring as they are. A theoretical note might be as formal as "I think Tadd's behavior after time in special education supports Kohn's notions about the danger of external reward systems." But most are less formal—they are those "aha" moments that are essential to good teaching. These might include statements like "Perhaps Jason's frustration in science is due to so many absences in the past two weeks—the group seems unwilling to bring him up to date on the project."

Cooking notes can also be as simple as adding questions to them, to extend and expand your thinking about what you are seeing. The Latin root of the word *theory* means to see or behold—cooking with questions in mind extends your sight about what patterns are emerging. Questions to consider while cooking your notes might include, Why did I think this was important to write down? How does this connect with what I saw earlier in the day, week, year? Based upon what I'm seeing, what action should I take to change the curriculum or my research project?

These questions can easily be abbreviated in your notes. For example, thinking about the importance of what you're noting becomes *I?* as an inserted code. Issues of curricular change become *C?* as a code. Potential additions to assessment narratives become *A?* as a code. What you're trying to do is develop a mind-set that constantly questions as you write your notes—that is what cooking is all about for researchers.
I. Define quantitative analysis
   Ask audience what they think of when they hear that—some ideas.
   Def: it’s a way of using numbers to represent behavior

II. What can you collect numbers from? Ask audience, list
   A. teacher-made tests
   B. surveys
   C. standardized tests
   D. attendance
   E. GPA, grades, etc

III. Define some relevant terms
   **Validity = accuracy**: the data are valid to the extent that the measurement instrument (test, survey, etc) is accurate; the instrument is valid to the extent that it measures what it is supposed to measure, the study is valid to the extent that you are studying a phenomenon accurately

   **Content validity**: how much the questions/items on the instrument measure what is supposed to be covered. E.g. if you are trying to find out how much a group of people knows about boating safety: ask questions about life jackets, weather conditions, boat regulations… Seems pretty straightforward, but how many of you have taken a test that asked questions that didn’t seem related to what you had been learning (especially in college)? Psychological tests—trick you… **measure**: by having experts review the questions (other teachers in the content area, other professionals who know about an area, such as if you are giving a survey about computer lab use at your school—ask computer lab technician/librarian, etc.

   **External validity** = how accurately the study reflects what can happen in other places—if, or how much, you can generalize your findings. “My classroom, my school, my students”…true to some extent, but everything you are finding out could help us see trends and understand things that occur in other classrooms, other schools, etc. Ex: using student-generated rubrics…the details of the exact rubric might be different to every class, but the principles could hold true across many different contexts

   **Reliability = consistency**: across people, or with the same people over time; if you did the study over, would you get the same results? No one expects 100%...usually 70-80% is considered pretty good.

   **Reliability of the instrument**—how consistently does it measure what it’s supposed to. **Inter-rater reliability**: if more than one person is collecting data (grading tests), how much do they make the same choices (such as giving a score)? This is a big deal when you’re coding, for example student writing samples…if more than one person is doing it, you want to find out if you are all making the same/similar choices. **Reliability of treatment implementation**—are you doing the same thing consistently with students in different classes, or with all of the students…

   **Error** = if you have too few students, then the statistical tests we’ll talk about might tell you there is no difference between groups you are comparing, when maybe a larger number of students per group might allow you to see if there are real differences (also the opposite can be true—small numbers might make it look like there are differences between groups, when in fact it’s just a fluke). For example, you could find in your class that girls outperform boys in giving presentations. Is this universally true? Probably need to look at a lot more classrooms to find out if there is a real trend.

IV. Research designs—2 main types
   A. Quasi-experimental (“quasi” means the subjects aren’t randomly assigned to treatments—usually the case for classes): examples are intervention studies, pre/post tests
   B. Correlational: these show relationships, no causation for what you find

V. Pre-test/post-test designs
   A. need a baseline for how the students are before an intervention/treatment = pre-test
   B. best to use the same measures/tests as pre-test and post-test, to compare
   C. some people like to report scores as %’s: grades, etc.
1. drawbacks of using categories like grades: lose information and variability (a student could go from 80 to 89 but still have a B—you won’t see the big change if you just look at the grade)
2. so it’s better to use raw scores, like 80, not B
D. to analyze score changes: chart data and plot scores to visually look at data for trends (eliminate outliers)
  1. can do a Sign Test (see statistics handout)
  2. compare means of pre to post, or by gender, etc., with t-test (see statistics handout)

VI. Correlational designs
   A. to look at relationships: attendance and grades, gender and grades, etc.
   B. not causation, but see if two things change together (positively or negatively)
   C. useful for: checking the strength of a relationship, making score predictions (GPA is used to predict college success)
   D. to analyze: Plot, Plot, Plot! Look at the slope of the line; calculate “r” (see statistics handout)

VII. Compare Groups
   A. ask group for examples (e.g.

VIII. Surveys
   A. Ask what types of things they might survey people about (students, teachers, parents).
   B. Making surveys—what things do they think they need to consider?
      1. wording of questions very important (clear, address only one idea per question, not leading, no jargon). Order: first should be interesting so people want to get into it; sensitive questions not at beginning
   2. different types of question responses:
      a. open-ended versus closed (you give them the options to choose from); pros and cons (quantifying, prompts people to think about things they might not come up with on their own)
      b. closed: dichotomous (yes/no)—least amount of info but good for factual things, ranking, rating—usually on a 5-pt. scale
   3. response problems: “social desirability”—people might pick responses to make themselves look good, acquiescence—choose responses they think you want/expect, order effect (responses can change depending on what people have seen before it—create a mindset), ceiling effect—response choice range too narrow to get much info (e.g. 3 choices—smiley faces); extremeness of response—choosing all 5’s: can switch things around, so if you are asking about things kids like, e.g. like to eat candy, ice cream, cookies, asparagus—catch people who are just circling 5’s, or not being honest, throw them out
   4. reliability and validity issues apply
   5. combat these problems: have other teachers/experts check questions and responses, pilot test on others not in your study and ask for feedback, refine, and pilot test again!!!!

C. Reporting results from surveys
   1. as percentages
   2. 5-pt. likert scale—mean and std. dev.
      \[ \text{Mean} = \text{average, add up scores and divide by # of scores} \]
      \[ \text{Std. dev.} = \text{tells you how much each score deviates from the mean—gives you and idea about the range or spread of the scores (draw example).} \]
      Calculate: (see statistics handout)
   3. t-test when comparing groups (like gender), or pre- and post-results

IX. Limitations and things to attend to
   A. non-random assignment = students are not randomly assigned to your class—they are there because of where they live, or parental concern, or scheduling with other classes…these and other outside factors may influence their reactions to your treatments
      1. Problems: not very generalizable, but teachers often want to generalize to their future classes
      2. there can be hidden variables (e.g. many “gifted” students are in your 1st period class because of other A.P. classes scheduled at other times). These can lead to “spurious causation”: a third
factor is really causing the other two (e.g. shark attacks and ice cream sales are positively correlated; is one causing the other? Or some other factor causing both, which are unrelated to each other?)

3. to counteract: use control groups, repeat experiment/treatment over several years, work with other teachers who are doing the same treatment in their classes

B. Maturation/development in longitudinal designs

1. problem: “learning”/effect of treatment, or skill increase due to maturation? Audience give examples… You want to know if the changes you see are above and beyond what would happen normally without the treatment, like in Shirley’s study

2. deal with it: use a control group for comparison—e.g. different from classes in previous years without new “program”

C. Experimenter “bias” or point of view

1. problem: we have our assumptions about what works/doesn’t, what our outcome will be; this could influence our study in subtle ways. Ask for examples of assumptions in work.

2. deal with it: always be aware of the possibility; be explicit and honest about your assumptions in your write-up—don’t have to get rid of them; be consistent with the way you treat different groups if you are giving a treatment, have other people look at your tests/surveys/findings

D. Analyzing your data

1. look for other explanations for what you’re seeing, and test if those are true, or why they aren’t

2. do more than 1 analysis to see if you get the same trends: look at the data 3 different ways

3. the coding of data that we do is man-made and arbitrary, so it may not be accurate!

E. Interpretation of quantitative data: what does it mean?

1. statistically significant results don’t always have practical value—step back and think about your results

2. every time you reduce behavior to numbers you lose information—go back and look at the behaviors, too, to see if they match up with the results

VIII. Small group work on examples (by 11:00 at latest)
STATISTICAL TESTS TO ANALYZE YOUR DATA
Developed and reprinted with permission by Julianna Raskauskas

Sign Test +/-

The sign test is a general test that allows you to look at whether an intervention or treatment has made a difference. It is not an inferential test so cannot be used to make inferences or predictions, but it does allow for looking at trends in existing data.

Follow these steps to use the Sign Test:

STEP 1: Give the same test, measure, or survey before and after a treatment or intervention.
STEP 2: Calculate a score for each student on pre-test and post-test.
STEP 3: For each student, find the difference between the post-test and the pre-test score. Some of the differences will be positive (+) and some negative (-).

<table>
<thead>
<tr>
<th>Student</th>
<th>Pre-Test</th>
<th>Post-Test</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larry</td>
<td>5</td>
<td>3</td>
<td>-2</td>
</tr>
<tr>
<td>Curly</td>
<td>6</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Moe</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

STEP 4: Count up the number of positive differences. Count up the number of negative differences. Do not count scores that did not change from pre-test to post-test.

STEP 5: Compare number of positive differences and number of negative differences. If there are more positive than negative changes than the treatment, on average, increased student scores. If there are more negative than positive differences than the treatment, on average, decreased student scores. This test does not test for a statistically significant difference.
Inferential Statistics
Mean, Standard Deviation, t-test, Correlational “r”

N = The number of scores/students answering a question or completing the test/survey.
X = An individual students’ score on a given measure or test.

MEAN
The arithmetic mean (M) is simply the average score on the test/survey. To calculate the mean, follow these steps:

STEP 1: Add all scores together.
STEP 2: Divide the total by the number of scores (N)

NOTE: Do not include students in the “N” for whom you do not have scores.

STANDARD DEVIATION
The standard deviation (SD) is the average difference between the scores and the mean. To calculate the SD, first calculate the mean as above, then follow these easy steps:

STEP 1: Subtract the mean from each student’s score to find the difference between the score and the mean (X - M). Some of the differences will be positive (+) and some will be negative (-).
STEP 2: Square each students’ difference (multiply it by itself). You must square each difference because the mix of + and – would cancel each other out if you added them up without squaring first. Squaring a negative number makes it positive.
STEP 3: Add all of the squared differences together to get a total.
STEP 4: Divide by the number of scores minus one (N – 1).
STEP 5: Because you squared the scores in Step 2, you must now take the square root of Step 4 in order to get the Standard Deviation (SD).

T-TEST
A t-test compares the means of two (2) groups (such as males vs. females, or morning vs. afternoon students) to see whether they are significantly different than what would be expected by chance. Calculate the mean (M) and standard deviation (SD) as above before following the steps below to calculate the t-score.

STEP 1: Square the standard deviation (SD) of group 1 and divide by group 1’s sample size (N).
STEP 2: Square the standard deviation (SD) of group 2 and divide by group 2’s sample size (N).
STEP 3: Add Step 1 and Step 2 together and take the square root ( ) of the sum.
STEP 4: Subtract the mean (M) of group 2 from the mean (M) of group 1 (M1 – M2).
STEP 5: Divide Step 4 by Step 3 to get the t-score (t).
STEP 6: Compare the t-score to the chart below. If your t-score is greater than the numbers listed, then the group’s scores are considered significantly different from each other at the probability < .05. This means, you can be 95% sure that a true difference between the groups exists.

<table>
<thead>
<tr>
<th>N</th>
<th>t-score at/or above</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 or less</td>
<td>2.57</td>
</tr>
<tr>
<td>6 to 10</td>
<td>2.23</td>
</tr>
<tr>
<td>11 to 15</td>
<td>2.13</td>
</tr>
<tr>
<td>16 to 30</td>
<td>2.05</td>
</tr>
<tr>
<td>31 or more</td>
<td>1.96</td>
</tr>
</tbody>
</table>

Example: If you calculated a t-score of 2.00, it would represent a significant change if you had 31 or more students participating in the study, if you had 30 or less, the test would not indicate a significant difference between the group means.

The t-test identifies that there is a difference between the groups but does not tell you anything about that difference. Look at the means (M) of each group to see which one is higher.
CHI SQUARE

The Chi Square test is used to compare two (2) items where responses for both items are in categories like gender, ethnicity, grade level, or letter grades. The chi square statistic tells you whether the number of people who fell into each category is different than what you would expect. To calculate a chi square use the following steps.

**STEP 1:** Only compare 2 items at a time (i.e. gender and letter grade, reading group and ethnicity). Start by making a table or grid to visually represent the comparison. Put the categories of one item (like gender) across the top and the other down the side (like reading level).

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Average</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above Average</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**STEP 2:** Put in the top left hand corner of each cell in the chart the number of people who scored in the intersection of those two items. These are the **observed frequencies**.

<table>
<thead>
<tr>
<th></th>
<th>Boys (N = 10)</th>
<th>Girls (N = 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Average</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Average</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Above Average</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

**STEP 3:** In the lower right hand corner of each cell put the number of children you would expect to fall into each category if there were no differences. These are the **expected frequencies**. Usually, the expected frequencies would be the same for all groups, assuming that all groups would have an equal number of people in them. However, the expected frequencies may be different if you know from prior experience or research that there is usually a difference observed between the groups. If that is the case, use proportions to calculate new expected frequencies. For example, if it is known that an average of 20% of children in the U.S. score below grade level on reading and 20% score above, you can calculate expected frequencies based on these numbers.

Example:

<table>
<thead>
<tr>
<th></th>
<th>Boys (N = 10)</th>
<th>Girls (N = 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Average</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Average</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Above Average</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

**STEP 4:** For each cell calculate the observed frequency minus the expected frequency and then square it. (Again, you must square this number because it may be negative and you do not want the numbers to cancel each other out.)

<table>
<thead>
<tr>
<th></th>
<th>Boys (N = 10)</th>
<th>Girls (N = 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Average</td>
<td>((4 - 2 = 2) \times 2 = 4)</td>
<td>((2 - 2 = 0) \times 0 = 0)</td>
</tr>
<tr>
<td>Average</td>
<td>((4 - 6 = -2) \times (-2) \times 2 = 4)</td>
<td>((5 - 6 = 1) \times 1 \times 1 = 1)</td>
</tr>
<tr>
<td>Above Average</td>
<td>((2 - 2 = 0) \times 0 \times 0 = 0)</td>
<td>((3 - 2 = 1) \times 1 \times 1 = 1)</td>
</tr>
</tbody>
</table>
**STEP 5:** For each cell, divide Step 4 by that cell’s expected frequency.

<table>
<thead>
<tr>
<th></th>
<th>Boys (N = 10)</th>
<th>Girls (N = 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Average</td>
<td>4 / 2 = 2.00</td>
<td>0 / 2 = 0.00</td>
</tr>
<tr>
<td>Average</td>
<td>4 / 6 = 0.66</td>
<td>1 / 6 = 0.16</td>
</tr>
<tr>
<td>Above Average</td>
<td>0 / 2 = 0.00</td>
<td>1 / 2 = 0.50</td>
</tr>
</tbody>
</table>

**STEP 6:** Add up all of the Step 5’s to get a total. This is your chi square statistic notated as $x^2$ in article write-ups.

$$x^2 = 2.00 + 0.66 + 0.00 + 0.00 + 0.16 + 0.50 = 3.32$$

**STEP 7:** Calculate the degrees of freedom (df) so you can look up on the table whether there is a significant difference between what you found and what was expected. To calculate the degrees of freedom you multiply the number of rows in your table minus one by the number of columns in your table minus one. $df = (#\ of\ rows - 1)(#\ of\ columns - 1)$

Example:
$$df = (3\ rows - 1)(2\ columns - 1)$$
$$df = (2)(1)$$
$$df = 2$$

**STEP 8:** If the chi square statistic is greater than the number listed next to your degrees of freedom in the table than it is significant at the probability < .05 level. This means that you can be 95% sure that there is a difference between the groups, and that this difference is not due to chance alone.

<table>
<thead>
<tr>
<th>df</th>
<th>Chi Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.02</td>
</tr>
<tr>
<td>2</td>
<td>7.38</td>
</tr>
<tr>
<td>3</td>
<td>9.35</td>
</tr>
<tr>
<td>4</td>
<td>11.14</td>
</tr>
<tr>
<td>5</td>
<td>12.83</td>
</tr>
<tr>
<td>6</td>
<td>14.45</td>
</tr>
<tr>
<td>7</td>
<td>16.01</td>
</tr>
<tr>
<td>8</td>
<td>17.53</td>
</tr>
<tr>
<td>9</td>
<td>19.02</td>
</tr>
<tr>
<td>10</td>
<td>20.48</td>
</tr>
<tr>
<td>15</td>
<td>27.49</td>
</tr>
<tr>
<td>20</td>
<td>34.17</td>
</tr>
<tr>
<td>25</td>
<td>40.65</td>
</tr>
<tr>
<td>30</td>
<td>46.98</td>
</tr>
<tr>
<td>40</td>
<td>59.34</td>
</tr>
<tr>
<td>50</td>
<td>71.42</td>
</tr>
</tbody>
</table>

Example: Since the calculated chi square ($x^2$) = 3.32, is not larger than 7.38 (the number opposite 2 degrees of freedom), it can not be said that these groups differed significantly, nor that the number of people in each category were different then how students would be expected to score by chance. If this example had been testing a treatment, we would conclude it had no effect on which category students fell into.

**NOTE:** Chi Square is an omnibus test – this means that it simply tells you there is a difference without telling you what that difference is. Look at the difference between the observed frequencies and expected frequencies in each cell to tell you which groups had more/less people than expected.
Correlation “r” Statistic

Variable (V): A question, scale or test score that is numeric and continuous.

Correlation measures the degree and the direction of a relationship between two variables. The correlation “r” statistics tells how much of change in one variable can be expected for a one-unit change in the other variable.

To obtain a correlation “r”, calculate the standard deviation (SD) for both variables you are interested in, as described above. Make sure to keep your notes for calculating the SD because you will need to know the difference (V-M) for each student later on.

\[
\text{Correlation “r”} = \text{Slope b X} \frac{\text{Variable 1 Standard Deviation}}{\text{Variable 2 Standard Deviation}}
\]

Steps 1-4 are to calculate your slope b. If you know how to get a slope from a graph, divide the numerator by the denominator to get a decimal to put in the equation, and skip to Step 5.

**STEP 1** For each student, multiply the difference between their score on variable 1 and the mean (V1 – M1) times the difference between their score on variable 2 minus the mean (V2 – M2).

<table>
<thead>
<tr>
<th>Student</th>
<th>Variable 1 (V1)</th>
<th>Variable 2 (V2)</th>
<th>Difference 1 (V1-M1)</th>
<th>Difference 2 (V2-M2)</th>
<th>Difference 1 X Difference 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bashful</td>
<td>5.0</td>
<td>1.0</td>
<td>2.3</td>
<td>-2.2</td>
<td>-5.0</td>
</tr>
<tr>
<td>Doc</td>
<td>2.0</td>
<td>4.0</td>
<td>-0.7</td>
<td>0.8</td>
<td>-0.5</td>
</tr>
<tr>
<td>Dopey</td>
<td>1.0</td>
<td>5.0</td>
<td>-1.7</td>
<td>1.8</td>
<td>-3.0</td>
</tr>
<tr>
<td>Happy</td>
<td>3.0</td>
<td>2.0</td>
<td>0.3</td>
<td>-1.2</td>
<td>-0.3</td>
</tr>
<tr>
<td>Grumpy</td>
<td>2.0</td>
<td>5.0</td>
<td>-0.7</td>
<td>1.8</td>
<td>-1.2</td>
</tr>
<tr>
<td>Sleepy</td>
<td>1.0</td>
<td>5.0</td>
<td>-1.7</td>
<td>1.8</td>
<td>-3.0</td>
</tr>
<tr>
<td>Sneezy</td>
<td>5.0</td>
<td>1.0</td>
<td>2.3</td>
<td>-2.2</td>
<td>-5.0</td>
</tr>
</tbody>
</table>

Variable 1 Mean = 2.7  Variable 2 Mean = 3.0

**STEP 2**: Add up all of the multiplied differences to get a total.

Example: Sum of Difference 1 X Difference 2 Column = -18

**STEP 3**: For one variable (1 or 2), square the differences and add them together. (You should have this information from the Standard Deviation calculation)

Example: Variable 2 (sum of differences squared) = 18.8

**STEP 4**: Divide Step 2 by Step 3, this will give you your slope b for the equation.

Example: \(-18.0 / 17.4 = -1.03\) (Note: a slope can be over 1.00)

**STEP 5**: Using the standard deviations calculated for each variable, divide the standard deviation (SD1) for variable 1 by the standard deviation (SD2) for variable 2.

Example: \(1.70 \text{ (SD1)} / 1.77 \text{ (SD2)} = .96\)

**STEP 6**: Multiply Step 4 by Step 5 to get your correlation “r” statistic.

Example: \(r = -1.03 \times .96 = .98\)

An “r” score should be between -1.00 and +1.00. The closer to -1.00 or +1.00 the score is the stronger the relationship between the two variables is. If the number is positive than the variable scores change together in the same direction. If the result is negative “r” than when one variable increases the other decreases.
November 21, 2002

Thank you again for your support.

Sharon King
Skinner@wsl.edu

Presentation

Questionnaire: After reviewing the data collection, graphs, and analysis, I hope you will be able to understand the recommendations and future directions for this project.

This brochure is to help you understand the rational behind the making of the pencil work in pencil and prisma. WSHS Beginning Art Students

Through Art

World

Reinterpret Their Students

Presentation

Analysis and

To Data Collection,

Alternative Methods

for Teacher Research

UCC Cross Center

Full Support Seminar

What are the worst are

There is only way Open

the best way we
What are alternative methods to data collection, analysis and presentation?

Data might be stories, poems, art work, PowerPoint, videos, movies, plays, dances, photography...

They might be analyzed as in critical analysis of literature for concrete elements and meaning.

Elements could be totaled as in quantitative analysis.

They might be interpreted as in qualitative analysis.

Alternative methods of presentation might be PowerPoint, brochures, newsletters, art shows, stories, poems, sculptures, videos, photographic presentations, etc.

What motivated me to do a research project on student art as a response to the events of 9/11?

It was the most obvious subject combining what I do as a teacher and what was on the minds of myself and my students as demonstrated on T.V., in newspapers, radio, Internet jokes and SPAM, conversations and class work.

But why present it as a PowerPoint and not a paper?

It was more fun.

And I have always hated writing. Words betray me and become contrived or misunderstood. Teachers always complain that I have had every fact but it is always disorganized. They are right. I do not think linearly.

For example if you take:

9/11, artist/teacher, teacher research, technology training, student art, inquiry based art education training and scramble it well in my head, let it ferment a little and then sift it out, in other words think holistically, you get a Teacher Research PowerPoint presentation of interpretations of student attitudes from art about 9/11.

Why use art as data?

Why not?

"I had a minor epiphany today. I showed my students a current drawing I had completed. It was surrealistic, a collage of real looking but impossible images. ... I had explained all the symbolisms to my students in a morning class. Several hours later, Sol, a frustrated 3rd year art student remarked, “What is my art? Where do I go? It is all jumbled! Your work has meaning, its planned.” I responded with, “Oh, I just make that up (the explanation of symbols in my art) after I make it. I don’t plan, I just put images together.” David, another student looked surprised and then started shouting, “RIGHT ON! RIGHT ON!” Both students could really relate to that. They also drew because they were captivated by images and let their minds wander...associating images, colors, and were subconsciously making connections."

Journal Entry
6/1/01

- Writers call it stream of consciousness, psychologists say they are getting to the subconscious, or free association of ideas.

- I think holistically and in images not words. (so do many of my students)

- Ideas seem to just emerge in my art work and when I view other’s art work.

- My ideas are not systematically developed but sometimes emerge full blown.

- I often collect my thoughts by doodling.

- I then translate the images to words, reflect back on the words in images, reflect on the images in words and then translate the ideas to hard data in semi organized forms so 'right brain' challenged thinkers, those less visual can understand.

What approaches to data collection worked for me and how do I make sense of it?

- I doodle, I draw, I paint, I journal at 3 am in the morning, I do clay, I play with Adobe Photoshop, I take photos, I talk to students, I survey students, then I sleep on it. If I am lucky the light bulb in my head lights up and I have an idea. Then I labor to present it in an understandable form that is economical to print... or present.

How am I being true to my research methods? And how do I organize the research?

- I remind myself to enjoy what I am doing.

- I think most honestly through art.

- I communicate better visually.

- I organize my work through laborious revisions and suggestions from my peers. Thanks WHS TR group, I need you.

- I search for symbolism and meaning in objects, juxtapositions, colors and subjects in my own and student’s work.

- I ask students what their work means to them.