Session 3238

Recapture The Fun Of Teaching And Learning Using Millennial Tools

Judson J. Singer
Kettering University

Abstract: Call it the digital revolution, information highway, communication age, information age or any other suitable name you like. No matter what you call it, its effect upon teaching and learning in this new millennium has and will continue to be profound. Certainly the use of digital information promotes greater thoroughness, speed, efficiency, and accuracy as well as leverages our ability to create more information. Past students and teachers of engineering graphics have rarely cited how much "fun" they had teaching or learning the subject. This paper explores how modern CAD tools, the World Wide Web, email, digital imaging, collaboration tools, broadband access, digital music, and streaming media can be woven together to create a fun and exciting experience that gives engineering graphics students a powerful feel for modern "engineering" while giving teachers unlimited opportunities for creative control of student learning in a "digital playground/classroom".

Singer's **M**illennial **I**nternet **L**earning **E**nvironment - The Web I Weave

People Learn In Proportional To The Fun They're Having

By observation over the years I have observed that students perceive that "hard work" and "qualifications" are the words most closely associated with learning. How hard a teacher must work to convince today's college students that study and learning can be interesting and even joyful activities! If learning is like play it will be more absorbing unless the student has been so affected that only truly dull and serious work is equated with learning. Probably the only difference between work and play is the attitude we have toward any given activity. Therefore, the author regularly makes every conceivable effort to establish an environment and offer learning activities which have proven to be fun to students taking his classes.

Establishing A Comfortable & Relaxed Environment

Nothing can beat first impressions! Into the classroom flow the students on the first day of class at the start of the hour. In the background hoots James Brown informing us all that he... "feels good!" Into class struts the professor waving his humming and glowing "Super Smart Stick" over the heads of students in the aisles. An occasional student spontaneously jumps into the show and bows submissively like a knight of old while another rolls her eyeballs back as she shakes under her mysterious and newly acquired power. Their classmates are howling with laughter by now. Other students passing by in the hallway delightedly peek into the room to see what's happening. After settling down a volunteer is solicited to permanently serve the class by wielding the "Yapper Zapper" to remind "Prof." that whenever he has gotten off track that he should return to the more important topics of discussion for the day. This overt gesture of student empowerment greatly lends to a positive classroom environment.

Figure 1 "Come back in three months for a booster."

Figure 2 "Hold it! Please stop rambling"

From the very first day the students must be made aware that they will be receiving cutting edge academic content and engaging presentation of that content. Equally, they must be able to identify what is unique and personally beneficial. The response of one engineering graphics student and his mother whom he promptly contacted was as follows:

Figure 3 Nonlethal Force: Super Smart Stick and "Yapper Zapper"

"*Hello,*
My son, Kurt Enkemann (Freshman B session) was impressed with your fun nature and told me to visit your site. I'm glad I did. Just wanted to say "Thank You!" I'm sure he'll enjoy your class."
Wendy Enkemann

Listserv

Listservs are free and provide a very useful and efficient way of coordinating the activities of a large group of people. Everyone can comment or inform everyone else about their work, some question that has arisen, or some organizational matter that needs to be resolved. A listserv for the course is maintained by the professor so that all students in all engineering graphics sections can maintain 7/24 communication with all other engineering graphics students and the professors who teach the course. Students have clearly enjoyed this degree of accessibility to each other and the professors. This is quintessential John Naisbett who spoke of the pressing need for "High Tech, High Touch" in his book Megatrends.

In course assignment #1 students are directed to *www.peak.org/cgi-bin/majordomo?me102:singer.kettering.edu* to subscribe to the course listserv. Using a web interface to manage participation in a listserv significantly reduces the complexity. By the end of the first day of class students have received two messages from their professor. The first introduces them to the lighter side of the engineering profession.

"Three men: a project manager, a software engineer, and a hardware engineer are helping out on a project. About midweek they decide to walk up and down the beach during their lunch hour. Halfway up the beach, they stumbled upon a lamp. As they rub the lamp a genie appears and says "Normally I would grant you three wishes, but since there are

three of you, I will grant you each one wish."

The hardware engineer went first. "I would like to spend the rest of my life living in a huge house in St. Thomas with no money worries." The genie granted him his wish and sent him on off to St. Thomas.

The software engineer went next. "I would like to spend the rest of my life living on a huge yacht cruising the Mediterranean with no money worries." The genie granted him his wish and sent him off to the Mediterranean.

Last, but not least, it was the project manager's turn. "And what would your wish be?" asked the genie. "I want them both back after lunch" replied the project manager.

A mathematician, a physicist, and an engineer were all given a red rubber ball and told to find the volume of the ball.
The mathematician carefully measured the diameter and evaluated a triple integral. The physicist filled a beaker with water, put the ball in the water, and measured the total displacement. The engineer looked up the model and serial numbers in his red-rubber-ball table.

During the heat of the space race in the 1960's, NASA decided it needed a ball point pen to write in the zero gravity confines of its space capsules. After considerable research and development, the Astronaut Pen was developed at a cost of $1 million. The pen worked and also enjoyed some modest success as a novelty item back here on earth. The Soviet Union, faced with the same problem, used a pencil.

Top Ten Things Engineering School didn't Teach You

10. *There are at least 10 types of capacitors.*
9. *Theory tells you how a circuit works, not why it does not work.*
8. *Not everything works according to the specs in the data book.*
7. *Anything practical you learn will be obsolete before you use it, except the complex math, which you will never use.*
6. *Engineering is like having an 8 a.m. class and a late afternoon lab every day for the rest of your life.*
5. *Overtime pay? What overtime pay?*
4. *Managers, not engineers, rule the world.*

3. *Always try to fix the hardware with software.*
2. *If you like junk food, caffeine and all-nighters, go into software.*
1. *Dilbert is not a comic strip, it's a documentary.*

Pick-Up Lines to use on Engineering Chicks

-I won't stop bugging you until I get the address of your home page.
-You fascinate me more than the Fundamental Theorem of Calculus.
-Let's convert our potential energy to kinetic energy.
-Wanna come back to my room and see my 166mhz Pentium?
-How about you and I go back to my place and form a covalent bond?
-You and I would add up better than a Riemann sum.
-You're sweeter than glucose.
-We're as compatible as two similar Power Macintoshes.
-Wanna see the programs in my HP-48GX?
-Your body has the nicest arc length I've ever seen.
-You're hotter than a bunsen burner set to full power!
-My love for you is like a concave up function because it is always increasing.

Real Engineers consider themselves well dressed if their socks match.
Real Engineers buy their spouses a set of matched screwdrivers for their birthday.
Real engineers have a nontechnical vocabulary of 800 words.
Real Engineers repair their own cameras, telephones, televisions, watches, and automatic transmissions.
Real Engineers say "It's 70 degrees Fahrenheit, 25 degrees Celsius, and 298 degrees Kelvin" and all you say is "Isn't it a nice day?"
Real Engineers wear badges so they don't forget who they are.
Sometimes a note is attached saying "Don't offer me a ride today. I drove my own car".
Real Engineers' politics run towards acquiring a parking space with their name on it and an office with a window.
Real Engineers know the "ABC's of Infrared" from A to B.
Real Engineers know how to take the cover off of their computer, and are not afraid to do it.
Real Engineers' briefcases contain a Phillips screwdriver, a copy of "Quantum Physics", and a half of a peanut butter sandwich.
Real Engineers don't find the above at all funny.

You Might Be an Engineer if...

your favorite James Bond character is "Q".
you see a good design and still have to change it.
you still own a slide rule and you know how to use it.
your family haven't the foggiest idea what you do at work.
you are better with a Karnaugh map than you are with a street map.
you think the real heroes of "Apollo 13" were the mission controllers.
you have owned a calculator with no equal key and know what RPN stands for.
you make four sets of drawings (with seven revisions) before making a bird bath.
you have trouble writing anything unless the paper has horizontal and vertical lines.

How many first year engineering students does it take to change a light bulb?
None. That's a second year subject.

How many second year engineering students does it take to change a light bulb?
One, but the rest of the class copies the report.

How many third year engineering students does it take to change a light bulb?
"Will this question be in the final examination?"

How many electrical engineers does it take to change a light bulb?
None. They simply redefine darkness as the industry standard.

How many nuclear engineers does it take to change a light bulb?
Seven. One to install the new bulb and six to figure out what to do with the old one for the next 10,000 years"

The second message, personalized with MailKing email merge software, welcomes them to the course.

" **Mr. Jonathan Bailey**
Kettering University
1700 W. Third Avenue
Flint, Michigan 48504-4898

Hi Jonathan,

I am really looking forward to our term together. I hope you're eager to learn new ideas and develop new skills which will serve you well in your professional career Jonathan. It's not unusual for me to have learned more from you that you learned from me. Kettering is a relatively small school so you'll have ample opportunity to get to know your professors personally as well as they you. That's one reason I love teaching so much.

I want to invite you to drop by often to see me so that we can get to know each other better. I often use email to stay in contact with you Jonathan because of its speed, cost, ubiquity, and informality. Actually, you too will be using email in the conduct of our course together. You'll find it useful to save those messages from me which are directly related to the course. Occasionally, I'll write you about other things, in which case you needn't maintain the messages."

Figure 4 Email merge example of letter welcoming student to course

For the greater part, students receive highly personalized email message from the author. These messages were created using an email merge program called MailKing. A downloadable demo version is available at www.messagemedia.com/solutions/mailking/. Email merge is similar to mail merge in Word or WordPerfect—you create a form letter and merge personalized data into each letter. Then your letters are addressed to "Dear Andrew" instead of "Dear Student," for example. With e-mail merge, you create personalized messages and send them via standard Internet e-mail—fast and easy. You don't have to await the next class session, print letters, stuff and stamp envelopes and wait several days for a response. MailKing lets teachers speak directly to the individual student, creating a better relationship.

Creative Play Using I-DEAS

Use and learning of the solid modeling program I-DEAS is broken into easily mastered components. One of these fun modules is as follows:
"*We will play a while during this class session. We will create a 3D model of some object described by your instructor. This is a fun and non-threatening exercise in which you creatively use your I-DEAS skills to build and design. At the end of the exercise period we will all leave our tables and wander around the lab examining each other's designs. People learn in direct proportion to how much fun they are having. You and your classmates have created your own*

models using I-DEAS. Vote online (singer.kettering.edu/play-on-ideas.htm) for the winner of each category below. The Winners receive an automatic perfect score on the next quiz. Your vote is kept confidential. Please vote just once by submitting the online ballot just once. We will perform this kind of creative exercise several times during the academic session. We will vote online for the winners in four different categories: funniest, most outrageous, most complex, and prettiest."

This play and mildly competitive exercise places much greater emphasis upon creativity rather than technical skills or software competency thereby permitting even the mildly competent engineering graphics student to occasionally shine and boost their self esteem through the approval of their peers. Some postsecondary students are motivated by an atmosphere of competition. This competition isn't necessarily healthy or effective though in terms of learning and benefits. Competition generally hurts students who haven't succeeded in competitive classrooms throughout elementary and secondary education. Therefore, the remaining students who don't "win" still get to "express themselves" graphically and absorb other dimensions of being from their classmates as well as assess skill levels of their classmates apparent in this free form exercise where there are no "right or wrong solutions".

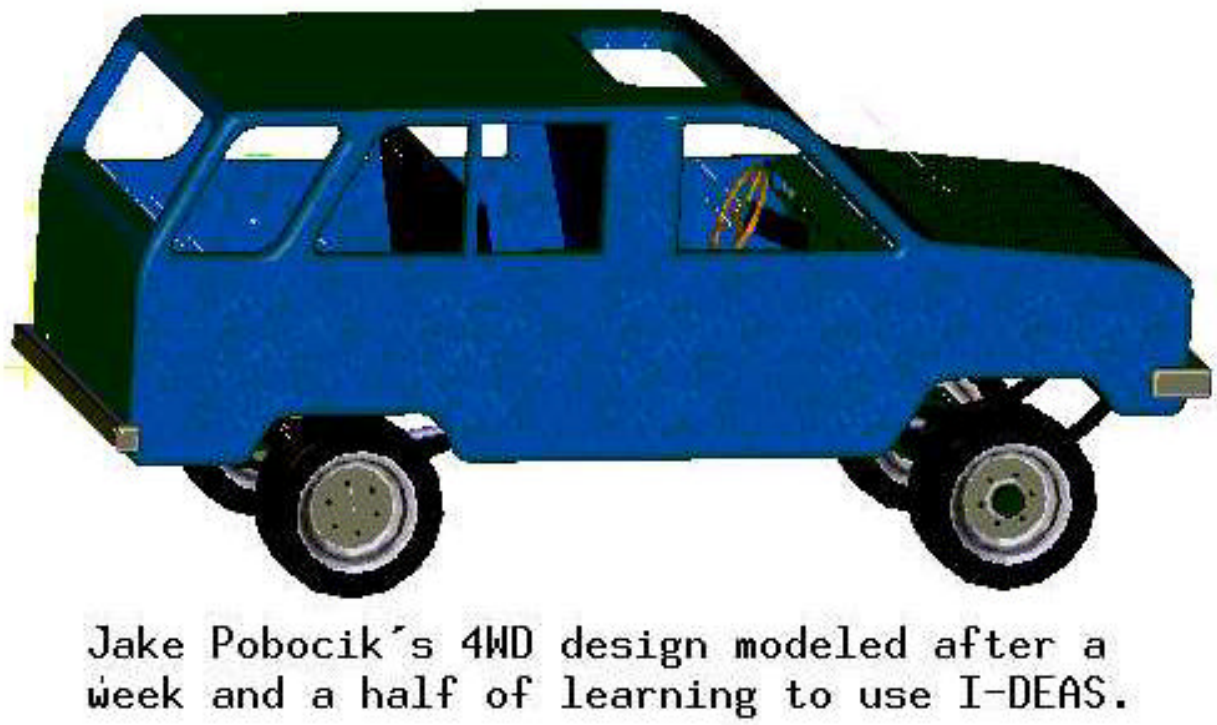


Figure 5 Example of model begun during "Play With I-DEAS" session

After participating in one of the "Play With I-DEAS" sessions in which they are encouraged to stretch their imaginations and bring all of the I-DEAS model building skills to bear, they vote online (*singer.kettering.edu/play-on-ideas.htm*) for four winners in the following

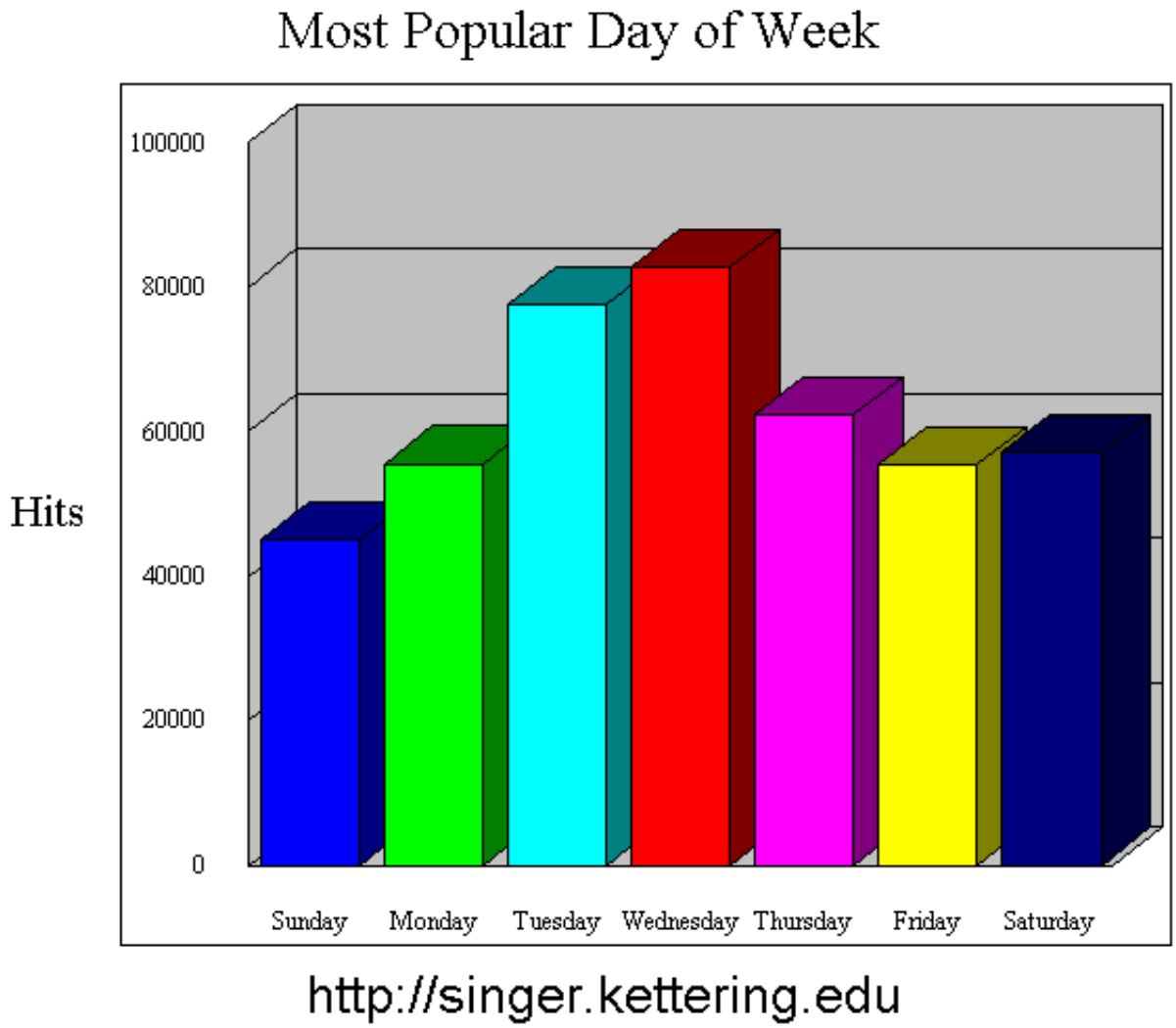


Figure 6 Graph depicting daily usage pattern of author's course web site based upon log file data

categories: Funniest, Prettiest, Most Outrageous, Most Complex. Since these sessions take place at the end of the week, the author can notify all participants by email who the winners were well before the start of the next class session. The four winners are awarded an automatic 100% on the next I-DEAS quiz and are excused from having to take it. Students are therefore anxious to know the results as soon as possible. Email, in this case is far superior to telephoning, writing and mailing letters, or faxing. On occasion the theme of the forthcoming "Play With I-DEAS" session is announced through email. For example:

Mr. James R. Stayer
Kettering University
1700 West Third Avenue
Flint , Michigan 48504-4898

Hi James .

Your "Find an expert" assignment is due by February 26, 2001. The 15 point bonus assignment #19 is due the second class day of the week. We will begin study dimensioning as well as have another "Play With I-DEAS" session . The theme/scenario is as follows James:

You have been chosen to be part of the committee at Kettering University which must decide upon ten items to place in a time capsule which will be opened in the year 2150 A.D. Congratulations! Your suggested item was ranked as number one on the list. Build that item as an I-DEAS model and we will judge it at the end of Monday's class. Here are some quotations from www.zianet.com/mailfromthepast/quotes.html for you to ponder as you carefully consider what that item will be.

Kettering, Charles (1876-1958): "My interest is in the future because I am going to spend the rest of my life there."
Adams, Henry: "A teacher affects eternity; no one can tell where his influence stops."
Bormann, Martin (1900-1945): World War II German political leader:
"Education is a danger... At best an education which produces useful coolies for us is iadmissible. Every educated person is a future enemy."
Epicetus: "Only the educated are free."
Euripides: "Who so neglects learning in his youth, loses the past and is dead for the future."
McAuliffe, Christa (1948-1986): "I touch the future. I teach."
Toffler, Alvin (1928-): "The illiterate of the future will not be the person who cannot read. It will be the person who does not know how to learn."
Twain, Mark (1835-1910): "I didn't have time to write a short letter, so I wrote a long one instead."

2. Genealogy

Boom, Corrie Ten: (1892-1983): "Memories are the key not to the past, but to the future."
Browne, Sir Thomas (1605-1682): Time, which antiquates antiquities, and hath an art to make dust of all things, hath yet spared these minor monuments."
Browning, Elizabeth Barrett (1806-1861): "Time's wheel runs back or stops: potter and clay endure."
Carrol, Lewis (1832-1898): " 'The time has come,' the Walrus said, 'to talk of many things; of shoes - and ships - and sealing wax - of cabbages - and kings - and why the sea is boiling hot - and whether pigs have wings.' "

3. History

Bacon, Francis (1561-1626): "Antiquities are history defaced, or some remnants of history which have casually escaped the shipwreck of time."
Bonaparte, Napoleon: "History is the version of past events that people have decided to agree upon."

4. Humor

Berra, Yogi (1925-): "It's tough to make predictions, especially about the future."
Burns, George (1896-1996): " I look to the future because that's where I'm going to spend the rest of my life."
Popular Mechanics, March 1949: "Where a calculator on the ENIAC is equipped with 18,000 vacuum tubes and weighs 30 tons, computers in the future may have only 1,000 vacuum tubes and perhaps weigh 1 ½ tons."

5. Inspiration

Ancient Roman Saying: "While there's life, there's hope."
Bacon, Francis (1561-1626): "So let great authors have their due, as time, which the author of authors, be not deprived of his due, which is further and further to discover truth."
Barker, Joel A.: "The ultimate function of prophecy is not to tell the future, but to make it."

6. Philosophy

Acheson, Dean (1893-1971): "Always remember that the future comes one day at a time."
Anonymous: "The sooner I fall behind, the more time I have to catch up."
Anonymous: "The hurrier I go, the behinder I get."
Anonymous: "Time is nature's way of making sure that everything doesn't happen at once."
Asimov, Isaac: "No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be."
Drucker, Peter (1909-): "Don't try to innovate for the future. Innovate for the present!
Einstein, Albert (1879-1955): "I never think of the future - it comes soon enough."

7. Poetry

Antoninus, Marcus Aurelium (121-180): "For a man can lose neither the past nor the future; for how can one take from him
Blake, William (1757-1827): "Hear ye the voice of the Bard! Who present, past, and future sees."

Blake, William (1757-1827): "To see a world in a grain of sand, and a heaven in a wild flower, hold infinity in the palm of your hand, and eternity in an hour. "

8. Prophecy

Arabian Proverb: "He who foretells the future lies, even if he tells the truth."
Bierce, Ambrose (1842-1914): "PROPHECY, n. The art and practice of selling one's credibility for future delivery."
Bohr, Niels: "Prediction is very difficult, especially about the future."
Byron, Lord (1788-1824): "The best of prophets of the future is the past."
Chinese Proverb: "When men speak of the future, the gods laugh."
Dressler, Fritz R. S.: "Predicting the future is easy. It's trying to figure out what's going on now that's hard."
EMI-manager for Beatles, 1962: "Guitar-groups have no future."
Henry, Patrick, (1736-1799): "I have but one lamp by which my feet are guided, and that is the lamp of experience. I know no way of judging of the future but by the past."
Machiavelli, Niccolo (1469-1527): "Wise men say, and not without reason, that whoever wished to foresee the future might consult the past."
Montaigne (1533-1592): "'Tis one and the same nature that rolls on her course, and whoever has sufficiently considered the present state of things might certainly conclude as to both the future and the past."
Popular Mechanics, 1949: "Computers in the future may weigh no more than 1.5 tons."
Unknown: "If you want to make God laugh, tell him your future plans."

"Time is the best teacher. Unfortunately, it kills all of its students"

Accessibility

The professor's accessibility can be demonstrated in a multitude of ways. The Internet provides an efficient channel to permit students to post short biographical sketches about themselves and the teacher. Simply maintaining an informative Home Page for students is tantamount to a form of accessibility from anywhere at any time. Human beings generally tend to relax and have more fun enjoying those whom they perceive to be transparent and accessible. Information on the course web site about the professor's personal and professional past and present as well as his hopes for the future are made readily known to students and their friends and family This accessibility puts students and their parents at ease early in the course. Posted

student comments and opinions permeate the course web site and give a strong message that honest and open communication flows abundantly 7/24. Periodic email announcements to all of the professor's students about the upcoming birthdays of their classmates bonds relationships within the classroom and makes team projects and cooperative learning more enjoyable. The Internet is a super conduit for letting one's humanity flow. Web links are sprinkled throughout course assignments which solicit students to assess the professor, the learning environment, and the course. These comments are posted online for all to see and remain a permanent part of the site.

When the teacher regularly uses humor, students come to feel that the "prof" is fully accessible to all students and permits the teacher to become more influential with them. This, in turn, permits their interests and desires to surface and be nurtured. Providing humor is a strong cue that the teacher cares about their emotional state and wants to keep it upbeat in at least small ways. When students perceive that the teacher is putting them first in every decision and action and is actively moving beyond the job description and removing limits to what the professor can do for the students then the groundwork is laid for a great class. An email response from one young man on the first day of class is as follows:

"*Thanks for the laugh Prof!*
I would like to meet with you sometime just to chat and get your ideas on engineering. If you read my survey you'll find I'm still searching for what I want to do with the rest of my life, and I love having new angles on it. I have experienced some engineering or what was said to be engineering. Its a long story that has to do with a FIRST robotics team. I'll stop by next week on your office hours.

Thanks again for the jokes."
Arnie Martin

Web site log files indicate that visitors use the course web site throughout the day and night. Students are delighted their comments, research, and creations have been made available on the Internet. They understand fully that the Internet is, among other things, a publishing medium with an extremely low barrier to entry. The understand that they can use it for their own personal and professional purposes.

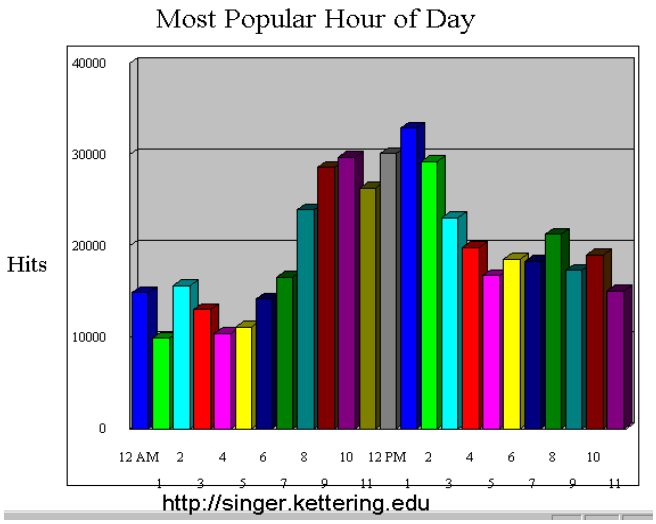


Figure 7 Graph depicting hourly usage pattern of course web site based upon log file data

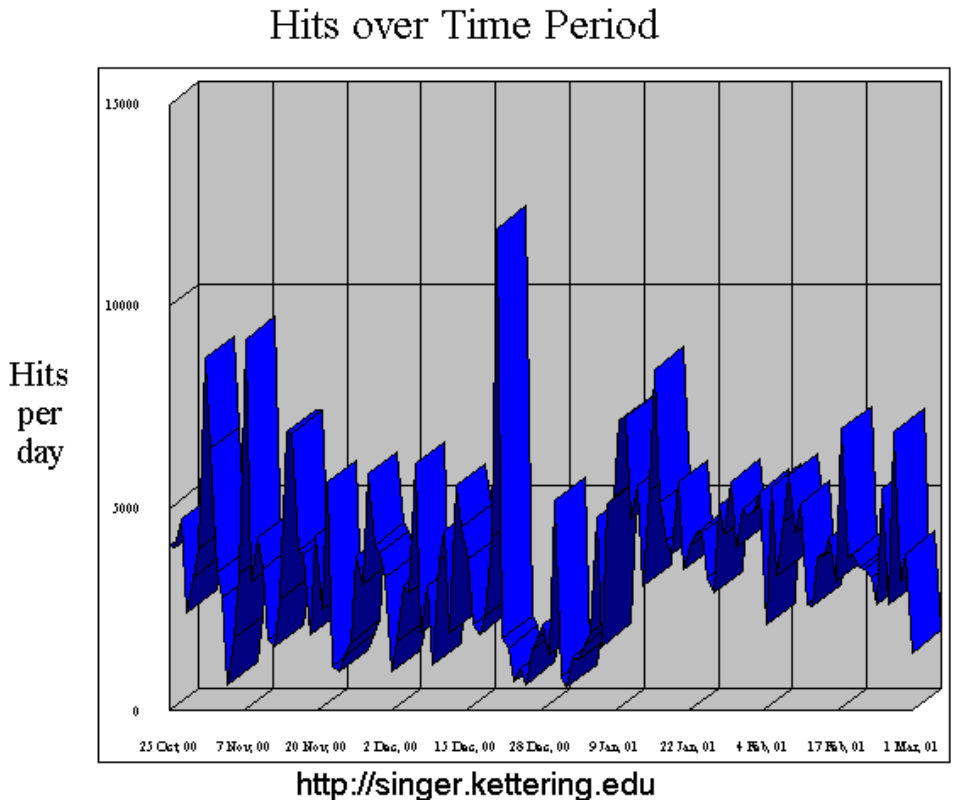


Figure 8 Graph depicting frequency of use of course web site between October 25, 2000 and March 1, 2001 based upon log file data

A low tech but highly effective means of relaxing new students and putting them at ease so that they can proceed to have fun is allowing them to read short bio sketches about previous students (*singer.kettering.edu/student_intros.htm*) and peer letters which recount their experiences (*singer.kettering.edu/peerlet.htm*). Through peer letters students have the opportunity at the end of the course to pass on useful information to their peers who will take this course in the future. These future learners who read the peer letters will receive current information about the course from those who have been through "the battle." Toward the end of this session students write a one and one half to two page type-written, double-spaced letter in which they will explain the topics that are covered in this course from their point of view. Further, they explain the course requirements, the importance and drawbacks of group projects/tests, the value of attending class, the ways of studying and preparing for the class work and tests which worked best. They may wish to go on and tell about their favorite and worst assignments. When they pass on any hints about time and resource management that did (or didn't) work these future learners are very appreciative to receive the wisdom. They express any opinions they have about the instructor which can be used to guide future students on to maximum success and enjoyment during the session which they spend attending class and learning. They often frame their advice as if they were talking to themselves and thinking what they would have done differently if they had it to do over again.

Millennial Course Accouterments

Photographs of current and past students are posted online together with any catchy phrase or saying of which the student is fond. The author has worked nationally and internationally as a sculptor, painter, and musician, having performed on numerous radio and television programs and exhibited art work at national and international art festivals. As a consequence of this background, the students receive heavy doses of cultural content and are escorted into rich imaginative forays during class. Individuals may freely choose from lists of hundreds of videos and tapes and CD album titles which are posted online. They request viewing or listening to these selections while they busily work on their assignments during the lab hours. The movies October Sky, Dead Poets Society, Apollo 13, Bill & Ted's Excellent Adventure, Days of Thunder, Gattaca, The Matrix, Patch Adams, Mission Impossible, and Top Gun are among those most often requested. A searchable database (*singer.kettering.edu/pchome.htm*) of video content is maintained and available online whenever a students is searching for content on particular topic. Coming to class is fun and students discover from the array of options for learning which ones best suit their learning style.

For those who enjoy learning about engineering from the "juicy and shocking" experiences of others they are invited to read about (*singer.kettering.edu/casestud.htm*) or solicit themselves input from "experts" who can share case studies (*singer.kettering.edu/probnews-21.htm*). In many instances these assorted case studies have a heavy emotional content. In this regard the case studies have an "edutainment" value and provide real problems and real solutions to those

problems. Case studies go well beyond what textbooks offer to students. In the course students are shown how they can tap into the wealth of the Internet to reach the people behind the data in order to get answers to their myriad questions. This is exciting stuff given the tedium and expense of achieving the same ends just ten years ago.

Music In The Classroom

"*The class is going well. I really enjoy learning AutoCAD, and mastering the skills used in graphic design. I really like how laid back the class is. Having a relaxed setting makes things go so much easier, it actually feels like you are having fun while you learn. When we listen to music, it takes your mind off of work, but you still do the work, and it might be better quality*."
Chad Johnson

"A few ways I learn things when studying is I listen to music when I'm studying or reading. I learn things way ahead of time so I'm not rushed when I need to learn something. I do several examples and problems related to what I'm trying to learn. I sometimes ask for help if I have no idea what to do. These are the basic things I do in order to learn things for tests."
Kendall Johnson

"*I tend to work with friends when I do homework or study or are trying to learn something new. I find that my friends can often times explain things in a simpler way than the teacher or text book. I also like to listen to music while I work. I find that it lightens the mood and makes my ability to concentrate greater than if I were in a quiet room*."
Pearl Moody

The author has insisted that the CAD lab workstations be equipped with sound cards and that multimedia capabilities be enabled. Using headphones, students can access music at their workstations from sites like riffage.com or numerous other sites like it. They can also visit an MP3 selection page set up for their course at *singer.kettering.edu/mp3.htm*. Their other option is to simply request that tapes and CDs be brought to class by the author. They can choose from an extensive list of music maintained by the author which is available at singer.kettering.edu/music_international.htm. Links to this page are always available to students at singer.kettering.edu/probnews.htm. In a recent article in the Washington Post, 25 February 2001 it reported that even as the recording industry exacts revenge on Napster for allegedly illegal file-swapping of music, a potentially far more powerful and ubiquitous file-swapping network is being built. In fact, Aimster--named for its fusion of Napster ideals with AOL Instant Messaging technology--may prove immune to legal attack. Aimster, launched in August and now numbering 2.5 million registered users, allows people to share all types of digital media files and soon will be extended beyond the AIM network to include other instant messaging networks. Users can even search the Napster network for files they want. Unlike Napster, Aimster does not use central computers to manage the files through the network. Instead, it utilizes AOL's popular AIM technology to link end users. Basically, it is only a software company, not a file-sharing service,

says founder Johnny Deep. Moreover, AOL does not seem to mind that the fledgling effort is so blatantly dependent on its AIM technology. Barry Schuler, chairman of AOL Time Warner's online unit, says of Aimster, "They're not doing anything illegal, and so we'll see where it goes." The structural and institutional barriers which hinder educators from catering to the different learning styles of students are falling very fast. Some of the individual students really enjoy hearing exactly and only music of their choosing as they study and work. It is easy for the author to make music available to them through tapes, compact discs, MP3 files, and online radio stations like those found at realguide.real.com/tuner/.

Figure 9 The "graduate" emerges from under a desk atop a stealthy RC car wearing a sign that declares, "Short Term Pain, Long Term Gain"

Online Course Content

Students have fun poring over the online grades for the course because they can examine their own progress calculated on each and every assignment and test as well as the progress of all of their classmates. Confidentiality is maintained by permitting the students to choose an alias name rather than real names, social security numbers, or student ID numbers. These grades are updated regularly throughout the academic session. Looking at the list of aliases will certainly amuse: **Beta Toter, Plotnik, Toothstink, Big Poppa Pump, stupid, hondagirl, Brain Smasher, chicken legs, Speed Geek, Kingdog, Bachmaster**. They also enjoy having course tutorials online 7/24 from anyplace in the world. They don't have to buy or carry or maintain books. They understand that updates to the online content is perpetual and feel comfortable in the knowledge that they are plugged into the "latest".

For those visual learners there is a plethora of "graphics" to be enjoyed; some humorous, whimsical, complex, explanatory, informative, and instructive. Using Camtasia and Dubit teachers can capture computer screen activity together with voiced commentary to training productions created on the desktop. This movie can be an .AVI file or converted to a streaming video format. (www.techsmith.com/products/camtasia/camtasia.asp) More online animated instructional demonstrations like that at *singer.kettering.edu/avi/demo.avi* will be posted as they are developed. The .AVI format readily plays on the default operating system used on student workstations at Kettering University. This abundance of pictures and other visual imagery really reduce the stress level associated with long reading assignments by quickly making concepts and procedures understandable because a "*a picture is worth a thousand words*". When stress levels fall then students can afford to relax and enjoy themselves and derive a concurrent increase in information retention.

Learning Styles

Some student exhibit the following learning style:

*You thrive on order and feel most comfortable when someone who really knows has laid out what's to be learned, in sequence. Then you can tackle the details, knowing that you're going to cover the whole subject in the right order. Why flop around reinventing the wheel, when an expert has been through it all before? Whether it's a textbook, a computer program, or a workshop - what you want is a well-planned, precise curriculum to work your way through***.**

These students thrive on and greatly enjoy being able to walk into the classroom on the first day and have the entire course mapped out before them and visible in great detail. They know and can access all assignments, tests, dates, grades, and supplemental resources created by the "expert".

Other students exhibit this learning style:

*What is learning, anyway, except communication among people? Even reading a book alone is interesting primarily because you're in touch with another person, the author. My own ideal way to learn is simply to talk with others interested in the same subject, learning how they feel, and coming to understand better what the subject means to them. When I was in school my favorite kind of class was a free-wheeling discussion, or going out for coffee afterward to discuss the lesson***.**

The numerous communication modalities available through the Internet serve these students well and they enjoy being accommodated in this regard. Listservs, discussion forums, online project management sites, email, and free long distance phone calls, all of which operate 7/24, keep this class of learners happy.

Playing With Working Model

Easy to use and freely available solid model viewers (*singer.kettering.edu/free-3d-viewers.htm*) rapidly draw students into course content. As they sketch selected models they have fun successfully performing activities they had previously felt would be rather difficult or time consuming to learn. They flower further because of these early successes.

Working Model 2D is very briefly introduced into the curriculum as a complementary visualization and simulation tool which extends and draws upon engineering graphics skills and applications. Downloadable and non expiring demo versions of Working Model are really "cool" engineering "toys" that students explore. Because Working Model is really fun and easy to use and yet remarkably sophisticated the students are given "play time" to explore program features after ten minutes of initial instruction. They're given the opportunity to design some type of Rube Goldberg device in a non-stressful and non-threatening exercise where there are no right or wrong designs. Upon completion they are invited to walk around the classroom and "play" with the gadgets their classmates created. Some of the most creative simulations born during this "play" period are largely the result of high adolescent hormone levels. The response of classmates is characteristically high excitement, laughter, snickering, groans, and even some moans. A review of educational physhology literature will reveal that learning activities with highly emotive

components result in more powerful retention of content. Use of a tool which elicits the "warm fuzzies" of peers will not be quickly forgotten and laid aside. Yes, Working Model is capable of contributing to great engineering. The author has chosen to introduce it through a smiling back gate of the playground where discovery learning, disguised as play, is actively encouraged.

On Creativity

In reflecting upon a Final Project design (*singer.kettering.edu/current-design-project-102.htm*) one freshman engineering student had this to say:

"This also lets us use our own creativity to design something that we think will do good in society, this is why some of us chose to actually be engineers. Many times people drop a major, or a certain career that they want to do, is because the subject matter that they cover in classes discourages them from going on. Doing something that is true to life, to let us design, and to let us be creative (which is why I chose Engineering, it's creative science!) only strengthens my want to be a Mechanical Engineer. I know I'm only speaking for myself when I say that last statement, but I also feel that the others in the class share my enthusiasm."
Pat Recker - Engineering Graphics Student (Spring 2000)

Engineering is a creative profession. The author has deliberately participated in bringing an integrated and significant design experience to first year engineering students (*singer.kettering.edu/probnews-24.htm*). Traditionally, design was left to senior design and capstone design courses. Design can be an inherently enjoyable experience. Freshmen students bring enough from their life experiences to enable them to take elementary steps into creative design modalities: team participation, graphically communicating and interpreting design intent, organizing human and material resources, online project collaboration, and understanding the design process are all meaningful learning outcomes that freshmen students will build upon as they advance through their degree programs. Discovery learning is powerful and joyous. They learn the principles of engineering graphics within the context of actual meaningful design (*singer.kettering.edu/current-design-project-102.htm*). One well conceived freshman design project imparts new meaning to the significance of future courses in their eyes; statics, material science, electronics, mathematics, economics, history, programming, written and oral communication, ethics, chemistry, thermodynamics, music, art history, biology, and more. As they've moved from brain storming to their final presentation they learn instinctively that newly acquired skill sets will get them closer to that goal of taking an idea and moving from "start to part". Adding other fun elements like design to course activities is meant to impress upon students that their chosen career path in engineering will be personally very satisfying.

Proverbs

During the middle and end of the academic session, a review of web site log files reveals that there is a predictable increase in students browsing through the numerous pages of memorable quotes and proverbs from around the world which the author has posted online (*singer.kettering.edu/provrb01.htm* and *singer.kettering.edu/gradprov.htm*). This tendency could be tied to the heightened stress levels they are experiencing in their classes due to the

pressure of deadlines and examinations.

Helpful Utilities Online

In addressing the student as a whole person, a list of useful utilities is given online at *singer.kettering.edu/utilities.htm*. These links help them with locating useful local vendors, finding cheaper books, bidding for tuition fees as well as airfares, creating their own online discussion forums, free long distance service, finding jobs, and more. They truly enjoy the sense of empowerment they can achieve by being actively engaged with the offerings provided through the Internet.

Online Games

Several dozen interactive course related games and quizzes are available. The quizzes are randomized and scored immediately but are not a component of the final grade. They simply inform students about progress and mastery of material. Like all good games these range from challenging to outright difficult but are always fun. The students entering the author's classroom are different than earlier generations. They have had access to many more entertainment choices since they were born. The come having different needs and expectations and the entertainment standards to which they are accustomed are rather high in the western world because entertainment is an industry catered to by celebrities and highly professional organizations that amuse for profit in a viciously competitive business environment. The computer software industry is doing its best to see that multimedia goodies remain under our nose to whet the consumer appetite for more, more, and more... There is much money to be made by feeding this appetite. Both Apple and Microsoft are scheming to dazzle consumers with their newfangled operating systems, Mac OS X and Windows XP. The two software systems feature more secure platforms, easier-to-use designs, and multimedia tools. Windows XP will use the stable code that makes Windows 2000 so appealing to business consumers. Additionally, Windows XP promises a host of music, video, and imaging features that are aimed at an increasingly multimedia-attentive market. Under these circumstances, the least we can do as educators is show, in the best ways we can imagine, that engineering is actually a lot of fun.

In Conclusion

The author has deliberately departed from using only traditional modes of teaching with all of his students all of the time. Traditional postsecondary teaching has not taken into account the whole student, diverse learning styles, diverse populations in the classroom, the state of family life today, the contributions of technology, and the "baggage" that each unique student brings to the classroom. The author provides room for each student to grow and flower in his or her own way and on their own terms. This openness lies at the heart of making the classroom a "fun" and a comfortable place to learn whether or not any of the "Millennial Tools" are available and in effect. Certainly though, the use of these tools adds another layer to the emotional and intellectual tone

within the classroom for that is the message of this paper. The secret of successful teaching is to teach accurately, thoroughly, and earnestly; this will impart interest to instructions, and awaken attention to them. All sciences, in their nature or connections, are replete with interest, if teachers properly illustrate and impress their truths in a pleasing, earnest and fun manner. At the dawn of the new millennium we in education are dramatically moving away from the teaching and learning paradigms of the 19th and 20th century whether we like it or not. With careful consideration, we in education will hopefully retain what is best from the past and carry it into the new millennium. As with all new communication technologies, there is the great temptation to carry old content in its old form into the new medium until innovators evolve a new and more appropriate genre within the medium. We, as educators, face the challenge of not just doing old things in old ways, or old things in new ways, but new things in new ways. The author firmly believes that the classroom of the new millennium will be unlike any other in the history of mankind in the powerful tools for learning it can offer to students and teachers alike. The good news is that the trend has just begun and there is unimaginably more yet to come! The author has chosen to embrace the changes brought on by new and widely available information technologies in the name of what the Japanese term "kaizan" (constant improvement). If we can appeal to our students' imaginations and challenge their intellect and occasionally shock them with something outrageous, just as they may shock us, we'll make the classroom and the learning exercises we give the student "something to write home about". After all, there could be method and meaning in our madness! The "bricks and mortar" university will be around for years to come because it can offer experiences that virtual universities simply cannot. With a dash of boldness, courage, creativity, and hope for the best for our students the term "classroom" is taking on new meaning. Classroom and world are becoming less and less distinguishable largely due to rapidly evolving information technologies. "The real world", as used in academia, is now more a state of mind than a state of circumstances, especially for Kettering University's co-operative education students. The classroom can yet remain a most pleasant, enjoyable, human centered, equitable, and fun place to be if we strive toward that end. The difference between work and play is the attitude with which we regard it. The awesome opportunity and responsibility to work with mostly freshmen students and positively influence their academic careers in a university setting strengthens the author's resolve to never let up trying to make this a better world.

A Daily Prayer

Each work day is begun with the following prayer: "***Lord, bless my work today. You are the Master Teacher. Help me to do each task one step at a time. Help me respond to the individual needs of each person. Help me treat others as I would like to be treated. Amen***."

References

Bjorklund, Stefani A. and Colbeck, Carol L. "The View from the Top: Leaders' Perspectives on a Decade of Change in Engineering Education." Journal of Engineering Education Vol 90, No. 1 (January 2001) 13-19

Judson Singer's Home Page (2001). [WWW document] URL http://singer.kettering.edu/Welcome.html

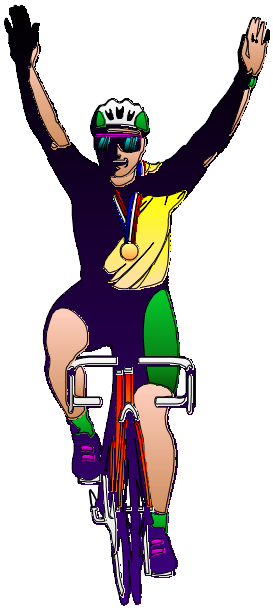
Klein, Alec. "Going Napster One Better." Washington Post 25 February, 2001 **sec A01**

MessageMedia (2001). *MailKing Overview* [WWW document] URL http://www.messagemedia.com/solutions/mailking/mkdetails.shtml

Mail From The Past (2001). [WWW document] URL www.zianet.com/mailfromthepast/quotes.html

Naisbett, John Megatrends. Warner Books Incorporated 1985.

Sarasin, Lynn Celli Learning Style Perspectives *impact in the classroom* Madison, Wisconsin: Atwood Publishing, 1999



JUDSON J. SINGER

Judson is lecturer of Mechanical Engineering at Kettering University (formerly GMI Engineering & Management Institute) in Flint, Michigan. Kettering graduates the largest number of mechanical engineering students in the United States. U.S. News & World Report magazine rates Kettering as one of the top 8 engineering schools without a doctoral program in the U.S. Judson J. Singer additionally served as Webmaster for the Department of Mechanical Engineering from 1995-1997 and will resume that position in March of 2001. In this capacity he originated, developed, and maintained the largest and most comprehensive academic department web site at Kettering University. The author has lived for extended periods in Hawaii, Africa, the West Coast, East Coast, Midwest, and South. The author has taught students from pre-K through eighth grade and high school seniors nationally and internationally. The author has worked nationally and internationally as a sculptor, painter, and musician, having performed on numerous radio and television programs and exhibited art work at national and international art festivals. He specializes in computer graphics and animation and in development of content and curricula for technology based educational products, including web sites for courses delivered on & off campus (synchronously & asynchronously). Judson served over two years on the curriculum development committee of Kettering University's Asynchronous Learning Team.