Compiled by Phil Wankat

For the 50 years of Chemical Engineering Education celebration Lynn Heasley, managing editor of CEE, and I thought that lists of readers’ favorite five articles would be a useful method to review papers in CEE. Members of the 2014 CEE Publication Board and some former members and readers of CEE were sent the following email or a slight variation of this email:

For the CEE special issue in 2016 celebrating 50 years of CEE, I am requesting that each member of the Publication Board select their top 5 CEE pieces in the last 50 years. Please select from your favorite articles and columns in CEE. These selections can be papers in your research or teaching areas, homework or lab papers, Teaching Tips, or Rich Felder’s columns. It would be helpful if at least one or two of your selections was from 2004 or earlier (all old issues are available on the CEE web page: <http://www.che.ufl.edu/cee/> and at <http://ufdc.ufl.edu/AA00000383/00170>).

As soon as I started receiving e-mail responses (the same day I sent out the invitation), we realized that the comments of the selectors would also be of interest. I have edited the comments to remove salutations and personal notes. The citations have been put into a standard format. The comments of the respondents are included with each article. In addition to the votes from respondents we have included the articles that won the William H. Corcoran Award for best article in CEE. The Corcoran award is counted as one vote. The articles are listed in the order of the number of votes received. When there is a tie in the number of votes, Corcoran award winners are placed first, in alphabetical order if there are more than one. The remaining tied papers are generally placed in alphabetical order of the first author, although if the respondent connected a series of papers the papers are presented together.

A total of 125 papers either won the Corcoran award or received at least one vote from the respondents. This large number of articles rated as among the favorites illustrates both the diversity of opinion of chemical engineering faculty and the high quality of many CEE articles.
FIRST PLACE
The entire series “The Future of Engineering Education” by Felder, Rugarcia, Stice, and Woods has the most total votes—20 for the sum of the six parts—and part II with six votes has the highest single number of votes.


6 votes: Dendy Sloan, Richard Felder, Jason Keith, Milo Koretsky, Stewart Slater, Stephanie Farrell

Stephanie Farrell – “I liked the whole series on ‘The Future of Engineering Education.’ I find these to be timeless pieces to which I refer often.”

SECOND PLACE
Part I of the “Future of Engineering Education” series, with 5 votes, is second.


5 votes: Dendy Sloan, Richard Felder, Don Visco, Stephanie Farrell, Rich Dickinson

Rich Dickinson – “It’s tough to choose. I really enjoy reading Rich Felder’s articles.”

TIED FOR THIRD PLACE
Three papers are tied for third place with four votes each.


4 votes: Corcoran award, Dendy Sloan, Lisa Bullard, Phil Wankat

Phil Wankat – “A prescription for better departments and a better world.”


4 votes: Dendy Sloan, Richard Felder, Stephanie Farrell, Stewart Slater

John O’Connell – “Without deep thought, I can say my favorites were the series on structure of knowledge organized by Don Woods in 1993, and the series by Jim Haile of ‘Toward Technical Understanding’ during the late 1990s.”


4 votes: Corcoran award, Dendy Sloan, Richard Felder, John O’Connell
TIED FOR FOURTH PLACE

There are seven papers tied for fourth place, with three votes each (counting each part of a multi-part series as separate).


*3 votes: John O’Connell, Stewart Slater, Richard Felder*


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*3 votes: Corcoran award, Stewart Slater, Stephanie Farrell*


*3 votes: Bill Koros, Jason Keith, Stephanie Farrell*

Bill Koros – “passed to young faculty here who are starting up their teaching careers. The young faculty noted that these [included 1990 paper by Felder] were very helpful to them.”


*3 votes: Lisa Bullard, David Silverstein, Richard Dickinson*

David Silverstein – “Helped me better understand my self-assessment and that of my students as well. The combination of this article plus Stuart Smalley significantly impacted my professional life.”


*3 votes: Dendy Sloan, Richard Felder, Stephanie Farrell*

Lisa Bullard – “I refer to (this) frequently, either to share with students or to refresh myself on good teaching practice.”

Matthew Liberatore – “A handful of articles have given me things to consider in my teaching. I would say the ‘best’ paper of this bunch is Don Woods (not surprising there) covering how to teach problem solving. We still have much to learn from Don.”


*3 votes: Richard Felder, Matthew Liberatore, Milo Koretsky*
TIED FOR FIFTH PLACE

These papers are tied for fifth place with two votes each.


*2 votes: Corcoran award, David Silverstein*

**David Silverstein** – “In light of ABET fallout from the first EC2000 cycle, this article gave me insight into approaches to closing the assessment cycle. While I have not gone to the same extent as the author in my assessment practices, it provided ideas and direction to focus assessment.”


*2 votes: Corcoran award, Phil Wankat*

**Phil Wankat** – “I have used this method in sophomore to graduate level courses and it never fails.”

**Lightfoot, E.N.,** “Evolution for Chemical Engineers,” *CEE, 30*(3), 168 (Summer 1996).

*2 votes: Corcoran award, Lisa Bullard*


*2 votes: Corcoran award, Jason Keith*

**Prausnitz, J.M.,** “Chemical Engineering and the Other Humanities,” *CEE, 32*(1), 14 (Winter 1998).

*2 votes: Corcoran award, Dendy Sloan*

**Sloan, E.D.,** “Extrinsic Versus Intrinsic Motivation in Faculty Development,” *CEE, 23*(3), 134 (Summer 1989).

*2 votes: Corcoran award, Milo Koretsky*


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*2 votes: Corcoran award, Polly Piergiovanni*


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**2 votes:** David Silverstein, Pedro Arce

David Silverstein – “The historical perspective on my course subject matter became far more accessible and consequently incorporated into my courses due to this article and some that followed in later years.”


**2 votes:** Jason Keith, Rich Dickinson

Jason Keith – “100 citations!”


**2 votes:** Milo Koretsky, Don Visco

Don Visco – “When I read this paper, I immediately said, ‘This is what I’ve been thinking of.’ I then convinced Pedro Arce (my chair at the time) to invest $1,000 so I can use this in my courses (and encouraged others to do so as well). I still use it today (a different brand and RF instead of IR), but John’s paper was a great catalyst for me on this item.”


**2 votes:** Tamara Floyd Smith, Daina Briedis

Tamara Floyd Smith – “I used this paper for my department-head-mandated ‘bio’ problem for the many years that I taught our process control class.”


**2 votes:** Milo Koretsky, Stewart Slater

Part 1 (Clark, et al., 2000) is listed in the previous section.


**2 votes:** Bill Koros, Lisa Bullard

Bill Koros – “The final two [other was Bullard and Felder (1990)] are related to articles by Rich Felder that I have liked, and passed to young faculty here who are starting up their teaching careers. The young faculty noted that these were very helpful to them—in fact, the last one, from 1990, helped me get started in my own career.”


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PAPERS WITH ONE VOTE

In addition to the Top 5 rankings, there are 93 papers that received either the Corcoran award or one vote. First, Corcoran award winners are presented in chronological order. Remaining articles are in alphabetical order of the first author, except when the respondent commented on a series of articles the articles are listed together.

Corcoran award winners


Editor’s comment – Fostering creativity in grad students.


Editor’s comment – The paper illustrates that research groups can be very educational.


Editor’s comment – This paper nicely complements Felder’s (1985) generic quiz paper.


Editor’s comment – The title is misleading—many methods for improving student learning are discussed.


One vote

Amundson, N., “American University Graduate Work,” CEE, 21(4), 160 (Fall 1987). 1 vote: Phil Wankat

Phil Wankat – “A nice description of Neal’s philosophy.”

- Balzhiser, R.E., “Chemical Engineering for the Seventies,” CEE, 10(1), 40 (Winter 1972). 1 vote: Milo Koretsky
- Biernacki, J.J., “A Quantitative Course-Level Strategy for Using Outcomes-Based Assessment to Guide Continuous Improvement,” CEE, 47(3), (Summer 2013). 1 vote: Stephanie Farrell

Bird, R.B., “Book Writing and Chemical Engineering Education: Rites, Rewards, and Responsibilities,” CEE, 17(4), 184 (Fall 1983). 1 vote: Phil Wankat

Phil Wankat – “The importance of books and how to write a book from one of the most influential book authors in chemical engineering.”


Felder, R.M., “We Hold These Truths to Be Self-Evident,” CEE, 25(2), 80 (Spring 1991). 1 vote: Suzanne Kresta


Christensen, J.J., “Reflections on Teaching Creativity,” CEE, 22(4), 170 (Fall 1988). 1 vote: Milo Koretsky


Don Visco – “I think this is a great paper that shows how quickly and easily such effective approaches can be used...and that they have been discussed for at least the last 20 years. I gave a little teaching workshop for the new faculty in our college in January and I have included this paper.”


Holles, J., “Old Dead Guys—Using Activity Breaks to Teach History,” CEE, 43(2), 150 (Spring 2009). 1 vote: Polly Piergiovanni

Hubbard, D., “Instruction By the PSI Method in a Required Senior Course,” CEE, 14(2), 76 (Spring 1976). 1 vote: Milo Koretsky


Don Visco – “As a thermodynamicist, I am partial to those who contemplate entropy. I remember reading this as a graduate student and I did recite the poem at the Summer School in 2007....”

Stephanie Farrell – “I liked the whole series on ‘The Future of Engineering Education.’ I find these to be timeless pieces to which I refer often. Of these, my top choice would be the last one, ‘Making Reform Happen.’”

Matthew Liberatore – “[The authors] cover teaching and motivating students [in a way] that is mostly timeless (and involves many techniques in the current active-learning toolbox).”

Bill Koros (former editor of Learning in Industry section) – “I have gotten good comments from people about that one.”


Jason Keith – “38 citations!”


Matthew Liberatore – “As teaching material and energy balances is a favorite topic of mine, it was great to see the thought process of the course over the years and how thinking evolves and changes every few years.”


Matthew Liberatore – “In addition, there are many stoichiometry papers by Felder, Bullard, and myself in more recent years. This could be an interesting review article.”


Matthew Liberatore – “Fraser Russell was gamifying ChE as early as 1978.”

Schmidt, A.X., and Pfeffer, R., “Chemical Engineering Professorial Staff as a Function of Student Load,” *CEE*, 1(1), 13 (October 1965). 1 vote: Phil Wankat

Phil Wankat – “Their formula to determine number of professors required still appears to work reasonably well:

# ChE Professors = a + b (# BS graduates) + c (# MS Graduates) + d (# PhD graduates)

With a = 2.2, b = 0.1, c = 0.14, and d = 0.45 (0.6 for research-intensive programs)

Although the required number of professors has not changed significantly, the duties of professors have changed at research universities. Professors currently spend more time on research and less time teaching undergraduates.”


Editor’s comment – Another stoichiometry paper to add to Rosen and Henley (1968) and Lacksonen (1979).

Snyder, J.R., “The Overhead Projector … a Teaching Aid,” *CEE*, 1(1), 11 (October 1965). 1 vote: Matthew Liberatore

Matthew Liberatore – “…best practices on using an overhead projector and many of these ideas still apply today (although our technology is different).”


Matthew Liberatore – “…discusses self-instruction in thermodynamics, which is a clear predecessor to peer instruction.”
50th Anniversary Issue


Don Visco – “When I was at Tennessee Tech, I used to teach the Thermodynamics course and the faculty member who taught before me taught separations in the same room. I remember erasing material from the board and then thinking to myself, ‘I am going to teach the same thing in two weeks to the same students.’ This led to merging the solution thermodynamics course with part of separations to be called ‘Separations and Solution Thermodynamics.’ Since I was scheduled to teach that, I had to think about which separation experiments to run in this class (and what would be run in a later lab course). This article was exactly what I (and the faculty) needed as we considered the course content.”

- Wankat, P.C., “Pedagogical Training and Research in Engineering Education,” CEE, 42(4), 203 (Fall 2008). 1 vote: Milo Koretsky


Woods, D.R., and Sawchuk, R.J., [see 5th place]

John O’Connell – “Without deep thought, I can say my favorites were the series on structure of knowledge organized by Don Woods in 1993, and the series by Jim Haile.” [see 3rd place]


DISCUSSION: GENERAL COMMENTS FROM RESPONDENTS

These comments are listed in the order received.

Tamara Floyd Smith – “I am only sending two because they stand out as the most impactful for me.”
[Editor’s note: Tamara responded within two hours of receiving my email.]

Phil Wankat – “I picked papers from the 1970s and 1980s to avoid conflicts of interest with editorial decisions I made when I became associate editor. I have cited all of these articles in various publications.”

Dendy Sloan – “Many thanks for suggesting a review of Chemical Engineering Education, since its inception in 1962, in order to select five favorite articles. This process has been a pleasant, existential experience to review the pedagogical history of our profession over the last half-century. It was difficult to avoid the temptation of choosing from very popular, outstanding sources such as the Felder/Brent Random Thoughts columns, or the articles of the current journal editor. Because those articles are so thoughtful and well-written, no one needs to highlight them for the CEE readership. I hope the authors of those articles will forgive me, with only the justification that five, perhaps lesser-known articles, deserve consideration.”

Rich Felder – “In going through the journal, I found a number of interesting papers but eliminated most of them because after a while, one paper on the unit operations lab or the second law of thermodynamics looks pretty much like every other one. In the end, I decided that three multi-paper series had a greater influence on me and my teaching than anything else in the journal.”

“In my wanderings I also came across the very first published work of mine in the field of chemical engineering education—a ‘Problem for Teachers’ on p. 178 of the Fall 1970 issue. I’m amazed that Ray Fahien chose to publish it.”
Jason Keith – “I couldn’t limit myself to five. Here are my top nine in chronological order.”

Don Visco – “Here are the five articles from CEE that have been my favorites/most useful.”

Milo Koretsky – “I have attached a draft of my selections for my favorite CEE pieces. I deviated from the “assignment” a bit. For 2000 – 2013, I have been an avid reader of CEE and picked the five papers that have most influenced me. That was easy. For 1962 – 1999, I went through the archives and identified papers that in hindsight I thought were particularly prescient. (I actually found a couple that will provide nice refs for a paper I am working on.) I was going to reconcile these, but I am having trouble since my perspectives are so different — so I have provided five in each group! I also have a list of ‘honorable mention’ identified through the process, but (it) did not make either top five.”

Lisa Bullard – “I will be very interested to see what articles the group nominates!”

Matthew Liberatore – “I started at the beginning and have skimmed through all of the issues through 1985. A handful of articles have given me things to consider in my teaching…. I hope my input is helpful. I will probably continue to go through the remaining issues as time allows.”

Daina Briedis – “OK, this was easier than I thought. Here are my top five in the sense that I have used the information in my teaching or have gotten a good laugh.”

Marcel Liauw – “I have already three papers logged in, which I had downloaded long ago and keep referring to in my work in one way or the other.”

Rich Dickinson – “It’s tough to choose.”

Suzanne Kresta – “I have given this some thought, and there are many useful articles in CEE. The ones that stand out are the big-picture ones which changed my way of thinking—and teaching—in many courses.”

Stewart Slater – “I’ve provided below my selections for ‘favorite’ articles/columns from CEE. I provided more than five, and if you wish, I can reduce. These may not be exactly what I would pick today if I had never read an earlier issue, but at the time I first read the article, or the article was recommended to me by a colleague, they are the ones that come to mind as being very insightful, useful, or informative. These are not ranked in any order. I specifically tried to identify the early ones to try to get you the <2004 ones. Seems like volume 34 was my favorite!!”

CLOSURE

If you have read this far and your favorite CEE papers were not included, send me an email at wankat@purdue.edu listing your favorites and the reasons why they are your favorites. CEE will consider publishing an addendum to this paper listing the additional favorite articles.