Survey of Computing in Industry and Academia

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The CACHE Corporation in cooperation with a number of chemical engineering departments is performing a survey of computing in industry and academia. The purpose of this survey is to generate data on how recent chemical engineering graduates in industry are using computers. Additionally, the survey is intended to provide a perspective on how computing should be taught to chemical engineers. Universities may be interested in using the survey results to guide changes in degree requirements and the content of computing-related courses. Also it may be helpful as part of an ABET accreditation continuous improvement process. This survey is being sent to recent graduates from several selected universities, although there is interest in having other universities participate. Contact Tom Edgar (edgar@che.utexas.edu) if you are interested.

Perspectives on Computing - A CACHE Survey

Section I - General Questions

1. **What is your primary job function?**
   a. Administration
   b. Technical Management
   c. Technical
   d. Sales/Marketing
   e. Academic
   f. Other (_____)

2. **What is your highest technical degree?**
   a. B.S.
   b. M.Eng.
   c. M.S.
   d. Ph.D.
   e. Other (_____)

3. **Years of professional experience**
   a. None
   b. Less than 5

c. 5 - 10
d. 11 - 15
e. More than 15

4. **Do you have an MBA (or are studying for one)?**
   a. Yes
   b. No

5. **Optional: From which university did you get your B.S. degree?**

   _____

6. **Optional: Who is your employer?**

   _____

Section II: Computing in Industry

1. **What type of work do you do? Please rank in order with 1 as the most important.**
   ____ Process Design/Analysis
   ____ Research and Development
   ____ Process Control
   ____ Administrative
   ____ Plant/Process Support
   ____ Systems
   ____ Other (Specify) _____
   ____ Don't Know

2. **What fraction of the day do you spend at the computer:**
   a. None
   b. 0 to ¼
   c. ¼ to ½
   d. ½ to ¾
   e. ¾ to 1
   f. All
   g. No idea

3. **Do you use the computer for office tasks? Examples: E-mail, word processing, calendars, and worldwide web.**
   a. Yes
   b. No

4. **Do you use spreadsheet programs? Examples: *Lotus 1-2-3, Quattro Pro, Excel*.**
   a. Yes
   b. If yes, specify _____
   c. No

5. **For what purpose do you use spreadsheet programs? Circle at most two letters.**
   a. Economic Studies
   b. Data Analysis
   c. Numerical Analysis
   d. Material Balances
   e. Other (specify):_____
   f. Don't Know

6. **Do you use presentation graphics software? Examples: *Powerpoint, Corel Draw, Micrographx Designer*.**
   a. Yes
   b. If yes, specify _____
   c. No

7. **Do you use scientific or engineering data visualization software? Examples: *Tecplot, Spyglass, CADKEY*.**
   a. Yes
   b. If yes, specify _____
   c. No

8. **Do you use dedicated statistical software packages? Examples: *SAS, Statistica, JMP*.**
   a. Yes
   b. If yes, specify _____
   c. No

9. **Do you use numerical analysis software?**
   Examples: *MathCAD, MATLAB, Octave*.
   a. Yes
   b. If yes, specify _____
   c. No

10. **Do you use symbolic and mathematical manipulation packages?**
    Examples: *Mathematica, Maple, Macsyma, Reduce, Derive*.
    a. Yes
    b. If yes, specify _____
    c. No

11. **Do you use numerical methods libraries?**
    Examples: *IMSL, DASSL, LAPACK*. Note - software in this category must be linked with other programs, often written by the user in languages such as Fortran or C.
    a. Yes
    b. If yes, specify _____
    c. No

12. **Do you use database management systems for project information, general engineering data, process information, etc.?**
    Examples: *Access, Paradox, Oracle.*
    a. Yes
    b. If yes, specify _____
    c. No

13. **What chemical process simulation programs (flowsheeting systems) are used in your organization? Mark all that apply.**
    a. None
    b. *Aspen+*
    c. *Hysys*
    d. *ChemCAD*
    e. *SIMSCI Pro II*
    f. *WINSIM (Design II)*
    g. *gPROMS*
    h. Other (Specify _____)

Section III - Training

1. **How much time did you need initially to learn the computer skills for your job function?**
    a. Less than 1 month
    b. 1 - 3 months
    c. 3 - 6 months
    d. More than 6 months
    e. Don't Know

2. **From where did you receive training in the use of new computer tools? Estimate the fraction that should be assigned to each of the following:**
    ___ From the organization itself
    ___ Self
    ___ Company colleagues
    ___ Outside training companies
    ___ The computer tool vendor
    ___ Other (_____)

Were you adequately trained at your university to use and to understand chemical process simulation programs? (See question 13 of the Section II for examples).

a. Yes
b. No
c. No opinion

Section IV - Computer Programming

1. **Does your work utilize your ability to write computer programs in Visual Basic, Fortran, C, Pascal, or other high-level language in order to do your work?**
   a. Yes
   b. If yes, specify _____
   c. No

2. **Should computer programming in at least one programming language (see the next question for examples) be a required part of the undergraduate curriculum for chemical engineers?**
   a. Yes, it is important (answer next 2 questions)
   b. No, it is not necessary (go to question 5)
   c. No opinion (go to question 5)

3. **If you answered yes to the previous question, what language should be taught to undergraduate chemical engineering students? Mark only one item.**
   a. Fortran 77
   b. Fortran 90
   c. C
   d. C++
   e. Pascal
   f. Visual Basic
   g. Java
   h. Other: (Specify _____)
   i. Does not matter as long as one is taught

4. **Should additional programming language(s) be part of the undergraduate curriculum for chemical engineers?**
   a. None
   b. Fortran 77
   c. Fortran 90
   d. C
   e. C++
   f. Pascal
   g. Basic

h. Other: (Specify _____)
i. Does not matter which

5. **Are you expected by your employer to be competent in a computer programming language?**
   a. Yes
   b. No

6. **Are you expected to be literate in <u>different</u> computer languages?**
   a. Yes
   b. No

Section V - The Value of Computing

1. **Do you feel that your exposure to computer tools is sufficient for solving a wide range of industrial problems?**
   a. Not enough
   b. About right
   c. More than enough
   d. Don't Know

2. **Has exposure to computers enhanced or hindered your ability to formulate or define problems conceptually and mathematically?**
   a. Significant enhancement
   b. Modest enhancement
   c. No effect
   d. Modest hindrance
   e. Significant hindrance
   f. Don't Know

3. **Do you feel there is a relationship between computer skills and problem solving skills?**
   a. Yes, strong positive correlation
   b. Yes, weak positive correlation
   c. No correlation
   d. Yes, weak negative correlation
   e. Yes, strong negative correlation
   f. Don't Know

4. **Do you believe undergraduate engineers would benefit from experience with more than one computer operating system? Examples: UNIX, Windows, Windows NT, LINUX**
   a. Highly desirable, should be required

b. Desirable, but should not be required
b. Not necessary
c. Unimportant

5. **Do you think new graduates are able to use process simulation software to model entire processes rather than single unit operations?**
   a. Yes
   b. No
   c. Don't know

6. **Have you noticed any difference in use of computers during the past several years?**
   a. Yes, significant changes
   b. If yes, specify _____
   c. No
   d. Unaware of any differences

   Please elaborate if you answered yes to this question.

Section VI. - Additional Comments (Optional)