# Teaching Oral Communication in Computer Science

Vianney Coté, Département de mathématiques et d'informatique
Université de Sherbrooke, Sherbrooke, Québec, Canada J1K 2R1

## ABSTRACT

Software analysts currently spend a large portion of their time communicating with others. Effective communication skills is of extreme importance if one wishes to be an efficient and productive software analyst. This article describes some of the exercises related to oral communications that are imposed on our students. Advantages and difficulties are discussed.

## 1. INTRODUCTION

Software analysts currently spend a large portion of their time communicating with others. Their primary function is to coordinate the users, the management, the programming and technical staff. Both written and oral communications are vital to the software analyst. Basili and Perricone [1] found that 48% of the errors in a NASA satellite planning system could be attributed to incorrect or misinterpreted functional specifications or requirements. This is mostly attributable to ineffective communications between analysts and their environment. Obviously, effective communication skills are a must for the productive software analyst.

Written communications can take place in memos, letters, technical reports, management summaries, etc. The importance of written communications has been stressed by many authors [4],[8]. If the analysts spend a large portion of their time on written communications, they probably spend an even larger portion their time on oral communications. According to Boehm [2], programmers spend at least 36% of their time talking or listening. For a software analyst, this percentage is certainly higher. The analysts must meet with users, ask questions, listen to answers, work in a team environment, sell their ideas, explain to the users how the system works, respond to various questions. It appears to us that most Computer Science or Information Systems programs do not emphasize those skills. Most courses are technical in nature and relate to such subjects as structured programming, operating systems or database concepts.

In this article, the focus is set on oral communications; in particular, we want to look at two forms of oral communications: the conference and the improvisation. The analysts also have to master the interview [5], [6], [7] and the teamwork [4] if they wish to be effective. However, these two techniques are more difficult to implement and to evaluate in a classroom environment.

### Speeches by the Students.

Good communication skills are strengthened throughout the entire Information Systems Program. This program is organized into six academic semesters and four work terms 15 weeks each). Approximately 500 students are currently enrolled in it. Many courses get into oral communications. In the course on "Systems Analysis and Design," students must complete a term project in teams of six to eight. In the course on "Information Systems in Business," students must present to the class their analysis of a system. In the course on "Information Systems Security and Auditing," a board of directors receiving a request concerning systems security is simulated. In the course on "Marketing", students must present to the class a complete market analysis of a new software proposal .

In the Software Management Course a special emphasis is put on oral communications. Leading industry consultants and executives are invited to present lectures which address information-processing issues from a practical managerial point of view. This is a perspective which is rarely offered students during their studies. These lectures are well received by the students and allow them to compare and evaluate many speakers while learning something and

broadening their horizon. The conferences in the winter 1986 course were:

- Steering Commitees and Strategic Planning of Information Systems
- The Information Center
- Large System Architecture
- An Assessment of State-of-the-Art in Information Processing Technology
- Social Implications of Information Processing Technology.

Communication skills development is stressed through practical exercises. The most noteworthy exercise is the talk that each student must present to his fellows classmates. The last four weeks of the course are devoted entirely to student presentations. Each student must speak for fifteen minutes on a relevant data processing topic. Helpful hints for preparing a speech can be found in [9] and [10]. Students select topic such as:

- Security Problems with Microcomputers
- Ergonomics of Information-Processing Environments
- Local Area Networks
- The SDI Program
- Computers in the School
- Motivating Data-Processing Professionnals
- Where is IBM Going?

Students can team up on a specific theme and in this manner a "seminar" on a subject consisting of a few student presentations is possible. Interacting with the audience is encouraged; the subject of the speech has to be chosen carefully in order to facilitate this interaction.

The professor and his assistants are each assigned one subgroup of 20-25 students. Students present their speech to their subgroup. The figure below is a simple scoring pad filled by each student in the the class after the speach. A compiled summary of these pads is returned to the speaker at the end of the semester. These summaries provide some feedback to the student from the class. However, students tend to have a very small standard deviation in their evaluations.

For each speaker two fellow students are assigned as oral evaluators. After the speech, the assigned evaluators present their comments to the subgroup and the speaker. Thereby, effective and immediate feedback is given to the speaker, and student participation is encouraged. The professor and the assistants also add their comments.

Student Name

| **Presentation Evaluation Form** | | | | | |
|---|---|---|---|---|---|
| **Preparation** Questions, analogies, examples, accessories (foils...) | | | | | |
| **Organization** Introduction, plan, objectives, summaries... | | | | | |
| **Personal Qualities** Gestures, vocabulary, enthusiasm, self-control... | | | | | |
| **Interest** Subject well adapted, sustained interest, global effect... | | | | | |
| **Total** | | | | | |

This exercise is rewarding to the students; they go through a steep learning curve, gain self-assurance, broaden their knowledge and usually have fun preparing and delivering their speech. They learn as much by looking at others and by evaluating them as they learn by delivering their own speech. The student's mark is assigned by the professor or assistant but it is strongly based on the submitted scoring pads and the group's comments. The student's mark is not computed from the students' scoring pads alone, because we do not wish this to become a popularity contest.

**Improvisations.**

Interspersed with student speeches are student improvisations. Students are invited to speak for two minutes without preparation on an information processing issue randomly chosen. Topics are varied and address such issues as:

- Will ADA survive?
- Do you believe in software metrics?
- Do you prefer the Macintosh or the IBM-PC?
- What is an information-processing system?
- How does a computer work?
- Will computer science save humanity?
- Is theoretical research in computer science useful?
- What is prototyping?
- How do you export information processing technology?
- Why isn't there a universal information-processing language?
- How do you facilitate the integration of office automation systems on the marketplace?
- Are computers a cause of unemployment?

Students are urged to be sincere and to put some substance in their message. This exercise does not contribute to term grades but at each session an oral evaluator is designated to comment briefly on the improvisations. At first students are apprehensive about improvising, but they quickly realize that it is a useful exercise in quick thinking, that it simulates real world situations and at the same time is a lot of fun.

**Difficulties Encountered.**

Here is a list of certain difficulties encountered while teaching this course and solutions to some of them.

1) The marking of presentations is not always consistent between the professors and the assistants, because there is a considerable amount of subjective evaluation when marking a presentation.

2) Because of the large number of students taking the course each semester, each student can only make one presentation during the semester. Unfortunately, this is not enough to significantly augment their oral communication skills. Students who make their presentation at the end of the semester benefit considerably from the comments given to their predecessors. This causes marking problems, so we increase the marks attributed to those students who speak earlier im the semester.

3) Our faculty colleagues tend to lack concern for student development of oral communication skills. Since we are in a faculty of science, our colleagues are better trained in mathematical and scientific subjects and therefore do not always realize the importance of well-founded communication skills. They tend to forget that people are significant components of information systems.

4) It requires a considerable degree of organization to teach this course to 200 students. If each student makes a 15-minute presentation, this adds up to 50 hours of presentations in a 45-hour course. Hence, we must have qualified assistants to be able to split up the groups, but qualified assistants are not easily found.

This course is popular with the students and they generally find that improving their communication skills is relevant to their future work. Mistakes in the classroom environment are not expensive. With practice and feedback, students go through a fast learning curve and are better equipped for their jobs.

**REFERENCES**

[1] V.R. Basili, B.T. Perricone, "Software errors and complexity: an empirical investigation", Comm. of the ACM, Vol. 27, No. 1, pp. 42-45, Jan. 1984

[2] B.W. Boehm, "Software Engineering Economics", Prentice-Hall 1981, page 341

[3] A.R. Harriger, T.I.M. Ho, "A Data Processing Communication Skills Course", Seventeenth SIGCSE Technical Symposium on Computer Science Education, pp. 97-101, feb 1986

[4] A. Jay, "How to run a meeting", Harvard Business Review, pp. 120-134, Apr. 1976.

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IDENTIFICATION DIVISION.
PROGRAM-ID. DATE-TABLE.
AUTHOR. W. L. POPE.
*    It is required to get the date from
*the system and print it in the form: MAY
*20, 1986; with the correct date printed
*each time the program is run.
* a. Write DATA  DIVISION  entries to
*  declare the fields to receive the date.
* b. Write DATA  DIVISION entries neces-
*     sary to edit the date as required.
* c.  Write DATA  DIVISION  entries to
*     declare a table of month names.
* d.  Write the PROCEDURE DIVISION  state-
*     ments to  get the date from the sys-
*     tem and to fill the  fields declared
*     in b. above.
*
ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
SOURCE-COMPUTER. VAX-11.
OBJECT-COMPUTER. VAX-11.
*
DATA DIVISION.
WORKING-STORAGE SECTION.
01  TODAYS-DATE.

01  DATE-OUT.

*
PROCEDURE DIVISION.
MAIN-PARA.

    DISPLAY
      "This is the date from the system:".
    DISPLAY "YYMMDD".
    DISPLAY TODAYS-DATE.
    DISPLAY " ".
    DISPLAY
"This is the way the date was converted:".
    DISPLAY DATE-OUT.
    STOP RUN.
```

The last example is a skeleton program demonstrating the use of the SORT verb with the USING and GIVING options. We have used a similar skeleton program for the SORT verb with INPUT and OUTPUT procedures, but it is not included due to space considerations. Students must be supplied with an unsorted file. Enough information about the format of the file to sort it is given in the comments in the skeleton program.

```
IDENTIFICATION DIVISION.
PROGRAM-ID.  SORT-USING-GIVING.
AUTHOR.  W. L. POPE.
*This is a test of SORT/USING/GIVING.  The
*output can be written to your terminal.
* a. Write the SELECT statements that will
*    be needed.  The data to be sorted are
*    in a file named PAGE154.DAT, records
*    are 35 characters long.
* b.Write the FD/01  pairs for the input
*    and outpt files, and the SD/01 pair
*    needed.  The two keys are customer
*     number in positions 1-7, and quant-
*     ity in positions 23-25.
* c.Write the SORT statement to sort the
*    file in ascending order by customer
*    number and descending order by quant-
*    ity.
*
ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
SOURCE-COMPUTER.  VAX-11.
OBJECT-COMPUTER.  VAX-11.
INPUT-OUTPUT SECTION.
FILE-CONTROL.
*
DATA DIVISION.
FILE SECTION.
*
PROCEDURE DIVISION.
MAIN-PARA.
    SORT
    STOP RUN.
```

We have used skeleton programs in our COBOL class several times, and different instructors have used them. Both students and instructors have responded favorably to them.

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COMMUNICATION-- continued from page 60

[5] T.R. Lewis, "Listening To Learn", Santa Ana, CA: Toastmasters International, 1969.

[6] R.G. Nichols and L.A. Stevens, "Listening to people", Harvard Business Review, pp. 112-119, Sep.-Oct. 1957.

[7] C.D. Sigwart and G.L. Van Meer, "The art of the user interview", in Proc. 17th SIGCSE Technical Symposium on Computer Science Education, Feb. 1986, pp. 127-130.

[8] W.J.Taffe, "Teaching Computer Science Through Writing", SIGCSE Bulletin, Vol 18, No 2, Juin 1986

[9] Toastmaster International, "Speaking to inform", in Advanced Communication and Leadership Program, Toastmasters International, 1978.

[10] Toastmaster International, "Technical Presentations" in Advanced Communication and Leadership Program, Toastmasters International, 1984.