Abstract of our Assessment Presentation

The Assessment Plan adopted by the Computer Science subdepartment in the Fall 1996 semester has the following components:

- Capstone Course
- Performance Reviews
- Faculty Inventory
- Alumni Survey
- Student Survey
- Program Reviews
- GRE's and Graduate School Admissions
- Instructor/Course Evaluations

Our presentation begins with our subdepartment's one-page Annual Report for 1996-97. Then we will present copies of our subdepartment's Alumni Survey form, the Student Survey form, and the Instructor/Course Evaluation form. These will be followed by a discussion of the procedure used for each separate component of the assessment plan (see the list above) and how the procedure was carried out. We will then itemize the various actions that we have taken in response to what we discovered or decided as a result of following our assessment procedures. Finally we will indicate some steps that we have not yet taken, but plan to take, in response to our discoveries and decisions.

Copies of Assessment Instruments Used

On the following pages we have included copies of

(a) the Instructor/Course Evaluation form adopted by the full department;
(b) the alumni survey form that we recently mailed;
(c) the student survey form sent out to current majors by the student chapter of ACM in 1996.

Analysis of Results

Capstone course (C435)

This course has more computer science prerequisites than any other in our curriculum. It is typically taken by students after they have completed most of their course work in computer science. The instructor (Dr. Hakimzadeh) is now teaching this course for the fourth consecutive year, and he will teach it again for the next year or two, so he is well-positioned to assess the skills of the students who enter this course and to compare them with students who have taken the course in the recent past.

The instructor has observed in the last two years that there has been improvement in the preparation of students entering the course. The first two times he taught it, he found that students
arrived with deficiencies in

1. manipulation of standard data structures such as linked lists,
2. organizing large programs,
3. basic programming skills (file I/O, dynamic allocation, etc.),
4. working together successfully in teams.

He attributed this to the fact that there had just been a change in the programming language we were requiring students to use and the fact that some students were progressing so slowly in the program (due to full-time outside employment) that they had forgotten many of the skills they had been taught in earlier courses by the time they arrived at C435.

More recently, however, the majority of students seem to arrive with their fundamental programming skills intact. The addition of C308 (which involves a serious team project) as a prerequisite for C435 has improved the ability of the students to work in teams. Some problems remain, but they are probably intractable: a few students arrive with weak programming skills, and some students try to let others on their teams do all the work on the big project. Starting next year, the course will carry 4 credit hours instead of 3. This will permit the students to start on their projects earlier, with the result that problem students in the teams may be identified earlier and forced to shape up or withdraw. The extra time may also allow more opportunities for leadership qualities of some of the students to emerge.

Performance Reviews

Two courses in the recent past have required students to present the results of significant projects to the instructor or to the class. The two courses are Y398 (Internship -- Professional Practice) and C463 (Artificial Intelligence).

Students in Y398 are required to be fairly far along in the computer science curriculum. They are placed in jobs in various high-tech firms in the Michiana region and required to perform work that uses the latest in computer technology.

The experiences that these students report give the Computer Science subdepartment significant feedback on the ability of our majors to make use of what they have learned in our courses. The instructor conducts a weekly review with each student separately in which the student submits a standard form that he/she has filled out and then makes an oral report on their job activities. The students must also submit several 3 to 4 page reports on the projects they work on during the semester. Finally, they must submit a 20 to 30 page paper that elaborates on one of the shorter reports; this final report undergoes revision and is then posted in the department.

Most of the students report initially that they feel overwhelmed and as if they don't really know what they are doing, but they quickly discover (in almost every case) that they are quite capable of performing high level useful work for their company. Usually they must learn to use unfamiliar software
on the job, and they sometimes tell us that they wish we offered such training in the computer science curriculum. Our standard reply is that there are so many different kinds of software in use in the workplace that it would be impossible for us to offer enough such training to be useful to every student. The interns do report that some of the courses they have taken have been useful (examples are the Advanced PC Techniques class, courses that use the UNIX operating system, the systems analysis and design class, and courses that involve computer networks or hardware such as C335 and C421).

[Josh will supply one or more paragraphs here about C463.]

**Faculty Inventory**

The entire computer science faculty meets on a biweekly basis to discuss curriculum issues and ways to improve our delivery of our subject to the students. In these discussions we share our perceptions of student achievement and the information we have gleaned from instructor/course evaluations filled out by our students. We have recently included student representatives in all these meetings to get their perspectives. In addition, our discussions have to some extent been informed by student responses to the email survey that the student chapter of the ACM distributed to our majors late in 1996. We expect that the responses that are now coming in from our alumni survey will also have a major impact on our decision making.

During the current academic year we have discussed the following issues relating to student performance and departmental objectives.

a. The use of closed laboratories in elementary programming classes. Transfer students who had experienced such classes at other schools had pushed for them at IUSB. We invited a faculty member from St. Mary's College to attend a meeting in order to discuss her experience with this teaching tool.

b. The replacement of the Pascal programming language by C++ in C101. We discussed whether such a change would give students more time in C201 to master the advanced features of C++ and more time in C243 to master data structures. The discussion was driven in part by the perception of instructors in some advanced courses that our students had not mastered certain data structures topics thoroughly. Another aspect of the matter is that crack C++ programmers are in high demand in today's workplace.

c. Scheduling of advanced courses to allow for more variety in the CS elective area. Our desire to have a stable, well-established collection of standard advanced courses that students could depend on came into conflict with our desire to offer a variety of advanced courses on recent developments in computing. We do not have enough majors or enough faculty members to do both. We discussed the possibility of relaxing the requirement that every student follow a fixed advanced track so that students could design their own mix of advanced courses.

d. Revision of the natural science requirements for our degree. This discussion was driven by
experience with students who had changed from a natural science major to majoring in computer science but whose many natural science credits did not include areas that we had previously required (biology and physics).

e. Introducing our students to "professional issues" much earlier in the curriculum. Students who have been introduced to this kind of material in Dr. Tenenberg's classes have let us know that they are enthusiastic about the idea of introducing it early in the program.

f. Offering non-major courses beyond A106. This is to some extent a response to interest expressed by some students who, on completing A106, wish that there were some advanced courses in computing skills. It is also driven by the faculty's belief that such courses could well serve the population of non-computer science majors at IUSB.

g. Offering masters degrees in computer science and MIS (management information science). In response to requests from computer science alumni and inquiries from people working in high-tech industries in the area, we have begun planning a proposal to offer a degree jointly with the Mathematics subdepartment in computer science and applied mathematics. Faculty members in the Division of Business and Economics have been working on a proposal to offer a masters degree in MIS. Such a degree would have a large computer science component. A number of our computer science alumni have expressed interest in pursuing an MIS masters degree.

h. Teaching students how to avoid plagiarism. We have observed the failure by many students to assign appropriate credit for material they have taken from other sources to use in their programs, and we discussed ways to provide helpful models of appropriate citation for them to imitate.

i. Increasing the number of credits in two courses (C308 and C435). Based on feedback from evaluation forms filled out by students and on instructors' perceptions of the amount of time needed by students to complete large-scale team programming projects in these two courses, we discussed the possibility of increasing the number of credits for each of these courses by one.

Alumni Survey

(I will summarize briefly the concerns and level of satisfaction reported on whatever forms are returned to us before this report must be presented.)

Student Survey

The student chapter of the ACM distributed an email survey to current computer science students at the end of 1996. The results were collected by officers of the chapter, and all information that could identify any individual students was stripped from the responses before they were made available to the computer science faculty. Unfortunately, the survey was designed with minimal input from the faculty, so it was not as helpful as we hope to make it in the future. Further, the number of students who responded to the survey was disappointingly small. Nonetheless, we felt that we did receive some interesting feedback. The primary concerns, expressed with some vehemence, were about the hardware and software environments in which the students in upper level courses must do
their work. There were also comments about the kinds of software that some students feel would be useful for them to learn in preparation for seeking employment.
Program Review

This procedure is carried out once every seven years. We expect to do it in 1999.

GRE's and Graduate School Admissions

To the best of our knowledge, none of our students has taken the GRE or entered graduate school in the last two years.

Instructor/Course Evaluation Forms

All computer science faculty members had each of their student fill out the department's official Instructor/Course Evaluation Form at the end of each semester for the past several years. Responses obtained from these forms are shared with other faculty members in the course of discussions of the kind reported under Faculty Inventory. This is one of our most powerful instruments for assessing how our students view our curriculum.

Summary of Actions Taken

1. A closed laboratory has been introduced into our beginning programming class (see item a. in the Faculty Inventory section).
2. The curriculum was revised to replace Pascal by C++ in the beginning programming class (see item b. in the Faculty Inventory section).
3. The "advanced track" system was abolished in favor of giving students increased flexibility in choosing an ensemble of advanced computer science courses (see item c. in the Faculty Inventory section).
4. Students were given more latitude in choosing courses to complete their natural science requirement (see item d. in the Faculty Inventory section).
5. Three new advanced courses have been introduced to enrich our curriculum (see item d. in the Faculty Inventory section). They are Computer Networks, Interactive Graphics, and Advanced PC Techniques.
6. A survey form is being sent to many individuals and businesses in the Michiana area to assess the demand for a computer science/mathematics masters degree (see item g. in the Faculty Inventory section).
7. Representatives of our subdepartment have been meeting on a regular basis with faculty from Business to work out details of an MIS proposal (see item g. in the Faculty Inventory section).
8. The faculty adopted an official statement on "The Use of Copied Software in the Computer Science Department". The document contains a number of examples showing how to cite the work of others (see item h. in the Faculty Inventory section).
9. One credit hour was added to each of the courses C308 and C435 (see item i. in the Faculty Inventory section).
10. The subdepartment's laboratory committee is working with the laboratory manager to develop and enhance the hardware and software facilities, consistent with departmental goals and in
response to student concerns (see the Student Survey section).

11. The combined Mathematics and Computer Science department revised its Instructor/Course Evaluation Form to elicit more extensive written comments from students and to sharpen the focus on areas of special concern about teaching performance.

Proposed Next Steps

1. One of our faculty members, Dr. Russo, is a member of a university-wide team working on computer applications courses for non-majors. We hope to introduce these into our curriculum and begin offering an Associate of Arts degree based on such courses (see item f. in the Faculty Inventory section).

2. We are considering requiring students in our C308 class to learn Visual C++ or Visual BASIC, both of which are used in the workplace, to carry out their team programming projects (see the discussion of student experience in the course Y398 in the Performance Review section).

3. We are still in the process of deciding how to introduce students to "professional issues" early in our computer science curriculum (see item e. in the Faculty Inventory section).

4. We expect to make proposals in the coming months for a masters degree program in MIS and another in computer science/applied mathematics (see item g. in the Faculty Inventory section).

5. We have been and will again be requesting new faculty positions in computer science to support the offering of more courses to non-majors and to support the masters programs we are proposing.