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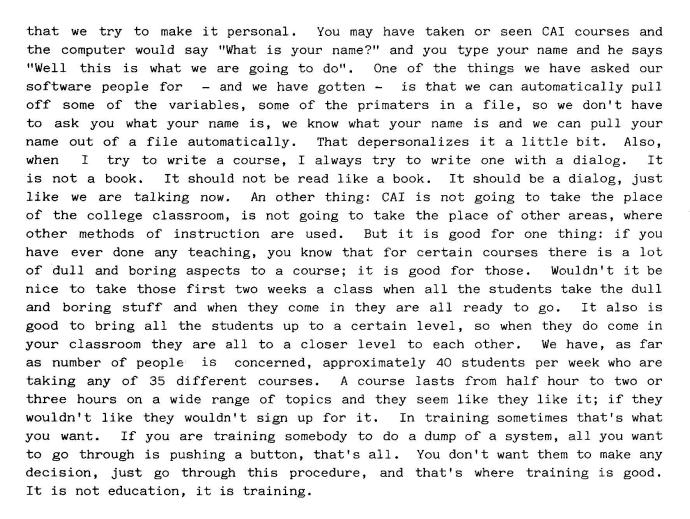
## SESSION V

### DISCUSSION

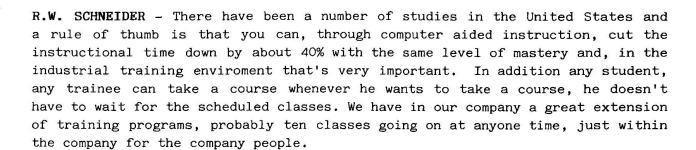
October 8, 1982 - Afternoon

Chairman: B.A. SZABO (U.S.A.)

- H. BALDAUF Mr. Schneider, what kind of answers does the program accept? Are they prepared answers from which the correct one has to be chosen? If four answers are available and one guesses, there is a 25% probability of getting the right answer! Furthermore, you stated in your paper that the computer has "infinite patience" and one can go back as often as one wishes and there is always adequate time for one's work. On the other hand, you said: "what might happen, will happen". The computer can monitor progress and keep track of the time consumed. So the training manager may finally say: "Get out, you are too slow". I believe these methods are an addition to our traditional methods, but not that they will completely replace existing techniques.
- R.W. SCHNEIDER When we write a course, we basically start with a blank piece of paper and the system; and the author of the course builds all of that into the course. The author can say that the student will only have three chances to answer this question correctly and, if he doesn't answer the question correctly, then we are automatically going to send him to some intermediate work. So it is all based on the experties of the author.
- B.A. SZABO Can you give me an order of magnitude, say in manhours, or manyears of the effort required for writing such a course?
- R.W. SCHNEIDER Actually anybody who knows what they are talking about won't quote any hours, because there are too many variables. If you have a course with a lot of graphics, a lot of branching, it takes longer. Our courses have very simple "course", from the time the boss comes in and says "write a course on this" to the time that is operational (it is about an hundred hours for every one hour of student's work, so an hundred hours to one). If it is more complicate and has more graphics, it can go up to six hundred hours to one. It takes a long time.
- J. BLAAUWENDRAAD If you allow Mr. Chairman once more the same question. It's indeed individualized, but on the other hand it is unpersonalized or depersonalized in some way. I think this way of learning is too mechanical. You are right that it will be part of the market, but it is not all, for it never can be a substitute of that social aspect which is in learning and in instructing. Also a teacher (which has experience in design) can, in some way or another, carry over to the student his engineering judgement. It may be a boundary about which this type of instruction and learning will never can and should go.
- B.A. SZABO Can you give an indication of how many people are taking this kind of instruction and how do they feel about it?
- R.W. SCHNEIDER You are correct. What we try to do, when we write a course, is



- **B.A.** SZABO I have a similar question for Prof. Greenberg. You mentioned in your presentation that something like two thousand undergraduates are taking the course that you offer. Is this course compulsory and if so, how do these people relate to it?
- D.P. GREENBERG Let me try to clarify one misunderstanding. We have approximately two thousand undergraduate engineers at Cornell University and they are in approximately ten different departments. The objective is to make sure that each one of those students gets exposed to one course using computer aided design systems before they graduate. There are approximately, 15 may be even 20, courses now tought on the system. I don't think that any course has more then 150 or 200 students. If you consider the fact that some students may take 2, 3 or even 4 courses on the system, we are probably teaching in the neighborhood of 600 to 850 students per semester now, although they are not in a single course.
- S. ELKMESHI Although I am impressed with Prof. Greenberg's presentation, my question goes to Dr. Schneider. Concerning the general attitude that computer is a black magic thing, you are teaching other things out of computer: how that affects your students when you are teaching them about those things you mentioned? Mixing up these things together, if you teach them whatever works or these different courses you mentioned, how are they affected? I mean they can be easily trained without computer, but with computer are they more affected?



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