

Turkey: A Report on Computer Graphics Education

Bülent Özgüç
Bilkent University

Introduction

In a formal or an informal manner, computer graphics has been a field of research and education since the early 1970s in Turkey. The earlier examples of academic research work came from Istanbul Technical University and Middle East Technical University in Ankara. Istanbul Technical University research efforts were basically on computer-aided design, whereas at the Middle East Technical University, more theoretical computer graphics work has been carried on.

Two examples can be given of early theoretical graphics work: A hidden line elimination algorithm by Ibrahim Canbulat, and an automated drafting algorithm by the author [2, 3]. To the best of my knowledge, the earliest official computer graphics course was offered at the Middle East Technical University in 1979. With the establishment of Bilkent University in Ankara, the first private university in Turkey, computer graphics became an official track of study, not only in computer engineering, but in fine arts as well.

In this paper, we examine the current state of computer graphics education in Turkey under two main headings. First, the educational activities within the departments of computer science will be examined. Then, the educational activities within the schools of art and design will be looked at. In order to find out the educational activities at various universities, we have written to 52 departments at 40 universities. The information given in this report is based on the responses from these departments. Many departments at various schools offer technical drawing courses by the use of drafting software. These have not been classified as computer graphics courses.

Computer Graphics Education in the Departments of Computer Science

At the Middle East Technical University Department of Computer Engineering, a third year undergraduate computer graphics course and a graduate level course are currently being offered. Being the earliest school to offer computer graphics as an undergraduate course, graduate research in graphics has been rather small and only a few master's degrees have been granted in this field. In the department of

Mechanical Engineering of the same university, CAD is a major field of study with some very advanced laboratories. Graphics is used and taught in order to support CAD education and research. Ege University in Izmir, one of the earlier schools to offer a computer engineering program, has an elective course at the junior level. Hacettepe University in Ankara, another university that has started a computer engineering program early in its establishment, offers an elective course at the senior level. In the Computer Engineering Department of Marmara University, a major university in Istanbul, one graduate and one undergraduate course have been offered since the 1993-94 academic year. Similarly, in the Department of Computer Engineering of Bogaziçi University in Istanbul, both a graduate and an undergraduate course are offered. This university, formerly known as Robert College, is one of the earliest engineering schools in Turkey.

Computer graphics became a field of study at Bilkent University Department of Computer Engineering and Information Science with its establishment in 1986. Actually, the very first doctorate degree granted by the Graduate School of Engineering and Science was on a computer graphics dissertation [1]. In the undergraduate program, there are two senior year courses on graphics, the former usually attracting about 45 students per semester, whereas the latter, a more advanced course, attracts about 25. A good number of these students who continue for their master's degree choose graphics as a field. There are two more courses at the graduate level, one on advanced applications, and the other more on user interface issues. These two courses have almost a steady attendance number of about 15 students per semester each. During the last nine years, about 20 graduate degrees were granted in computer graphics. Students have a chance to work with a wealth of workstations, and for more advanced applications, parallel machines are available.

New universities are happily incorporating computer graphics courses in their curricula. Kocaeli University in Izmit, established in 1994, has a senior year computer graphics course. Cumhuriyet University in Sivas offers a general engineering course on computer-aided graphical design to the graduate engineering students. Mersin University, planning to start their computer engineering program in the 1996-97 academic year, has already assigned a master's thesis topic in computer graphics. This looks

promising for their curriculum. Another young university, Mustafa Kemal University in Iskenderun, has one required computer graphics course, again for the juniors. The school currently has up to sophomore level students. Firat University at Elazig is planning to open the undergraduate computer engineering program in the 1997-98 academic year. They have, however, started their graduate program already and are offering four computer graphics related courses, and five of their students are working on computer graphics topics for their M.S. degrees.

Computer Graphics Education at the Departments of Fine Arts, Design and Architecture

Anadolu University, located at Eskisehir, a state university that celebrated its first decade in fine arts last year, has invested a great deal in computer graphics, TV-video graphics and production. One noteworthy mission of the university is to prepare all the course work for the open university system in Turkey that depends heavily on video graphics and multimedia. The university also provides support to various private or state TV broadcast companies in Turkey. At the Department of Graphic Design of Anadolu University, there are two different programs that support computer graphics education. The first program consists of the graphic design courses with computer support. These courses are scheduled for eight hours a week during which computer graphics laboratories are used extensively. The other heavily computer-supported track of study consists of publication graphics courses where the student learns the principles of document design and desktop publication. The Department of Animation in the same university is comprised of two tracks: one on conventional animation, and the other on computer animation. Computer animation courses start at freshman level and continue until graduation. Software used are two and three dimensional animation packages, digital imaging and video packages, line test systems and multimedia applications.

The interior architecture program at Bilkent University starts computer graphics courses at the second year, and two required courses aid students in graphical presentation. The program of the Department of Graphic Design relies heavily on computer graphics. In

addition to required courses, elective courses are also offered. The Department of Landscape Architecture and Urban Design also has two required undergraduate courses on computer graphics.

The Faculty of Architecture at the Middle East Technical University also offers computer graphics courses to aid architects in design and drafting. Currently there are two courses being offered, one undergraduate and one graduate.

Hacettepe University, another state university in Ankara began offering both a compulsory and an elective computer graphics course to its fine arts students in the 1992-93 academic year. The same university also has graduate level courses for art and design students. In the 90s, two dissertations were carried out on the application of computer graphics in graphic arts.

At the architecture school of Yıldız Technical University in Istanbul, required computer graphics related courses are offered in the sophomore year. An elective course, more related to architectural animation for walk throughs, is also offered almost every term. The school is noteworthy for its efforts in starting a graduate program called "Architecture in Computer Medium" in the 1995-96 academic year.

At Mimar Sinan University in Istanbul, the oldest fine arts school in Turkey established in 1883, the Graphic Design Department started incorporating computers in the graphic design studios in 1990. In their junior and senior years, as well as in graduate programs, various computer graphics software packages are taught and used effectively in design work. Similarly, in the Architecture Department, various advanced applications of multimedia, graphics and related work are incorporated into education as well as research projects.

Concluding Remarks

The examples outlined in this paper are by no means the only examples of computer graphics education carried out in Turkey. However, they do represent a significant part of the educational activities carried on in the field of computer graphics. (Please see Table I for the distribution of computer graphics education in Turkish universities.) In the engineering schools, the beginning courses are mostly involved with the mathematics and principles of computer graphics, whereas the advanced courses study topics like ray tracing, radiosity and parallel algorithms. Most courses require that programming projects be carried out. Equipment ranges from personal computers to

| Department | Total Responses | | Positive Responses | |
|--|-----------------|----------------|--------------------|----------------|
| | % ¹ | % ² | % ¹ | % ² |
| Engineering | 25 | 54 | 15.3 | 33 |
| Architecture | 21.5 | 57.8 | 11.5 | 31.5 |
| Fine Arts | 9.6 | 55 | 5.7 | 33 |
| Total Responses (Out of 52 departments) | 56.1 | | 32.5 | |

Key
¹ Percentage of those departments that responded (positively or negatively) out of a total of 52 departments contacted. For example, from the first column, we see that 25 percent of the total of those responding were in engineering departments. From the third column, we see that 15.3 percent of those responding positively were in engineering departments. We assume that the departments that did not respond have no formal CG education or use CG as an aid in various other classes such as CAD, technical drawing or desktop publishing.
² Percentage relative to the total by department, 24 in engineering, 19 in architecture, 9 in fine arts. For example, we see from the second column that 54 percent of the 24 engineering departments contacted responded. From the last column, we see that 33 percent of the 24 engineering departments contacted have computer graphics education.

Table I

high speed parallel architectures, but the most common graphics CPUs are RISC workstations. Courses at fine arts and design schools are more involved in design principles. Various available graphics software packages are used. Some departments, however, give basic geometric and graphics principles before the students are heavily involved in using graphics software. Personal computers and workstations are commonly used pieces of equipment.

The interest in computer graphics is steadily increasing, especially with a series of articles published in *Bilim ve Teknik* (Science and Technology), the most popular science journal in Turkey published by the Scientific and Technical Research Council. The state television also has a popular science series in which computer graphics is going to be studied in great detail, again supported by the Scientific and Technical Research Council of Turkey. Such attempts of the media make the prospective high school graduates aware of the technological and scientific developments in the field of computer graphics, thus leading to their demands to know more about the field. The universities and other educational institutions have no choice but to adjust their curricula. It is, indeed, very pleasing that all the new universities are employing computer graphics courses in their curricula, often both at graduate and undergraduate levels.

References

1. Akman, V. and A. Arslan, "Sweeping with all graphical ingredients in a topological picturebook." *Computers & Graphics*, 16(3): 273-281, (1992).
2. Canbulat, I. "Perspective Drawings with a Computer." *Electronic Information Processing, Proceedings of the Istanbul Technical University Symposium, 1977*, pp. 175-198, (in Turkish).
3. Özgüç B. and M. Pultar. "A Computer Graphics Program for Architectural Drafting." *METU Faculty of Architecture Journal*, 5(2): 269-285, (1979).

Bülent Özgüç

Bilkent University
 Faculty of Engineering
 Faculty of Art, Design and Architecture
 06533 Bilkent Ankara
 Turkey
 Tel: +90-312-266-4471
 Fax: +90-312-266-4136
 Email: ozguc@bilkent.edu.tr