Profile of Students Who Enroll in a Technical Graphics Program

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Abstract

For several years the Graphic Communications Program at North Carolina State University has enrolled students into an informal major through the Technology Education Program. Because the major is now in the process of being formalized, determining the needs of the students has become a priority. With this information, course offerings can be tailored more closely to the needs of the students. Along with the needs of industry, a profile of the students who enroll in a program helps it to recruit and retain students.

This paper will provide a summary of the profiles of students enrolled in the Graphic Communications Major under the Technology Education Program and the students in the Graphic Communications Minor. Likewise, it will discuss the value of knowing the characteristics of its students and how their profiles can be used to provide a closer match in course content, offerings, and instructional strategies in a program of this type.

Introduction

The Graphic Communications Program (GC) at North Carolina State University (NCSU) is in the process of creating a specialization under the Technology Education Program (TED). The program has used the TED Non-Teaching Option for some time to provide students with a degree similar to the one that is being planned. To develop this new specialization, knowledge of the characteristics and concerns of the students with an interest in this type of degree is important. The students, as the customers of this degree, must be taken into consideration. A program in any institution of higher education must also sell itself to potential customers. To ignore this aspect of creating a degree could doom the degree to failure. To obtain some of this information, a descriptive study was conducted in the form of a survey given to students who are in the TED Non-Teaching Option majoring or minoring in GC. This paper will report on the findings of this survey as well as discuss their implications for developing a major in the field and advertising it to potential students.

The Graphic Communications Program

The current Graphic Communications Program at NCSU offers 14 courses, three introductory engineering graphics courses and 9 advanced courses. The three introductory courses include a course for the general college population, a course for Mechanical and Aerospace Engineering, and a course for Industrial Engineering. The advanced courses include content related to advance

CAD, solid modeling, surface modeling, descriptive geometry, desktop publishing, web site development, technical data presentation, visual thinking, and animation. The program has approximately 65 students who are in the informal major under TED and approximately 200 students in the 15-credit hour minor.

The Study Design

This descriptive study was designed to examine some of the characteristics and opinions of students who are enrolled in either the major or the minor. In order to collect this data, a survey was designed with the input from the faculty in the Graphic Communications Program. This survey consisted of 20 questions plus demographic information. Questions on the survey related to the following areas: satisfaction and dissatisfactions with the program in general, computer programs taught by the program, reasons and methods for entering the major or minor, previous experience in the field of study, courses taken in the TED Program, and future plans. Instructors who were teaching upper level courses in the Graphic Communications Program administered the survey to students enrolled in the major and minor during the last week of class of the Fall 2002 semester.

Demographics

A total of 56 students completed the survey, 13 females and 43 males. Of these, 18 were majoring in Graphic Communications through the TED Non-Teaching Option and 38 were minoring in the program. The students who completed the survey had taken between one and seven courses in the program. With the exception of two, all of the respondents had completed high school in North Carolina. Their ages ranged between 19 and 47, with a mean age of 22.2 and median age of 22. Forty-five were Caucasian, four were African American, three were Hispanic, two were Native American, and two were Oriental. The mean of the respondents' grade point averages (GPA) was 2.83 (SD=0.43). The majority of the students in the minor program were majoring in some field of engineering. The majors were predominately individuals who began in an engineering program and transferred to Graphic Communications.

Program Satisfaction

The answers to questions related to student satisfaction with the program and the reasons for this satisfaction were revealing. Of the 55 students who completed this portion of the questionnaire, all of them (100%) stated that they would recommend this program to another student. When asked what they liked best about the program, 19 or 35%, out of the 53 who responded to this question, indicated that the faculty were the main reason for their satisfaction. Fourteen (26%) liked the hands-on nature of the curriculum, and 12 (22%) liked some aspect of the content of the courses.

When asked what changes the respondents would make to the Graphic Communications Program, the most common suggestion was to increase the number of classes and sections offered. Fourteen students out of 44 (32%) listed this improvement. The second most common

suggestion, was that that more software instruction be included in GC classes (12 or 27%). The number of individuals who made this suggestion was somewhat unexpected, since only 11% of respondents indicated that software instruction was the reason they liked the program. The third most-often-listed suggestion was that nothing be changed (7 or 11%).

On the survey, students were asked to indicate the courses they had taken in the GC Program and to rank order them, beginning with the number one (1), to indicate their order of enjoyment of these courses. To examine these responses, a subset of the original respondents was created to examine only those students who had taken four or more GC courses. Twenty-one of the 56 respondents met this criterion. When examining the data on the course that these students listed as their favorite, the analysis revealed that students listed GC 410, Concepts of Desktop Publishing, and GC 420, Visual Thinking, equally. A tie also occurred for the second most commonly listed choice for favorite class between GC 496N, Introduction to Technical Animation, and GC 350, Applied CAD/D and Geometric Controls.

When analyzing the data for respondents' selection of their second most favorite course in the program, GC 350, Applied CAD/D and Geometric Controls was listed most often. For the second most commonly listed course selected as the second favorite course, a three way tie occurred among GC 496N, Introduction to Animation, GC 420, Visual Thinking, and GC 496O, Surface Modeling.

Hobbies and Activities

Of interest to the faculty in the program were the hobbies of the students in the program. Knowing the interests of the students allows instructors to better tailor their projects to student interest. The data revealed that the majority of the students were interested in some form of sports. The hobbies that the respondents listed second generally involved building or fixing things in some fashion.

Software

When respondents were asked about their preferences for software taught as part of the courses in the GC program, the largest number, 22 out of 55 (40%), indicated that their favorite software was Solidworks, a constraint-based solid modeling program. AutoCAD was listed second (14 or 25%), and 3D Studio Max was listed third (8 or 15%). When asked which software was the most difficult to learn 15 (28%) of the 53 students who responded to the question listed AutoCAD, and 10 students (18.8%) listed none. When examining the subset of respondents who had completed four or more courses in the GC Program, the software liked best was tied between Solidworks and 3D Studio Max (7 or 33%). The analysis of the data from this group also produced a tie for the most difficult software to learn, 3D Studio Max and AutoCAD (4 or 20%); however, the software packages they listed were more diverse.

Gender

Although the study sample only contained 13 females, their responses were compared to the males in the study and some differences were found. The GPA of the female respondents was slightly higher than the males in the study. The mean GPA for females was 2.89 and the mean GPA for males was 2.81. A significant difference was found in the number of male and female respondents who had prior drafting experience. The percentage of males with prior experience was 74.42%, but only 33.33% of the females indicated they had prior experience ($p = 0.0095$). The females' most common answer to the question related to what they liked best about the program was its hands-on nature (54%). The faculty was mentioned with the next highest frequency (36%). It was not a surprise that none of the females listed software instruction as a reason for choosing the program. Based on findings in earlier studies related to attitudes towards computers and gender, males were found to have a stronger positive attitude towards computers when compared to their female counterparts (Arch & Cummins, 1989; Fetler, 1985; Francis, 1994). When asked about improvements they would like to see to the program, females and males again differed slightly. The 34 males that made recommendations on the survey indicated equally that it would be improved by an increasing the number of class sections and increasing software instruction (29.4%). However, of the 10 females who answered this question, 50% recommended more sections and 30% more software instruction.

Minors and Majors

When comparing the data for the students who were majoring and minoring in the program, some differences also came to light. Eighteen of the respondents were majoring in Graphic Communications through the TED Non-Teaching Option. The minors had an overall higher mean GPA than the majors. The mean GPA for the minors was 2.91, and the mean for the majors was 2.68 ($p=0.065$). This was not unexpected. The current students in the major are predominately individuals who did poorly in other majors and transferred into the program with lower GPAs to start with. This is also apparent when comparing the number of times the minors and majors had transferred between programs. The average number of program transfers made by the minor students was 1.26 in comparison to the majors who had an average of 1.88 program transfers ($p=0.002$). The majority of the majors (15 or 83.33%) had transferred to a different program at least once. The minors who completed the survey, on the other hand, had only 8 students (21.05%) who had changed major.

Another difference found between the two groups was the reasons they liked the program. The main reason stated by majors in the program was clearly the professors (53%). Minors on the other hand were more diverse in their reasons. The data from this group revealed that their most frequently reported reason for entering the program (31%) was the content of the courses, with 27.7% listing the professors, and 27.7% listing the hands-on nature of the course work. This was an interesting finding which may indicate that students who major in this field are looking for a program where instructors pay them more attention and they can feel more at home. The majority of the students transferring into the GC major come from large programs in

engineering, and frequently make comments to their advisors on the greater time and attention instructors in the Graphic Communications Program pay them compared to their previous major.

There was also a difference found in the way that these groups had heard about the Graphic Communications Program. The minors became aware of the program predominately when they took an introductory GC course (61%). The majors, however, became acquainted with it in more diverse ways. Twenty-eight percent heard about it from other students, 22% through the Freshman College, 11% from a faculty member, and 11% through career fairs.

As expected, there is also a great deal that these groups had in common. Examination of their prior drafting experience found them to be almost identical. Sixty-six percent of the majors and 65% of the minors took drafting previously in high school. This was somewhat higher than expected. When compared to a previous study, conducted in 1999, the author found that approximately 50% of the students in Graphic Communications introductory classes had prior drafting courses in high school (Scales, 2000). Although a slightly different population, the students in the introductory classes were predominately majoring in engineering programs, and it was expected that their prior drafting experience would be similar. This finding, however, likely indicates a predisposition of individuals who have taken courses in high school to be more attracted to Graphic Communications.

Discussion

In examining the data, it is obvious that the current Graphic Communications Program works fairly well for most of the students who are enrolled in the minor or the major. All of the respondents stated that they would recommend the program to other students, and many indicated that they liked the instructors in the program. Most complaints were centered on the lack of classes and class sections. The students surveyed also indicated their desire for an increase in software instruction. The need for additional sections is a legitimate complaint. Due to a lack of instructors, the number of upper level courses taught by the program is restricted, leaving these students to fight to get into classes. This survey provides evidence that a problem exists and can possibly be used to push the administration to rectify the situation. However, the suggestion that the courses include more software instruction leads the author to the conclusion that the instructors in the program are not doing a sufficient job in informing students of the importance of understanding the basics of graphics that the courses cover. For better or worse, students perceive software instruction to be the center of the program, and, although it helps attract students to the program, its relationship to the core content of the courses should be keep in perspective. If students are unable to see this, then the faculty teaching the courses should address it.

Another observation that can be gleaned from the data is that students who have taken a large number of courses in the program seemed to enjoy most the courses that involve some creativity. These courses were Visual Thinking, Desktop Publishing, and Animation. This result probably can be attributed to the large number of minor students in the sample. Since the majority of these students are in some program in engineering, they may enjoy a change from the technical courses

they take as part of engineering; however, this finding could also indicate that students find these courses a direct compliment to their studies in engineering design.

The issue of software preference was also interesting. Since the program changed to Solidworks from AutoCAD as its primary program in the introductory and some advanced courses, a debate over which program is better for preparing students for their careers after leaving the university has occurred in a number of faculty meetings. The data analysis provides evidence both software programs are liked by students, but the majority of them prefer Solidworks. Although this may not be an indication that Solidworks is the best program to teach, it does indicate that students have embraced this change.

The results of this survey have implications for teaching, recruiting, and keeping students in the new major. In the area of teaching, student interest can become the center of projects in courses and allows instructors to acknowledge the preferences of students even when it is inappropriate to adhere to them. Fortunately, the majority of students voiced satisfaction with the program, particularly with the faculty. Although faculty in the Graphic Communications Program have always dedicated considerable time to students, the survey results imply that the time faculty spend with students is valued by them. In recruiting students for this major, the personal attention paid to students should, likewise, be highlighted. This is particularly true for students currently enrolled in engineering programs that are looking for a new major. The data likewise indicate that the program should have more of a presence at university career fairs, Freshman College events, and high school career fairs, since these seem to be the main source of majors for the program. In particular, high school students who have taken drafting in high school are a large potential source of majors for this program and should be courted by it before they enter college.

This study was just the beginning of an examination of the characteristics of students who are enrolled in the Graphic Communications Program at NCSU. The next stage will be to administer a learning style test to the students who are majoring or minoring in the program so courses can be designed to fit their learning styles. Evaluation of the nature of the students in the program allows the faculty better to address students' needs, design instruction that "fits" students' learning styles, and improve students' achievement. Further, reviews of individual courses, beyond the traditional teacher evaluation, is also needed to refine these so students both enjoy and receive the maximum benefit from the courses that are part of the new major. Assessment has become one of the major initiatives in higher education; therefore, it must be built into the major and taken seriously.

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