

Evaluating a Prospective Student Mentoring Program

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Abstract - *Although student enrollment in computing programs is rebounding, there are still not enough students in the pipeline to meet future demand for computing professionals. Mentoring programs play a role in the retention of existing students, but mentoring of prospective students can help to bridge the gap between secondary and post-secondary experiences. We describe a long-standing prospective student mentoring program at a Midwestern university in the United States and share the results of a two-year evaluation of the program. We found that the program was more likely to influence the enrollment decisions of female students, that a majority of students were interested in continuing contact with their assigned faculty mentor, and that contact with a faculty mentor was correlated with positive enrollment decisions.*

Keywords: Student recruitment, student enrollment, student mentoring, student-faculty interactions

1 Introduction

Effective student recruitment has long been of interest to educators [5], and such interest is not restricted to U.S.-based institutions [3, 7]. This is particularly true in computing. Despite favorable job prospects [9], the numbers of students enrolling in programs in computer science, information systems, and information technology programs is only beginning to recover [9]. Because at many institutions fewer students enroll in computing programs than would be desirable [9], retaining students takes on an increased importance. One approach to retaining students is to use mentoring programs. But mentoring programs are often not implemented until a student has enrolled at an institution [2, 4, 6, 8, 12] and then often to improve the retention of underrepresented groups [6] or of students in particular courses such as introductory programming [8]. This leaves a potential hole for prospective students, who may not have access to resources while they are making crucial decisions about college enrollment. One approach to this issue has been to design virtual environments for prospective students, but this approach has not been evaluated for its effectiveness [1].

The College of Computing and Digital Media (CDM) at DePaul University is one of the largest information technology institutions in the United States with approximately 1800 undergraduates enrolled in 14 Bachelors degree programs. CDM is unusual in its breadth of degree programs, and advising is crucial both for matriculated and prospective students. Matriculated students have long had

access to both faculty and staff advisors throughout their career, and recent changes have been made to improve their experience [10]. Programs designed for prospective students are more challenging, in part because of the logistical issues. Since 2004, CDM has had a mentoring program that pairs faculty members with prospective students applying to CDM. The goal of the prospective student mentoring program is to allow students early access to faculty, with the hope that the information faculty provide about academic programs will help the students make good decisions about college enrollment and CDM in particular.

However, creating a prospective mentoring program is only helpful if that program is achieving the goals that motivated its implementation. Although CDM had a prospective mentoring program for many years, an evaluation of the program had never been conducted. In 2009 a project was begun to understand the effectiveness of the program, with a two-fold focus. First, we wanted to understand whether the program was impacting the decisions of prospective students. A secondary goal was to understand whether faculty were engaged and effective as mentors, since that is a prerequisite for useful mentoring program.

The evaluation project consisted of a series of surveys for three audiences: prospective students, current CDM students, and faculty participating in the prospective student mentoring program. Prospective and current students were asked whether the program had affected their enrollment decisions. Faculty were asked about their participation in and engagement with the program. The first year of evaluation resulted in poor response rates and quality of data from both prospective students and current students, although useful information was obtained from faculty participants [11]. The evaluation process and the program itself were modified slightly based on the faculty feedback during the 2010 – 2011 academic year, and surveys of prospective students and faculty were implemented again. The response rates and quality of data were better. We found that while student recall about the program was spotty and students reported less contact than faculty did, the program was more effective at influencing enrollment decisions for female students. A significant minority of students indicated that the program had influenced their enrollment decisions, and a majority of students were interested in continuing contact with their faculty mentors.

In the remainder of the paper we describe the CDM prospective student mentoring program, provide details about the surveys of students and faculty, analyze the data gathered, and discuss the results.

2 Mentoring program

As mentioned previously CDM has had a mentoring program that pairs faculty members with prospective students applying to CDM since 2004. The goal of the program is to provide prospective students with academic information that they would not otherwise receive from contacts with advising staff and also to improve the enrollment rate among prospective students.

The CDM undergraduate services staff assign students to volunteer faculty within a few weeks of their admittance, typically beginning in January of each year. Students are sent the contact information for faculty in a letter congratulating them on their acceptance to the university and in an e-mail following the letter two weeks later. Faculty receive a spreadsheet, typically twice a month, with mentees' information. Faculty are expected to initiate at least one contact with the student and to answer any questions the students may ask. Faculty are not required to contact the students in any particular way and are provided with each student's address, phone number, and e-mail address. In March there is an Admitted Student Day in which students and their parents/guardians are invited to come to DePaul for an open house. Faculty participating in the mentoring program are encouraged to come to the event, where they can meet with students and answer any questions they or their parents/guardians may have. The program is typically somewhat dormant after the March event, although students do still have the opportunity to contact faculty. May 1st is the national deadline for students to declare their intentions for university enrollment, and student-faculty contact associated with the mentoring program typically ends at that point.

While the mentoring program has existed in various forms since 2004, no systematic evaluation of the program was done until 2009. In the next section we describe the process used to evaluate the program over the two years of this project.

3 Evaluation

When approaching the evaluation of the prospective student mentoring program, we believed there were two major issues. The most important consideration is the effectiveness of the program with respect to students. Since a strong reason for the existence of the program is to recruit prospective students, our main measure of effectiveness is an increased likelihood of participating students attending DePaul. But there were other impacts of the program we considered, such as the possibility that the faculty mentor was a poor fit for the student. In particular, to evaluate the effectiveness of the program with respect to students we considered the following questions:

1. Are students with a particular major who participate in the program more likely to enroll at DePaul?
2. Are male or female students more likely to enroll at DePaul after participating in the program?

3. Are students who were contacted by faculty mentors more likely to enroll at DePaul?

4. Are students who contacted their faculty mentor more likely to enroll at DePaul?

5. Is a student who met with a faculty member other than their mentor more likely to enroll at DePaul?

To evaluate the impact of the program on students we surveyed newly enrolled students who had participated in the program. We also surveyed students who had participated in the program during previous years. Response rates for each of the surveys varied enormously and the results are discussed in the following section.

A prospective student mentoring program will not be effective without faculty who are engaged in the program. Therefore a secondary evaluation approach was through faculty surveys. There we wanted to understand how often faculty contacted students, how faculty contacted students, the frequency with which faculty answered student questions, and what topics were discussed during faculty-student interactions. The information from the faculty surveys is provided in the final part of this section.

3.1 Student analysis

The first year of the evaluation of the prospective student mentoring program was 2009-2010 and during that year there were two populations of students who were surveyed: newly enrolled freshman who had participated in the prospective student mentoring program in the six months prior to their enrollment and all relevant enrolled CDM students. Prospective students were surveyed after they had enrolled at DePaul, either in their first or second quarter. Only current CDM students who had enrolled since 2004 as a traditional freshman, and thus had taken part in the prospective student mentoring program, were included in the survey.

Unfortunately the response rates for both student groups were lower than expected in the first year of the evaluation project. The response rate for current students was 18% (64 out of 355). Further among the 64 responses, only a small percentage (18% or 12 out of 64) indicated that they had participated in the mentoring program, something that simply was not true. Our conclusion was that current students were unable to recall their participation in the program, a hypothesis supported by the comments provided by students responding to the survey. The response rate among prospective students during the 2009-2010 year was also low at 20% (66 out of 325). Although there were more useful responses than the current student survey produced, we felt that improving the response rate would be crucial in order to gain sufficiently reliable data.

During the 2010-2011 evaluation process current students were not surveyed at all since their recall of the program was deemed to be too weak to provide useful data. Further, the process for prospective students was changed. Students were surveyed earlier, at their orientation rather than during their

first or second quarter after enrollment. Students completed an anonymous paper survey during orientation. As hoped this improved the response rate for the surveys, with 191 responses received. There were 211 students over the age of 18, for a response rate of 91%.

The following questions were included in the 2010-2011 prospective student survey:

1. Sex: Male/Female/Prefer not to specify
2. Age: [fill in the blank]
3. My intended major is: [selection from available items]
4. My assigned faculty mentor has contacted me: yes/no
5. I have contacted my assigned faculty mentor: yes/no
6. If you answered yes to question 4 or 5, indicate how often you have been in contact with your faculty mentor, regardless of who initiated the contact: weekly/monthly/at least once
7. I have been in contact with another CDM faculty member other than my assigned faculty mentor: yes/no
8. If you answered yes to the previous question, please indicate how often you have been in contact with the other CDM faculty member: weekly/monthly/at least once
9. I would be interested in having my faculty mentor be assigned as my faculty advisor: yes/no
10. The contact I had with my faculty mentor positively impacted my decision to enroll at DePaul: yes/no
11. The contact I had with my faculty mentor positively impacted my decision to choose a major at CDM: yes/no
12. The best things about being assigned a faculty mentor are: [fill in the blank]
13. The faculty mentoring initiative could be improved by: [fill in the blank]

In the remainder of this section we provide descriptive statistics for the responses from the prospective students and analyze correlations between various survey responses to answer our previously-mentioned evaluative questions. All data analysis was done using SPSS.

3.1.1 Responses

A vast majority of prospective students were male (82.2%) with the remainder female (17.8%), which is comparable to the overall CDM student population. The overwhelming majority of students were traditional age, with 94.8% indicating that they were 18 years of age, 4.7% 19 years, and 0.5% 20 years. The majors of the students participating in the program were proportional to the overall enrolled student population. The data about majors is not included here due to space constraints.

The following table indicates the responses to the questions about contact with the faculty mentor and the frequency of that contact:

Table 1. Contact with faculty mentor

Question	Yes	No	No answer
Contacted by faculty mentor	28.8%	69.1%	2.1%
Student contacted faculty mentor	17.8%	79.6%	2.6%

A total of 56 students answered the follow-up question, with 1 (1.8%) indicating contact weekly, 7 (12.5%) indicating contact monthly, and 48 (85.7%) indicating contact at least once.

When asked about contact with a faculty member other than their assigned mentor, 16.8% of students responded yes, 74.9% responded no, and 8.4% declined to answer. In the follow-up question, 0.5% indicated weekly contact, 2.1% monthly contact, 17.8% reported contact at least once, and 79.6% declined to answer.

When asked if they would like to have their assigned faculty mentor as their CDM advisor, 50.8% indicated yes, 18.8% indicated no, and 30.4% declined to answer.

When asked whether the faculty mentoring program had any impact on their enrollment decisions, the results were nearly evenly split between each response (yes, no, unanswered). The table below lists the responses for both questions:

Table 2. Mentoring impacted enrollment decision

Question	Yes	Maybe	No	No answer
Enrollment at DePaul	34.0%	0.5%	33.5%	31.9%
Choice of a major at CDM	28.8%	0.5%	36.1%	34.6%

The final two questions on the survey were open-ended. The first asked students to list the best thing(s) about the mentoring program. 47.65% did not answer the question and 13.61% reported that the benefits were unknown. Among those students indicating a benefit, the most common were having help/guidance (10.99%), help with classes/curriculum (8.9%), a source of information/answers to questions (8.38%), a personal connection/relationship (3.66%), communication (2.62%), and feeling welcomed/connected (2.09%). When

only those students who reported some contact with faculty are considered, the percentage who reported unknown dropped to less than 2%, and the percentage of each common answer increased. The ordering of the common answers remained the same.

In response to the open-ended question about ways the prospective student mentoring program could be improved, 67.54% of students did not answer the question and 4.19% indicated unknown. The largest percentage of students providing a response indicated no suggestions for improvement (10.47%), followed by more contact with faculty (9.95%), and better responses by faculty (5.24%). If only the students who reported contact with faculty are considered, the percentage not answering the question dropped to 16.84% and the number indicating unknown dropped to 1.58%. Among these students the top two responses are more contact (5.26%) and nothing (4.74%).

3.1.2 Correlations

To further investigate the impact of the mentoring program on the participating students we considered correlations between responses to various questions. The first correlation we considered was that between a student's major and a response indicating that the mentoring program had an impact on their decision to come to DePaul. Unfortunately, almost all of the expected counts were less than 5, meaning that the data set was too small for reliable statistical analysis.

Gender was the next factor considered, with correlations between a student's gender and a response indicating that the mentoring program had an impact on their decision to come to DePaul. Here the results were significant at $\chi^2(1, N=209) = 211.24, p=0.0$. The program had a high effectiveness for female students when making a decision to come to DePaul.

We next considered the relationship between faculty-student contact and the student's decision to come to DePaul. The first significant result was a correlation between the student reporting contact with a faculty member and the student indicating that the program had an impact on their decision to enroll at DePaul with $\chi^2(1, N=209) = 264.187, p=0.0$. If a student's assigned faculty mentor contacted them it was reflected in a positive response regarding their decision to attend DePaul. Also, there was a high correlation between a student indicating that the faculty mentor did not contact them and that the program did not impact their decision to attend DePaul. As a follow up to this, the relationship between the reported frequency of contact with the faculty mentor and the DePaul enrollment decision was checked. Here there was no significant correlation found.

If the student contacted the faculty mentor there was also a significant correlation with the reported impact of the program on the DePaul enrollment decision at $\chi^2(1, N=191) = 44.246, p=0.0$. The students reporting that they contacted their faculty mentor were also more likely to report that the program impacted their enrollment decision, and students who reported that they did not contact their faculty mentor were

more likely to report that the program did not impact their enrollment decision. We also checked the correlation between a student reporting contact with a faculty member other than their faculty mentor and their DePaul enrollment decision. Here there was no statistically significant result.

3.2 Faculty analysis

Faculty participants in the mentoring program were surveyed during the 2009-2010 and 2010-2011 academic years. In April 2010 24 (18 male and 6 female) faculty were surveyed and 13 faculty completed the survey for a response rate of 54%. In February 2011 23 (17 male and 6 female) faculty were surveyed and 11 faculty completed the survey for a response rate of 48%. There were some common questions between the two surveys, and the responses from those common questions are presented in this section. First, the gender of faculty responding, what percentage that count represents among all responses, and response rates by gender are provided in the table below.

Table 3. Gender of faculty respondents

Year	Female			Male		
	#	%	Rate	#	%	Rate
2009-2010	3	23.1%	50%	10	76.9%	56%
2010-2011	2	18.2%	33%	9	81.8%	53%

Faculty were asked how often they contacted their assigned students. They were allowed to select more than one option.

Table 4. Frequency of contact with students

Frequency	2009-2010		2010-2011	
	Count	%	Count	%
Within 30 days of assignment	10	76.9%	10	90.9%
Weekly	0	0%	0	0%
Monthly	3	23.1%	1	9.1%
I wait for them to contact me	Not an option on this survey		0	0%
Never	1	7.7%	0	0%

Faculty were also asked how they contacted prospective students and were allowed to select more than one option.

Table 5. Methods for contacting students

Method	2009-2010		2010-2011	
	Count	%	Count	%
E-mail	12	92.3%	10	90.9%
Phone	2	15.4%	1	9.1%
Regular mail	0	0%	0	0%
Other	3	23.1%	0	0%
Not applicable	1	7.7%	0	0%

The faculty members in the 2009-2010 program who selected other for the method of contact indicated that the student services staff send information with the faculty member's name on it and mentioned the event where faculty can meet with prospective students and their families. One respondent indicated that she meets with students and their families upon request.

One question appeared only on the 2009-2010 survey asking faculty how often they answered questions from their assigned students.

Table 6. 2009-2010 Frequency for answering student questions

	Weekly	Monthly	At least once	Never	No questions
#	5	3	5	0	1
%	38.5%	23.1%	38.5%	0%	7.7%

One question appeared only on the 2010-2011 survey asking faculty how frequently they were contacted by students. None indicated weekly contact, 2 (18.2%) indicated monthly contact, 9 (81.8%) indicated contact at least once, and 1 (9.1%) indicated that contact never occurred.

Faculty in 2010-2011 were also asked about the reasons for student contact.

Table 7. 2010-2011 Reasons for student contact

	Count	%
Curriculum in selected program	7	63.6%
Curriculum in other program	2	18.2%
Career and job prospects	4	36.4%
In-person visit	6	54.5%

Admitted Student Day	2	18.2%
Logistics (deposits, housing, etc.)	5	45.5%
Other	2	18.2%

Faculty who indicated contact about another issue both mentioned questions about hardware and software available at DePaul.

Faculty in the 2010-2011 program were asked about a positive interaction with students in the program. Three mentioned seeing students in the program much later in their time at DePaul and that it was rewarding to see them progress. Another mentioned how satisfying it was to direct students to the correct major.

When asked about benefits of the program faculty in the 2009-2010 program five indicated that early contact with faculty was helpful, one mentioned that it welcomed students, and two said that the benefits were unclear. In the 2010-2011 program five faculty indicated that contact with professors was beneficial, one said that the program was good for those who use it, and one indicated that having experts in the curriculum was helpful.

The question about improvements to the program produced five suggestions from faculty in the 2009-2010 survey. The responses indicated students should be encouraged to contact faculty, students should be surveyed to determine if it impacted enrollment, it should be more important in faculty merit review, canned material should be provided by student services, and the mentoring program should be eliminated. Faculty in the 2011-2012 program suggested that students be prompted with sample questions so that they knew what to ask or that faculty mentors should be informed regarding what approaches were successful previously in reaching students.

4 Discussion

There are several themes that emerged from this work. In this section we discuss the results and provide context for them, concluding with an identification of some limits of the study.

4.1 Understanding the results

The first interesting result from the 2010-2011 prospective student survey is the gap between the contact reported by students and faculty. Faculty during that year overwhelmingly indicated (90.9%) that they had contacted students within 30 days of assignment, yet only a minority of students (28.8%) reported that they had been contacted by a faculty member. There was also a gap between students reporting that they had contacted a faculty member (17.8%) and faculty who reported such contact (81.8%). It is certainly possible that the actual amount of contact between the faculty and students lies between the two sets of reported numbers, but it is difficult to say with certainty which is more accurate. One would suspect

that faculty would have more accurate recall, but that is simply conjecture. It is, however, somewhat supported by the response of students to the follow-up question about faculty-student interactions, where 85.7% of that smaller group indicated at least one round of contact.

In a surprising result given the relatively small number reporting contact, a majority of student respondents (50.8%) indicated that they would be interested in having their faculty mentor assigned as their advisor. The results from the open-ended questions indicated a combined 28.27% of respondents felt that helpful advice or information was a benefit of the program and 10.47% of students reported that they had no suggestions for improving the mentoring program. This data provides support for the idea that the prospective student mentoring program is beneficial for some of the students. While one would hope that a larger percentage of students would report direct benefit from the program, it is encouraging that those students who recalled participating in the program feel positively about it.

The results regarding the impact of the program on enrollments is more mixed. When directly asked about it, only a minority indicated that it had impacted their decision to enroll at DePaul (34.0%) or to choose a major within CDM (28.8%). More students (36.1%) indicated that it had not influenced their decision to choose a major within CDM, and close to an equal number (33.5%) indicated that it had not impacted their DePaul enrollment decision. However, the analysis of the correlation between responses to some questions suggests that the program may be more effective for some subpopulations. For example, the program was shown to impact female students more strongly. While the analysis also showed that students who contacted their faculty mentors were more likely to have indicated that the program impacted their enrollment decision, this may simply be due to an increased interest or curiosity about DePaul that pre-existed their participation in the mentoring program. More interesting is the result that shows students who were contacted by their faculty mentor were more likely to indicate that the program had an impact on their DePaul enrollment decision.

An important characteristic of prospective student mentoring when interpreting faculty results is the optional nature of the program. Faculty are solicited to participate, and as one faculty member noted the work is only one of many service opportunities in CDM. In the 2009-2010 academic year an opt-out method was used for recruitment, meaning that faculty who had participated before needed to indicate that they no longer wished to continue. Based on the relatively high number who mentioned that the benefits of the program were unclear (2 or 15%) or that it should be eliminated (2 or 15%), an opt-in procedure for recruitment was adopted in 2010-2011. This change in policy and an orientation session for faculty regarding the program improved the percentage of faculty who contacted their assigned students within 30 days of assignment from 76.9% to 90.9%. It also eliminated the suggestions that the program be

discontinued, indicating that faculty who were not convinced of the worth of the initiative were no longer participating.

The questions added in the 2010-2011 program show that the faculty believe the program is being utilized by students, with slightly more than 80% of mentors being contacted at least once. The new questions also reveal that faculty field many questions that should be handled by other staff. Faculty typically are unable to arrange in-person visits, have no role except as a participant in the Admitted Student Day, and do not have detailed logistical information. Given that the materials distributed to students have clear statements on whom to contact for this information, strategies for improvement of this aspect of the program are not obvious.

4.2 Study limitations

The first limitation of this work is that the survey instruments developed were not validated. There were no similar studies of prospective student mentoring programs for technically-focused post-secondary institutions upon which to base our work. It would be helpful to consider how the surveys could be more effectively designed. Another significant limitation is the self-reported nature of the data. While care was taken when designing the survey, the participants may have misinterpreted the survey questions. Participant recall is also an issue with a survey discussing a program that happened many months previously, as was seen in the student data from the 2009-2010 evaluation year.

During both years of the evaluation project the only group of prospective students who were surveyed were those who ultimately chose DePaul as their institution. Since only students who chose DePaul are surveyed, this may artificially raise the apparent effectiveness of the prospective student mentoring program. However, legal obligations do not allow us to survey students who do not enroll after they have indicated their decision making this situation difficult to avoid. One possibility is to survey students before they have made a decision one way or another, during which time we are still legally allowed to contact them. There are two drawbacks to this idea. First, many students will be under the age of 18, and surveying them will require a more complex type of human-subjects protocol. The second is that students finishing their last year of secondary school have many obligations and the response rate of the surveys may be low.

5 Conclusion

Between 2009 and 2011 we evaluated a prospective student mentoring program, with the two-fold goal of understanding the impact on student recruitment and the extent of faculty engagement. As a result of the first year of evaluation [11], we made changes to faculty recruitment procedures that produced an improvement in faculty engagement with the program. Although the student data gathered during the first year of the evaluation project was not usable, the changes in the survey timing produced excellent response rates during the second year. In analyzing the responses, we found a gap

between reported rates of contact between faculty and student respondents, with faculty reporting higher levels of contact than students. Students did report satisfaction with the program as seen in the relatively high number who indicated an interest in having their faculty mentor assigned as an advisor and in the comments shared on the open-ended questions. There were also several significant correlations that suggest the program is more effective for female students and that students contacted by faculty mentors are more likely to indicate that the program influenced their enrollment decision.

Attracting and retaining students in computing programs is important, and mentoring of prospective students is an important tool for university educators. There are difficulties in measuring success of such programs, most saliently effective student recall. But engaging students with faculty shows promise, and it would be interesting to see if and how prospective student mentoring programs could be implemented at other institutions.

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7 References

- [1] Alkadi, G. et al. 2011. Virtualization of our University for the Recruitment and Orientation of new Students. *Journal of Computing Sciences in Colleges*, 26:4, pp. 71-77.
- [2] Binker, C. and Fernandez, J.D. 2004. *Journal of Computing Sciences in Colleges*, 19:4, pp. 218-224.
- [3] Binsardi, A. and Ekwulugo F. 2003. International Marketing of British Education: Research on the Students' Perception and the UK Market Penetration. In *Marketing Intelligence & Planning*, 21:5, pp. 318-237.
- [4] Boyer, K.E. et al. 2010. Increasing Technical Excellence, Leadership and Commitment of Computing Students through Identity-Based Mentoring. In Proceedings of the 41st ACM Technical Symposium on Computer Science Education, Milwaukee, Wisconsin.
- [5] Chapman, D. 1981. A Model of Student College Choice. In *Journal of Higher Education*, 52:5, pp. 490-505.
- [6] Craig, A. 1998. Peer Mentoring Female Computing Students – Does It Make a Difference? In Proceedings of the 3rd Australasian Conference on Computer Science Education, Brisbane, Australia.
- [7] Cubillo, J.M., Sánchez, J., and Cervino, J. 2006. International Students' Decision-Making Process. In *International Journal of Educational Management*, 20:2, pp. 101-115.
- [8] D'Souza, D. et al. 2008. In Proceedings of the 10th Australasian Computing Education Conference, Wollongong, Australia.
- [9] Roberts, E.S. 2011. Meeting the Challenges of Rising Enrollments. *ACM Inroads*, 2:3, September 2011.
- [10] A. Settle and J. Glatz. 2011. Rethinking Advising: Developing a Proactive Culture to Improve Retention. In the Proceedings of the Special Interest Group for Information Technology Education Conference (SIGITE 2011), West Point, New York.
- [11] Settle, A., Pieczynski, S., Friedman, L., and Davidson, M.J. 2011. An Initial Look at Prospective Student Mentoring, In the Proceedings of the 16th Annual Conference on Innovation and Technology in Computer Science Education (ITiCSE 2011), Darmstadt, Germany.
- [12] Tashakkori R. et al. 2005. A Systemic Mentoring Model in Computer Science. In 43rd ACM Southeast Conference, Kennesaw, Georgia.