

## **AC 2009-2512: AN EXERCISE TO ENGAGE COMPUTING STUDENTS IN DISCUSSIONS OF PROFESSIONAL ISSUES**

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# An Exercise to Engage Computing Students in Discussion of Professional Issues

## Abstract

Both ABET and CC2001 emphasize the importance for students to engage in learning about professionalism and ethics. For computing programs, teaching these topics might seem daunting compared to technical material. In this paper we present a hiring exercise that engages students in crafting arguments and presenting evidence to support their hiring decisions. Given a fictitious company and set of four candidates, students choose one to fulfill a software developer position and one to fulfill a program manager position. Students determine their hiring criteria; this process encourages reflection upon skill sets and attitudes of computing professionals. Through writing and oral discussion, students discuss several topics related to professionalism and ethics (e.g., honesty, loyalty, motivation, creativity, diversity). This paper contains the hiring exercise, an instructor guide, and analysis of students' work. Our results show that students met the learning objectives of crafting arguments, reflecting upon computing skills, and discussing issues related to professionalism and diversity.

## 1. Introduction

One of several educational objectives for computer science programs is preparing students for a successful career in the software industry. Both ABET and CC2001 emphasize that computer science graduates should engage topics related to ethics and professionalism<sup>1,10</sup>. For example, CC2001 identifies the social context of computing (SP2) and professional and ethical responsibilities (SP4) as core subject areas. It also describes in detail the scope of these areas (Chapter 10, pages 55-61). ABET program outcome letter (e) (an understanding of professional, ethical, legal, security and social issues and responsibilities) demonstrates that students should gain experience with ethical and professional issues prior to graduation.

Engagement in professional and ethical issues could be fostered through several types of learning activities. For example, using case studies provide opportunities for students to analyze decisions and responsibilities in a certain context<sup>4,9</sup>. Encouraging students to participate in professional societies, such as the Association for Computing Machinery, is another way for students to better understand professional responsibilities. Internships and cooperative work experiences benefit students in several ways; one such benefit is direct engagement in the profession. The working group, chaired by Little and Granger, created a list of pedagogical approaches to teaching professionalism<sup>11</sup>. Among the pedagogical approaches is the use of role-playing and discussions. We used role-playing and discussion to develop a hiring exercise to directly engage students in making decisions about which candidates to hire for a fictitious software company. Students are asked to choose the most appropriate candidates for two positions: a software developer and a program manager. In preparation for making their decisions, students read a description of the company, DotEdu, the job descriptions, and information about four candidates. The candidate information includes standard résumé information and notes about responses to interview questions. Students complete written deliverables, where they identify criteria for their

decisions and present arguments for their chosen candidates. After submitting their written work, students engage in discussion, acting as a hiring committee.

The hiring exercise provides students practice in evaluating the various qualities of a good employee before they enter into the job market. In addition to evaluating technical competence, students assess candidates' employment history, team skills, and diversity considerations. The exercise could inspire students to reflect upon skills and traits to which they aspire; such reflection is necessary for experts to improve their craft<sup>12</sup>.

An attractive feature for instructors is that the hiring discussion provides a concrete way to discuss issues of professionalism, gender, diversity, and ethics. Instructors also gain the knowledge of computing skill sets students value.

The contributions of this paper include providing the hiring exercise materials, an instructor guide, and results from using this exercise in 8 courses at three universities. To date we have conducted a thorough analysis of five separate courses at two universities after pilot testing the exercise at one institution. The paper is organized as follows. In Section 2 we discuss related work and other approaches to engaging students in professional issues. Sections 3 and 4 provide the exercise and instructor guide, respectively. We provide results from analysis of student work in Section 5 and offer conclusions in Section 6.

## **2. Related Work**

Related work to this exercise includes previous studies that determine hiring criteria and resources for teaching ethics<sup>6,7</sup>. In previous studies, we investigated criteria students use when making hiring decisions and if gender matters in the rate of selection of candidates. We found that computer science students do use criteria other than technical skills when making decisions and that the gender of the candidate does matter in terms of the rate of selection. However, the purpose of this paper is to disseminate the hiring exercise to other instructors and evaluate if the exercise met the desired learning outcomes.

There have been many studies on the criteria industry uses to predict effectiveness. Bailey and Stefaniak<sup>3</sup> used surveys, interviews, and focus groups to determine what employers in the IT industry valued as important non-technical skills for employees. They identified both soft skills and business skills mentioned by the 325 IT professionals surveyed. A panel at the ACM Conference in 1978 presented skill sets of what industry looks for in new hires – among these skills are math ability, software development knowledge, problem-solving, team skills, initiative, diversity, and versatility<sup>14</sup>.

Several resources exist for teaching issues of professionalism and ethics. Among these are exercises compiled by the working group on integrating professionalism into the curriculum<sup>11</sup>. An exercise about researching types of computing jobs is related to the hiring exercise presented here. Several teaching resources also exist. For example, Gehringer maintains a web site of computer ethics, with workplace issues as one of the topics<sup>8</sup>. Other model exercises and case studies are described in Bowyer<sup>4</sup> and Harmon and Huff<sup>9</sup>.

### 3. Hiring Exercise

Below is the complete company description and candidate descriptions given to students at the University of Washington, Tacoma. Instructors who adopt the exercise may want to change the candidate biographies, substituting their institutions and local computing companies. Note that the exercise below was conducted in 2005, so the dates should be updated prior to use.

The exercise has the following learning objectives. Students will:

1. Construct arguments and present evidence, in writing and in oral form
2. Engage in critical reflection about computing skills
3. Discuss topics related to professionalism and diversity

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Given the descriptions of the candidates who would you hire for each of the two positions that DotEdu is filling?

**Program Manager**  
**Software Developer**

List **specific** criteria by which you evaluated the candidates. Explain what each criterion is. For example, if “people skills” is one of your criteria, explain what you mean by it. For each candidate, give a rating for that candidate on each criterion (on a scale of 0 through 4, where 4 is best). A table similar to a source analysis table would be appropriate. In the overall rating of the candidate, the relative weights of each criterion need not be equal.

The way in which you evaluate for each position might be different. If so, explain your method of evaluation for each position.

Also, if there is any information about the candidates that you think would help you make a decision (for example, more specific information or a response to a specific question that you would liked to have asked each candidate), please describe what kind of information would be helpful.

Briefly explain (about 500 to 750 words) why the candidates you chose are more appropriate for the positions you assigned them and why other candidates are less appropriate.

#### **Scenario: Hiring at DotEdu Corporation**

DotEdu is a software company based in Tacoma (Portland). It employs 45 people, 20 of which are software and web developers. There are 5 in sales and marketing, 5 office assistants, 5 product managers, 5 program managers, and 5 officers (president, two VPs, a Chief Financial Officer, and a Chief Technology Officer).

The **sales and marketing** people are involved with the design of promotional materials and web sites. They also deal with the paperwork associated with payments.

**Program managers** provide a link between the developers and the product managers. They set the development and testing schedule so that the developers have enough time to finish their code, but so that the product gets out the door in a timely fashion. Program managers generally have enough technical

skill to be able to do development, and they understand enough about the technical details to appreciate the difficulties with developing software and can estimate how long it takes to fix bugs, provide more features, etc. Note that program managers are not normal “managers” in that they have no direct reports (people who are subordinate to them in the company’s organizational chart). Instead, they manage the flow of information between various people on a project so that people are working together towards the end product. They derive their authority through their ability to do this, rather than through a company’s organizational hierarchy.

**Product managers** provide a link between the program managers and the sales and marketing group so that the release of promotional materials coincide with the finishing of the code. They are more focused on the promotion of the products and are in direct contact with potential customers. They have some technical background, but they tend to have more business skills than program managers.

Since DotEdu is a small company, in fact the job descriptions are a bit loose. If there is a coding crunch, the President will sometimes contribute to the software development, or if the sales people need some help designing or developing a pamphlet, then developers who have some layout design background help when they can.

DotEdu develops software with an educational theme. For example, they have software for K-12 (similar to Microsoft's *Magic School Bus*), reference software (*History of Music*, which is an encyclopedia of composers and performers from 1800 to present), and games with an educational flavor (similar to *SimPlanet* by Maxis).

The President of DotEdu has determined that there is a need to create a new line of software, called SciSoft, to help college freshmen learn the basic concepts of science (for example, visualization of the laws of gravitation and planetary motion, models of the atom, animation of basic cell functions, DNA, etc.). One of the goals of this line of software is to provide a tool for students who find traditional forms of presenting material (e.g., lectures, reading books) only partially effective.

The company is seeking to hire a program manager to be in charge of SciSoft. Also, a new software developer will be hired to design and implement the code base for SciSoft.

DotEdu is proud of its mission to diversity in hiring and its commitment to the community. Its employees are of many different racial backgrounds (40% white, 25% Asian-American, 20% Latino, 15% African-American). Of its software and web developers, 30% are female (much higher than the industry average), 35% white, 30% Asian-American, 25% Latino, and 10% African-American. Here is its diversity statement (published on its web site):

At DotEdu, we believe that diversity enriches our performance and products, the communities where we live and work, and the lives of our employees. As our workforce evolves to reflect the growing diversity of our communities and the global marketplace, our efforts to understand, value, and incorporate differences become increasingly important.

By fully pursuing the company's mission and in keeping with what we value, DotEdu has established a comprehensive plan to promote and integrate diversity at every level within our

organization and in everything we do. By achieving these goals, DotEdu hopes to enable its employees to realize their full potential.

Evidence of DotEdu's commitment to the community is that it sometimes donates some of its K-12 software to relatively poor school districts.

There were 10 applications for the positions, and they have been narrowed down to four outstanding candidates. They each had a one-day interview where they talked with five to seven different people in the company (typical was three developers, two product managers, a program manager, and one of the VPs). Information from their resumes and notes from their interviews are attached. All of them have graduated from UWT with a degree in CSS.

Your goal is to make the following decision regarding hiring: Who should be hired for the two positions (program manager and software developer)?

The context for the in-class activity will be the final hiring committee meeting to make the hiring decision(s). Each person will make a case for the decision he or she made.

### **Candidate #1: Mary Plata**

#### **Education:**

Graduated from Lakeside H.S. (in Seattle) in 1997.  
Assoc. of Science from Tacoma Community College in 2001.  
B.S. from UWT (CS) in 2003. GPA at UWT: 3.7.

#### **Employment:**

Cashier for bookstore at Tacoma Community College (2001).  
Office assistant for the Finance Department at UWT (2002).  
Worked with lab support staff to install and maintain software on the department's machines (2003).  
Instructor for courses on C and C++ at University Extension, University of Washington, Seattle (2004-05).

#### **Volunteer work:**

Helped design and set up web page for Lakeside H.S. (2002).  
Currently supervises two students who maintain the Lakeside H.S. website (2003-present). The website has received an award for its design.  
Organizes events for the elementary school where her 6 year old son attends.

#### **Letters of Recommendation:**

From the manager at the Tacoma Community College bookstore: very responsible, went beyond her official duties to help other workers, took initiative to suggest ideas for how to improve the bookstore.

From lab support staff: was very capable, suggested ways to do things, finished all of the projects she was given on time and correctly.

From a faculty member at UWT: very good student (3.9 in the class taken), participated in discussions in class, very creative answers on homework and tests. In the top 10% of students. Student feedback from the University Extension courses: excellent reviews, she clearly likes teaching and has knowledge of C and C++.

**Diversity considerations:**

White female. Unclear from visual appearance what exact ethnic background.

**Here are some notes from the interviews:**

When asked why she wanted to work for DotEdu, Mary said that although she thought teaching the C/C++ courses was rewarding, she wanted to be involved in the development of software. She said she was very interested in education, so what better place to work than at DotEdu.

When asked what her long-term career goals were, she said that she wanted to be a part of a company that contributes to society, either as a developer or as a manager.

When asked by the developers technical questions, she demonstrated that she could design and write simple code (design of a tic-tac-toe game, and how to determine whether some has won in a game of tic-tac-toe). When asked to write Quicksort, she had trouble at first, but she eventually got it right. Had trouble remembering when it might be more appropriate to use a hash table than a binary search tree.

When asked what courses she took for electives, she said she took the database course, the networks course, the digital media course, the entrepreneurial course, and a capstone project where she implemented a medium-sized program (about 6000 lines of Java) to keep track of the sales records of a small company, along with a web page to take orders.

She seems friendly, and she seemed excited about the idea of working at DotEdu. She probably will work well with the developers and program/product managers. She seemed to have a strong technical background and was not afraid to speak her mind.

**Candidate #2: Oscar Escalante****Education:**

Graduated from Foss H.S. in 1995.

Associate of Science from Green River Community College in 1998.

Bachelor of Science from UWT (CSS) in 2000. GPA at UWT: 3.0.

**Employment:**

Worked as a cashier at a Japanese restaurant near Green River C.C. (1996-1998).

Worked in the media department of the UWT library (1999-2000).

Web development at Weyerhaeuser Corporation (2000-2003).

Software engineer for Boeing Corporation (2004-2005).

**Volunteer work:**

Helped design, set up, and maintain a web page for his church (1999-2001).

**Letters of Recommendation:**

From the manager at the UWT library: very responsible, very efficient, did everything asked of him.

From a faculty member at UWT: an above average student (3.5 in the class taken – the database class), showed interest and aptitude in database systems.

From a manager at Weyerhaeuser: knowledgeable about web page design, very creative when coming up with ideas for web design.

From a manager at Boeing: always met deadlines that were set, worked well with others on the team.

**Diversity considerations:**

Hispanic male.

Here are some notes from the interviews:

When asked why he wanted to work for DotEdu, Oscar said that he had trouble in some of his introductory science classes, and so he thought that with his background in computer science, he could help students that were in a similar situation as his as a freshman.

When asked what sort of work he did for Weyerhaeuser and Boeing, Oscar said that he mostly worked on web page design. He occasionally helped out others on the team with some back end code. He said he left Weyerhaeuser when they had to downsize; he accepted a good “exit” package. Boeing was looking for someone with his background and experience and so immediately hired him. He said that although he is still working at Boeing, he is seeking other career opportunities.

When asked what his long-term career goals were, Oscar said that although he feels that he is a strong web developer, he wants to expand the scope of his skills into software development. He feels that either position (program manager or software developer) would be an advancement in his career and would likely have greater monetary rewards (greater salary), too. He said that with his five years of experience in industry, he can make important contributions to DotEdu. He also said that much of his work involved working closely with others on a team, and so he knows what it takes for a team to be successful.

When asked by the developers technical questions, he had some trouble (design of a tic-tac-toe game, and how to determine whether some has won in a game of tic-tac-toe). When asked to write Quicksort, he had trouble at first, but he eventually got it right. Was stumped by the question on when it might be more appropriate to use a hash table than a binary search tree.

When asked what courses he took for electives, he said he took the database course, the networks course, the computer security course, the web services course, and the entrepreneurial course. He also did an independent reading course where he read articles on testing and debugging in the software engineering cycle.

He seems friendly, and he seemed enthusiastic about the idea of working at DotEdu. He probably will work well with the developers and product/program managers, but Oscar seems quiet and when he seemed unconfident when he was answering the technical questions.

**Candidate #3: Joseph Anderson**

**Education:**

Graduated from Stadium H.S. in 1998.

Associate of Arts from Pierce Community College in 2000.

Bachelor of Science from UWT (CSS) in 2002. GPA at UWT: 3.8.

**Employment:**

Co-founded a startup company, GameHouse Software (10 employees), with other UWT graduates and some graduates from UW Seattle. The company produced strategy games, board games, and real-time computer games (2002-2005).

**Volunteer work:**

Has worked with the computer clubs in local high schools. Besides playing GameHouse software, the clubs also learn about computers in general.

**Letters of Recommendation:**

From a computer science instructor at Pierce Community College: Was always the best in the class and helped others in the class.

From a faculty member at UWT: very good student (4.0 in the class taken), had complete mastery of the material in the class.

From a computer science teacher in one of the high schools he volunteers in: works well with the students, is able to transmit his excitement of the computer to the students.

**Diversity considerations:**

White male. Unclear from visual appearance what exact ethnic background.

Here are some notes from the interviews:

When asked why he no longer works for GameHouse, Joseph said that Nintendo offered to buy the code for all of the games that GameHouse had produced. So, they decided to sell the company to them and split the profits among themselves.

When asked what his long-term career goals are, Joseph replied that he wants to continue with the kind of programming he had done with GameHouse, but he wants to move toward the area of educational software. He said that if he had not founded GameHouse, he would have looked into a career of teaching (either at the college level or at the high school level).

When asked by the developers technical questions, he demonstrated that he could design and write simple code (design of a tic-tac-toe game, and how to determine whether some has won in a game of tic-tac-toe). When asked to write Quicksort, he got it right. He also pointed out that Mergesort had a better worst case running time than Quicksort. Got the hash table versus binary search tree question right.

When asked what courses he took for electives, he said he took the database course, the networks course, the AI course, the robotics course, and a capstone project where he implemented a medium-sized program (about 6000 lines of Java) that simulated the interaction of bacteria and cells that fight bacteria in a human body. "It was all interesting to me," he said.

In general, Joseph is a quiet person, but when he starts talking about software and applications, he gets very motivated and excited. He probably will work well with the developers and program/product managers.

**Candidate #4: Michael Simmon****Education:**

Graduated from John F. Kennedy H.S. (Memphis, TN) in 1997.

Associate of Science from Olympic Community College in 2000.

Bachelor of Science from UWT (CSS) in 2002. GPA at UWT: 3.4.

**Employment:**

Manager at Simmons Hardware Store (15 employees) (1997-1999).

Microsoft Corporation. Worked on some of the web development for MSN. (2002)

Boeing Corporation. Entry-level software development for the visualization of the mechanics of parts of the planes being designed (2003-2005).

**Volunteer work:**

none listed on the resume.

**Letters of Recommendation:**

From a computer science instructor at Olympic Community College: Sometimes had trouble with the assignments, but he was always eventually finished the assignments.

From a faculty member at UWT: very good student (3.7 in the class taken), had mastery of the material in the class. Seems to have an interest in science-related projects.

From a manager at Microsoft (MSN): very hard-working. Often put in 60 hour work weeks. Did everything asked of him.

From a manager at Boeing: very hard-working. Seemed to really enjoy the work. Always contributed in the design discussions. Was never afraid to speak what he was thinking.

**Diversity considerations:**

Black male.

Here are some notes from the interviews:

When asked why he moved from Tennessee, he said that after he graduated high school, his uncle offered him a job. So, he moved to Bremerton and worked there. Then he decided to pursue a bachelors degree at Olympic Community College. When asked why he quit Microsoft, Michael said that he didn't want to work 60-hour work weeks anymore for the kinds of things he was doing at MSN. When asked why is looking for a job now, he said that Boeing had just laid him off in the recent layoffs. Since he had little seniority, he was targeted to be laid off.

When asked what his long-term career goals are, Michael replied that going to school opened his eyes to a whole new world of possibilities for software. His family was poor, and his only access to computers was at school. When he showed an aptitude for science and mathematics in high school, his family bought a PC (when Michael was a junior in high school). He said he wanted to give back to kids who grew up like he did by writing educational software for them.

When asked by the developers technical questions, he demonstrated that he could design and write simple code (design of a tic-tac-toe game, and how to determine whether some has won in a game of tic-tac-toe). When asked to write Quicksort, he got it right. Had trouble remembering when it might be more appropriate to use a hash table than a binary search tree.

When asked what courses he took for electives, he said he took the database course, the advances in object-oriented design course, the client-server course, the embedded systems course, and an internship at Microsoft in the MSN team where he helped with some of the web development. He said he enjoyed all of courses, although he especially liked the courses where they had big software projects.

In general, Michael is friendly and is not afraid to speak his ideas and defend them.

## 4. Instructor Guide

The hiring exercise has been used in Computer Ethics and Software Engineering courses at three universities, facilitated by four instructors. We include this guide based on our experiences and observations of colleagues conducting the exercise.

### 4.1. Preparation

In deciding to use the exercise, an instructor may wish to determine if the exercise is appropriate for the learning objectives of her course. The exercise has been used in Software Engineering courses, serving juniors and seniors, and an Ethics course, serving students post CS 2. From our experience, the exercise fits well into these courses.

The instructor should contextualize the candidate descriptions to her university and location. For example, if the instructor teaches at “State College”, then we recommend revising the candidate biographies to reflect graduates of “State College”. Alternatively, the instructor may choose to use candidates graduating from different colleges and universities.

Before distributing the hiring exercise, the instructor may include the Adam<sup>2</sup>, Campbell<sup>5</sup>, and Sher<sup>13</sup> articles or others as required or optional reading. The hiring exercise has been used in all three contexts: no reading materials, optional reading materials, and required reading. The exercise worked effectively with or without the reading.

The instructor may want to establish grading guidelines for the exercise, depending on her learning objectives. Some instructors have graded the responses as pass/fail; some instructors have developed grading criteria for writing and argumentation.

### 4.2. In-class Discussion

After students complete the written deliverable, they discuss in class who they want to hire. The discussion could proceed in several ways. With a larger set of students, the instructor may allocate smaller discussion groups, having each group act as a hiring committee to come to a decision. To encourage discussion and debate in these small groups, it is useful to group students whose choices were different. With smaller classes, all students could act as a single hiring committee.

Here are example questions to lead the discussion:

- Who did you choose for the software developer (SD) / program manager (PM)? [Make tallies]
- Why and how did you choose \_\_\_\_\_ for the SD / PM?
- What skills are most important for the SD / PM? Are there different sets of necessary skills for the two positions?
- Do you have hesitations about any of the candidates?
- How do the candidates fit into the culture of DotEdu?
- DotEdu embraces diversity. Does diversity matter in terms of your decision?
- (Post-discussion) Who should DotEdu hire? [May try to come to consensus]

After the discussion, the instructor may ask students to complete a survey about the discussion and if they changed their hiring choices. If there are other learning objectives for the exercise, the instructor could create appropriate survey questions. When we facilitate the activity, we ask the following questions: (1) What were the two most relevant points in the in-class discussion?, (2) What were the two least relevant points in the in-class discussion?, (3) What are your (possibly new) choices for the two positions?, and (4) Why did you change your position (or not)?

The instructor may want to engage students in a meta-analysis of the discussion. For example, the instructor may wish to point out to students that people tend to hire candidates that are similar to themselves. Other discussion points raised by instructors who have used this exercise include: 1) hire people who have room to grow to keep them challenged and engaged, 2) recommendations from references are usually positive, 3) hiring new people is an investment for a company, so getting productivity may take a few months, and 4) some people may not interview well.

## **5. Data Analysis**

We believe the hiring exercise is a valuable pedagogical tool, both for students and instructors. With IRB approval, we collected hiring deliverables and survey responses from students. In total, we have analyzed 61 deliverables and 56 survey responses from students who gave consent to participate in the study.

We independently coded students' hiring deliverables for criteria used to make hiring decisions. Where we disagreed, we argued to consensus to produce the final set of codes. Our coding scheme was emergent and created 42 categories. These categories were refined and combined to produce 25 distinct categories, which in turn were aggregated into the five broad categories shown in Table 1. The 25 individual categories are shown in the Criterion column of Table 1. After agreeing on the criteria, we then counted the number of students who used each criteria per position.

### **5.1 Constructing arguments and reflecting upon computing skills**

To evaluate the learning objectives of crafting an argument and reflecting upon computing skills, we investigated the arguments and criteria students used in making hiring decisions; the breadth of the criteria in Table 1 shows students took the exercise seriously and reflected upon skills they found most valuable<sup>6</sup>. All deliverables contained justifications for the hiring choices, with examples below demonstrating user knowledge, teamwork, and management skills, respectively:

“She has an understanding of the various methods of learning and how to make the software especially effective.” [HA11]

“Joseph’s experience with GameHouse indicates that he can work in a small company environment and is a team player.” [HA04]

“Her background in academics as a teacher shows both a firm grasp of technical skills and that she can handle and guide a group of people effectively.” [HA09]

**Table 1: Percentage of students using criteria listed for hiring the software developer and the program manager**

<i>Broad Category</i>	<i>Criterion (examples)</i>	<i>% SD</i>	<i>% PM</i>
Technical Skills	Technical Ability, Software Engineering Experience / Skill, Domain / User Knowledge, Visual Information Skills, Flexible Skills	100%	100%
Soft Skills	Social / People Skills, Management of Others, Communication Skills, Team Skills, Organizational Skills	84%	88%
Previous Experience	Previous Employment, Educational Background, Teaching Experience / Interest in Education, References / Resume, Volunteer Activities	60%	56%
Personal Traits	Personality, Diversity, Creativity, Self-Motivated / Initiative, Work Ethic, Answered Questions Directly	48%	48%
Company / Job Considerations	Commitment to Company Values, Reason for Wanting Position, Professional Development Opportunity, Prospect for 3 – 5 Years of Employment	44%	44%

## 5.2 Professionalism and diversity

We compared student-generated criteria to those of 11 faculty comprising the working group on professionalism<sup>11</sup>. The working group identified 13 general behavioral characteristics of computing professionals, such as showing commitment to quality, being honest, being a team player, listening to others, taking pride in work, and reaching for responsibility. Of the 13, three were considered as criteria in written deliverables by at least 10% of students:

- Becomes a team player
- Anticipates and does not wait to be told what to do
- Thinks differently/creatively

Thus, students engaged in thinking about and discussing professional issues as defined by the working group, which is one of the learning objectives of the exercise.

To better understand what professional and diversity issues were discussed in class, we analyzed the responses to the survey questions regarding most and least relevant points. Students commented on the importance of technical skills, previous experience, people skills, communication skills, management experience, and company culture fit when hiring new members. The issue of diversity was claimed one of the most relevant points by just three of the 56 survey respondents. On the other hand, the issue of diversity was claimed least relevant by 19 of 56 students and the issues of race and/or gender was claimed least relevant by 10 students. For example, a student stated that “Diversity (ethnicity) does not /

should not have anything to do with how good a person is at a job.” This sentiment was expressed by over half the students in survey responses. Because of these different positions among students, the issue of diversity was raised in the class discussion. A more detailed study looking at how gender and diversity influence hiring choices is described in (reference omitted for anonymity)<sup>7</sup>. Other discussions related to professionalism include loyalty, honesty, trustworthiness, attitude, job responsibilities, company culture, effort, poor hiring, and concern for giving back to the community. A student commented that “Bad hiring is worse than not hiring. A bad hire can do a lot of damage and take a long time to fix.” The breadth of responses to the post-discussion survey indicates that a variety of issues were discussed and students took the hiring exercise seriously.

## 6. Conclusions

Teaching ethics and professionalism may seem daunting and contrived in a computing program. We developed, pilot tested, and rigorously tested the hiring exercise presented in this paper. The benefits of this learning exercise include, but are not limited to, getting students to think about hiring criteria, engage in discussions about professionalism and diversity, and write clear arguments. Because there is not a “correct” set of candidates to hire, students must make convincing, rational arguments with supporting evidence. Our experience with the hiring exercise is that students take their roles as members of a hiring committee very seriously. In addition to engaging students in analysis and argumentation, instructors benefit from getting a glimpse into what students value in terms of program outcomes. Through analysis of student’s work and survey responses, we conclude that the hiring exercise met its learning objectives.

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