NO13083

Employer verses Student Perceptions of Information System Internships.

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Abstract

This paper presents a statistical analysis of the differing perceptions of employers and their student employees. All of the internships were completed through the Computer Information Systems Department of a University and all internships required the student to work for an employer and complete a set of objectives. A questionnaire containing fourteen questions must be completed by both the employer and the student at the conclusion of an internship. Using eighty-nine internship surveys from 1995 through 2010, this paper exams how employers and the student interns view the internships.

Keywords: Internships, Employer perceptions of student interns.

INTRODUCTION

The Metropolitan State University of Denver is a comprehensive state supported academic institution in the heart of the city of Denver. MSUDenver offers a wide range of bachelor's degrees through its three Schools as well as several masters programs. It is located on a non-residential campus that is shared by the University of Colorado at Denver and the Community College of Denver. During the past fifteen years, the University, and especially the School of Business, has sought to partnership with area businesses. The Computer Information Systems department, housed in the School of Business, works with the campuses Cooperative Education Center to provide internship opportunities to students.

The Computer Information Systems Department supports a highly successful internship program that allows qualified students the opportunity to work in the information systems industry under the supervision of an experienced professional. Students are allowed to take the internship for academic credit with the course being treated as an upper division elective within the CIS Department. At the end of the internship, the student and employer must complete a survey that measures their perceptions of the internship in a variety of areas. This paper provides an analysis of the perceptions of both the employers and the students.

STRUCTURE OF THE CIS DEPARTMENT INTERNSHIP PROGRAM

A Cooperative Education Internship allows a student to work at a job outside of the college environment and receive academic credit for it. The position is subject to the approval of a faculty supervisor from within the CIS department and the CIS department chair. There is a well-defined set of objectives that the student, the employer, and the faculty supervisor agree upon at the commencement of the internship. Internships may be of one, two, three, or four credit hours and must be completed during a specified time frame. At the end of the semester, the student must turn in documentation that shows the objectives of the internship have been achieved. The faculty supervisor, in consultation with the employer, will assign a grade for the course.

Any student enrolled at MSU Denver who meets the following requirements is eligible to participate in the internship program. However, the great majority of students enrolled in the program are upper level CIS majors. To be eligible, the student must:

- be current enrolled at MSCD as a degree-seeking student with a declared major. (Enrolling only in a certificate program does not count.)
- have sophomore standing (at least 30 credit hours).
- have completed one full semester at Metro State.
- have at least a 2.5 overall GPA to be in a compensated internship position. be enrolled at MSCD for a minimum of 12 credit hours **per year** to be in a compensated internship position.
- be related to information systems and must be approved by a faculty supervisor in the CIS department.

A student may complete an internship in any generally recognized information systems discipline. The faculty supervisor always has the final say on whether an internship is acceptable or not. Generally, activities such as entering data into standardized forms, simply answering help desk calls and assigning them to someone else, monitoring activity in a student lab, or working in a position without adequate onsite professional supervision are unacceptable candidates for internships.

Internships are designed to provide students with the opportunity to learn new skills under the guidance of experienced professionals. They are not a reward for past experience or previously acquired knowledge. If someone has been at the job for a relatively short period of time (generally one year or less) the student can use the current job without question. If someone has been on the job for a longer term, he or she still may be eligible for an internship if the responsibilities have changed significantly in the past year. CLEP exams, credit-by-examination, and portfolio review are used to provide academic credit for prior knowledge.

An internship, by definition, requires the student to secure a position (either paid or unpaid) with an employer. Internship placements may occur in one of three ways:

- a placement through the MSCD Cooperative Education Office.
- a position secured independently by the student.
- In rare circumstances, ongoing employment in a current position.

Regardless of how the placement is obtained, if the student desires credit, the student must follow the procedures for applying for academic credit as detailed in *the Student Handbook of the Cooperative Education Center*. All students seeking academic credit must register with the Coop Education Office, enroll in CIS3980, and be under the supervision of a faculty member in the department in which they enrolled for credit.

The student, the employer, and the faculty supervisor will all sign an agreement that clearly states a set of objectives. These objectives must be detailed and measurable. The agreement will also contain a due date and a description of items that must be submitted. To complete the internship, the student must accomplish all of the agreed upon objectives and provide convincing evidence in the final submission that everything agreed was accomplished. The student must be employed for a minimum of fifty hours for each hour of academic credit earned up to a maximum of three credit hours. The student must submit the following material to the supervising faculty member at the conclusion of the internship.

- A formal report written in narrative form which clearly demonstrates that the student has meet the agreed upon objectives.
- A journal written concurrently with the described activity.
- An evaluation form completed by the student.
- An evaluation form completed by the employer.

SURVEY INSTRUMENT

Table 1
Employer and Student Survey Instrument

Listed below are several qualities and skills which have been found to be important in assessing student performance. Please place an X on the line to indicate where you feel your student's behavior is best reflected. Please rate those areas applicable to your student.

	Low **High**
Knowledge	.....
Dependability	.....
Interpersonal relations	.....
Initiative	.....
Ability to work independently	.....
Creativity	.....
Ability to make decisions	.....
Organizational skills	.....
Adaptability	.....
Enthusiasm & positive outlook	.....
Ability to accept directions	.....
Communication skills	.....
Competence	.....
Resourcefulness in seeking information.	.....
Student Only Questions	
Orientation to the position	.....
Supervision/Feedback	.....
Training received	.....
Work environment	.....
Opportunity to build skills	.....

Student interns and employers are both required to complete an evaluation form that assesses their perception of learning acquired by the student on the job. The survey itself is show in Table 1. Students complete the fourteen question survey along with the five additional student questions and turn it in to their faculty supervisor along with other

documentation of the internship. The employer completes the survey independently from the student and submits it to the Cooperative Education Advising Office. The student and employer evaluation should be completed and submitted independently. All data in this study contain paired value of both a submitted student survey and employer survey. This study includes eighty-nine completed internships

The above instrument measures the perceptions of the students and employers on a variety of characteristics and forms the basis for this study. The form above doesn't provide numbers but a scale of one to ten was used with ten being the highest possible value that could be assigned to a question.

DATE DIMENSIONS

Using the information on the student's internship application and on the survey instrument, a several dimensions for the data could be developed. The application for the internship contains a great deal of demographic data. The data were collected from internships that were completed between 1995 and 2010. The data have a time dimension (YEAR) that was measured by the year plus an indicator for semester of 1, 2, or 3 representing spring, summer, and fall semesters, respectively.

Internships sometimes require the student to perform a variety of activities. However, since the internships are very short-term, virtually all have a single primary purpose. That single purpose allows the internships to be categorized into a single TYPE. The categories for TYPE used in this study are described below.

- Database Development. This includes an objective to develop and use a database at any level. It includes those students who developed small, decentralized database applications using software such as Access to students who develop large, enterprise level databases on Oracle or DB2 platforms. It also includes students who intern as DBAs.
- End User Support. This includes people whose primary role is to work a help desk and/or respond is some way to user requests for support.
- Programming. This includes programming in any language. It does not include those students who have primary responsibilities for database or web development as defined elsewhere. It does include programming for both new development and maintenance.
- Web Development. This includes the development of web pages and sites. It usually requires programming in HTML or Javascript. Most internships require the student to learn and use products such as Dreamweaver or Flash.
- Networking. This includes all internships that require the development or extensive maintenance or a network. Most of the internships in this category involve the creation of and support for a Windows nt network.
- Systems Development. This covers a wide range of activities that are not placed in one of the categories defined above. Internships that are placed here generally

require some kind of system design. Normally, an internship placed into this category would not require end user support.

The ORANIZATION that hires the intern can be categorized into one of the following:

- Government Organization (including Federal, State, and Local Government). This is rather self-explanatory and includes government (usually State) supported educational institutions.
- Private For Profit Company. All internships that are not included above are placed in this category. It also includes three internships that were completed in a charitable, not-for-profit organization.

DATA SET AND MATCHED PAIRS

The data set consists of the internships offered by the Computer Information Systems Department for the years 1995 to 2010. The number of internships has varied significantly during that period. This study includes internships completed during each of the years under consideration. The contingency table below (Table 2) shows the number of internships completed in by Organization and by Type of Internship. The data points between the perceptions of the employers and the interns are matched pairs that will be analyzed with a t-test following the methodology found in several sources including Milke & Berry (1982).

Table 2
Contingency Table Categorizing Survey Data

	Organization		
Type of Internship	**Business**	**Government**	**Total**
Database Development	3	6	9
End User Support	16	10	26
Programming	10	2	12
Web Development	6	3	9
Networking	6	4	10
System Development	15	8	23
Total	56	33	89

STATISTICAL TESTS AND RESULTS

Table 3 shows the averages for each question for both the employer and the student. The results are displayed as sorted from the highest rated to the lowest rated response by the employer. Note that the ranking of the averages for the student means are almost exactly identical to the employer rankings. The softer skills such as the ability to make decisions and positive outlooks are ranked more highly than the more analytical skills such as knowledge and the ability to make decisions. The employers rate the students higher than

the students rate themselves for twelve of the fourteen questions. The employer mean exceeds that student mean for everything except enthusiasm and resourcefulness.

Table 3
Difference in Survey Means for Employee and Student Responses
(Sorted by Employer Means)

Question	EmpAvg	StuAvg	difference	t-stat	P-value
Ability to accept directions	8.9775	8.9765	0.0010	0.25	0.800
Enthusiasm & positive outlook	8.8427	8.8470	-0.0043	-0.55	0.584
Dependability	8.6854	8.6652	0.0202	1.19	0.237
Competence	8.6573	8.6530	0.0043	0.19	0.848
Adaptability *	8.5674	8.5590	0.0084	0.52	0.420
Resourcefulness in seeking information	8.5674	8.5763	-0.0088	-0.81	0.607
Communication skills **	8.4157	8.4061	0.0096	1.83	0.070
Ability to work independently *	8.3876	8.3825	0.0052	2.39	0.019
Interpersonal relations	8.3764	8.3650	0.0114	1.42	0.159
Organizational skills	8.2978	8.2712	0.0265	1.18	0.243
Initiative *	8.2670	8.2504	0.0166	2.01	0.047
Ability to make decisions	7.9551	7.9300	0.0251	1.05	0.299
Creativity	7.7809	7.7421	0.0388	1.45	0.150
Knowledge	7.2247	7.1603	0.0644	1.33	0.187

* Significant at Alpha = 0.05 ** Significant at Alpha = 0.10

Table 3 shows the results of the test of the differences in employer and student perception for each question. Employers view students significantly higher that students view themselves for adaptability, working independently, and initiative. The communications questions is also significant at the ten percent level of significance.

Independence of Employer and Student Means

One way analysis of variance was used to test the independence of the employer means and of the student means. Table 4 shows the results of the two tests. The employer means are independent of one another as are the student means.

Table 4
ANOVA Results Testing Independence of Employer and Student Means

Employer Responses		Student Responses	
Ho: All Employer Means Are Equal		Ho: All Student Means Are Equal	
Ha: At Least One Mean Is Different		Ha: At Least One Mean Is Different	
F-Statistic	P-Value	F-Statistic	P-Value
9.55	0.00	12.71	0.00
Ho Rejected at Alpha = 0.05		Ho Rejected at Alpha = 0.05	

Independence of Survey Responses and Time

Changes in perceptions of interns may change over time by both the employers and the student interns. Table 5 presents the results of a an analysis of variance test for each question in the survey for both the employer and the student. The analysis of variance tests did not result in any statistical difference in employer responses over the study's sixteen year time period. The perception of student interns by employers seems exhibit consistency. However, the results of the analysis of variance tests provide very good statistical evidence that student perceptions have changed over time. Students view themselves as having more initiative, creativity, interpersonal skills, and communications skills in the more recent years. Also, students view themselves as having more knowledge and enthusiasm at the ten percent level of significance in more recent years.

Table 5
ANOVA Results Testing Independence of Employer and Student Question Responses and Year

	Employer Responses			Student Responses		
Question	**F-Stat**	**P-Value**	**R-Sq**	**F-Stat**	**P-Value**	**R-Sq**
Knowledge	1.20	0.271	.3831	1.56 **	0.072 **	.4470
Dependability	0.78	0.769	.2873	0.75	0.805	.2790
Interpersonal relations	0.93	0.570	.3259	1.90 *	0.018 *	.4962
Initiative	0.67	0.886	.2596	1.97 *	0.014 *	.5044
Ability to work independently	0.86	0.670	.3074	1.98 *	0.013 *	.5060
Creativity	1.00	0.489	.3404	2.18 *	0.005 *	.5303
Ability to make decisions	0.93	0.575	.3250	2.07 *	0.009 *	.5169
Organizational skills	0.90	0.617	.3173	1.08	0.388	.3590
Adaptability	0.62	0.921	.2432	0.72	0.836	.2709
Enthusiasm & positive outlook	0.57	0.950	.2289	1.53 **	0.081 **	.4425
Ability to accept directions	0.73	0.822	.2746	0.84	0.699	.3019
Communication skills	0.77	0.785	.2836	1.67 *	0.047 *	.4634
Competence	0.71	0.848	.2679	1.46	0.110	.4296
Resourcefulness	1.22	0.250	.3877	1.47	0.105	.4314

* Significant at Alpha = 0.05 ** Significant at Alpha = 0.10

Independence of Student Responses to Perception of Adequate Supervision

One of the questions asked of students concerned their perception of how well supervised they were and the quality of the feedback they received from the employer. Since the internship is regarded as a learning experience, supervision by a qualified professional who is willing to provide guidance and feedback is essential to the success of the internship. The results in Table 6 examine the perception of students to the fourteen survey questions within the context of the student's perception of quality supervision and feedback. Students who perceived higher levels of supervisor feedback also reported perceiving significantly higher levels of "analytical" skills such as knowledge and competence in the field as a result of the internship.

Table 6 ANOVA Results Testing Independence of Student Responses to Students Perception of Adequate Supervision and Feedback			
	Student Responses		
Question	**F-Stat**	**P-Value**	**R-Sq**
Knowledge	2.82 *	0.001 *	.3919
Dependability	1.39	0.174	.2407
Interpersonal relations	1.36	0.186	.2377
Initiative	1.19	0.297	.2139
Ability to work independently	0.92	0.546	.1745
Creativity	1.05	0.415	.1940
Ability to make decisions	1.22	0.274	.2183
Organizational skills	1.13	0.346	.2053
Adaptability	1.32	0.211	.2316
Enthusiasm & positive outlook	1.63 **	0.083 **	.2716
Ability to accept directions	2.07 *	0.020 *	.3214
Communication skills	0.63	0.847	.1262
Competence	3.16 *	0.000 *	.4194
Resourcefulness	1.70 **	0.068 **	.2794
* Significant at Alpha = 0.05 ** Significant at Alpha = 0.10			

Conclusions

This paper presents a statistical analysis of the differing perceptions of employers and their student employees. In general, employers appear to view student performance as slightly higher than do students although in most areas, there does not seem to be a significant statistical difference between employer and employer perceptions. Both employers and students tend to rank the "softer" skills higher that the more "analytical" skill sets. Both employers and students rank the possession of knowledge as the lowest skill. Reported perceptions of questions measuring different skills are independent of one another for both employers and students. The is good statistical evidence that student perception has changed over time in how they view their own skills, however, employer perception has not changed.

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