The Information Job Family: Results of an Exploratory Study

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ABSTRACT

OBSERVATION OF THE CONVERGING and integrating functions of computing centers and libraries in research universities, particularly on campuses where the two units were linked administratively, led to an exploratory study of whether the effects of the information technologies extended to job classification and compensation systems. The study, funded by the Council on Library Resources (CLR), found a sufficiently strong relationship between some computing and library jobs to warrant considering the creation of a single information job family in classification systems. Instituting such a change could prompt reevaluation and subsequent reinforcement of an organization's values and emphasize the strategic importance of human resources planning in successful organizational change. The authors describe the methodology and findings of the exploratory study and suggest areas for further detailed research.

INFORMATION TECHNOLOGY AND THE NATURE OF INFORMATION

As a change agent, information technology is almost without peer. Whether the change itself is evolutionary or revolutionary may be a semantic distinction best arbitrated by history. What is indisputable today in research universities is that the opportunity

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exists for all information service and information systems units to form a partnership with each other and the technology to manage the changes creatively. A recent research study, funded by the Council on Library Resources, has focused on computing services and libraries and how these two groups, which have consistently assumed major information technology roles on campus, might influence both structure and infrastructure on the "transformed" campus.

The apparent transformations propelled by information technology are difficult to articulate in terms that convey information's preeminence to the variety of stakeholders in the academic community (Ryland, 1992; Penrod, 1992; Euster, 1992; Lowry, 1992). Among these stakeholders are of course those in the immediate academic community, such as students, faculty, and administrators, who participate in the entire information chain from creation to consumption. Other stakeholders exist in the broader environment in which higher education exists. Those stakeholders include the trustees, research and grant-making bodies, the information industry, and society itself as full participants in the creation, dissemination, and use of information. Finally, there are those from each group whose responsibility it is to manage where these groups converge. The communication difficulties inherent in this complex community are caused, in part, by the nature of information itself. Elusive in behavior and definition, information slips among, between, and outside of administrative and academic boundaries. It can be physically "captured" in a variety of forms, from clay tablets to laser disks, or definitionally captured by placing it in operationalized contexts (Machlup & Mansfield, 1983; Buckland, 1991). To bring order to the management difficulties and to define, manage, and convey their information priorities, some academic institutions have a position generically called chief information officer (CIO).

Role of the Chief Information Officer

The CIO's role in academia is thought to be similar to several other functions common to the industrial or corporate model (finance, human resources) (Penrod et al., 1990; Woodsworth, 1988, 1991; Brumm, 1989). Business literature and the research in which it is grounded has influenced both the terminology and the models of academic organizations as they adjust to operating in the environment of an information society. These models provide not only a focus, but they also indicate what can be observed at a time when validation cannot be achieved through experience. In addition, the pressures on organizations in both the private and public sectors are remarkably similar today, especially the financial ones. The caveat is, of course,

that the business model is only one of many that could be followed. Models cannot be used in one-to-one correlations between corporate and academic organizations and should not be exploited to assume such a relationship. The process must be one of adopting and adapting. A prominent example among those being looked at in academic computing and research libraries is the work of Zuboff (1988), in which the word "informated" is coined to describe those organizations which have not simply replicated older work processes in an "automated" environment but have "transformed" the organization by using the capabilities of information technology to "informate." The model is a promising one for academic institutions, but its success depends on changes to both structure and infrastructure (Lowry, 1992).

The chief information officer role represents one approach to creating an organizational umbrella for structuring information related operations (Woodsworth & Maylone, 1992). As they pointed out, the CIO model has many variations, and recent research has found that 90 percent of colleges and universities in the United States, as well as an increasing number of corporations, manage their information functions without a CIO (Penrod, 1992; Wilder, 1992). By designating responsibility for existing information systems and services, coordinating information functions and future information planning, a basic information structure is created. Implied, if not stated, are resulting changes to infrastructure—different communication pathways, shared databases, networked access to internal and external information. But what about operating functions such as those for library and computing services? How deeply into the organization does a changed administrative structure penetrate? What is the effect on the infrastructure? Does leadership for change occur from the bottom up as well as the top down—or even from the middle out? Could jobs, like information, cut across the organizational boundaries of libraries, computing centers, media services, and other information units? Might there be a measurable similarity in the nature of individual jobs as information technology infuses rapidly on campus? Finally, how effectively are existing institutional and societal policies coping with the transformation being wrought by information technologies?

Observations made on campuses where there was already a high degree of structural integration among information units indicated that these were questions that had not been directly addressed, and that the answers to them might contribute to the model of the "informated" campus. The study described in this article addressed specifically the question of job similarities in computing centers and libraries but unavoidably touched related policy areas as well.

Background of the Study

Although not necessarily recognized by either group, staff in both libraries and computing centers:

- develop training tools and system documentation;
- design, operate, and use local and wide area networks;
- plan, select, and operate system hardware and software;
- collect and organize information in various forms and formats;
- create, maintain, query, and manage databases;
- analyze user, service, and system needs;
- provide consulting and technical assistance; and
- instruct faculty, students, and staff in all of the above

Their goals in these activities are also much the same: helping users to access, manipulate, or use information—in all its definitions—through the optimum use of hardware, software, and communications systems. The physical settings in which these skills are employed and the activities that take place are also becoming difficult to differentiate: the computer terminal and its attendant staff and users could equally well be located in a faculty office, dormitory, computer lab, library, or computing center.

The policy and institutional frameworks, however, tend not to recognize this, particularly as interpreted in job classification and compensation systems. The staff of libraries and computing centers still tend to be classified and compensated in two different job streams and slotted into two job families, usually determined by departmental affiliation or sometimes by job title. Each family tends to have different salary and responsibility level demarcations, and benefit packages may differ to include, for example, faculty status for librarians but not for computing professionals.

An extensive search of the literature of computing, management, and library and information science unearthed no studies that examined related information jobs from the perspective of classification and compensation systems. Studies, such as Mowshowitz's (1990), on the effects of technology on jobs, emphasize the need for management attention to specific human resource issues, primarily training and retraining, but do not explore the effects of integration of information technologies and the attendant need for reanalysis of job content and salary structure. Although it is breaking down, libraries and computing centers are, for the most part, perceived as having separate and distinct functions and belonging to two different cultures. This distinction is reinforced in most colleges and universities by their classifying the groups into two separate job families.

Based on these observations in university settings and because of the gap in the literature, a study was designed to test the hypothesis

that, as campuses pass from the automated to the "informated" stages in their use of information technologies, jobs in libraries and computing centers, in particular, will have altered significantly enough to identify a single new job family out of two traditionally separate job families. A secondary objective was to find a benchmark methodology which could show, even in gross terms, whether the changing nature of library and computing jobs was resulting in the overlapping and blending of job content and compensable factors.

Methodology

Because of the exploratory nature of this study, developing a customized methodology was considered prohibitively time consuming and costly. The University of Pittsburgh had recently developed a point factor job analysis system which they graciously permitted to be used in the study. The strength of the system, particularly in regard to the primary and secondary purposes indicated for this study, was that it not only allowed for identification of the most important compensable factors for each job, but its point system also approximated a coding structure for content analysis. Jobs were analyzed on the eleven factors shown in Table 1 (see Appendix A for a more complete description of each of the factors). Each factor had a rating scale, allowing assignment of points according to the degree to which a job possessed a particular factor. Most factors were assessed along a single dimension (knowledge, experience, or analytical skills), but more complex factors (financial responsibility, degree of supervision exercised) could be measured according to a two-dimensional matrix. To calculate the responsibility and compensation level for each job, an algorithm consisting of a predetermined multiplier was assigned to each of the factor values. The resulting total weighted points (TWP) for each job determined the responsibility level and corresponding salary range.

Three sites were selected to participate based on three criteria:

1. a relatively large academic institution;
2. the library and the academic computing center potentially at the same level in the organizational hierarchy; and
3. a high degree of potential administrative integration insofar as both the library and computing center reported to a single CIO considered by peer judgment to be beyond automation, and at the "informated" stage in the use of information technologies.

Organization charts and job descriptions for all jobs in each library and computing center were collected. To confine jobs in the study to those that did solely "library" and "computing" work, all administrative, secretarial, vacant, frozen, and part-time positions

were eliminated from the study. Because the intent was to look at the entire range of jobs, no distinctions were made between "professional" and "nonprofessional" or exempt and nonexempt. Duplicate jobs were also eliminated. That is to say, if the same description was repeated for six reference librarians or four systems analysts, only one of each was used for the study. In consultation with representatives from each of the sites, the remaining job descriptions were examined for completeness and recency. A data collection form was provided to supply the information which was missing or outdated. Each job was checked against the organization charts to verify that all jobs in each computing center and library were actually included and that jobs at all levels were represented. Every description was then given a code to ensure anonymity of both individual jobs and the institutions from which they came. Finally, to ensure complete representation of all types of jobs, each site was asked to review the selection for omissions. Out of 371 descriptions, 63 unique jobs were identified for full analysis.

TABLE 1
JOB EVALUATION FACTORS

KN	Knowledge
EX	Experience
SR	Degree of supervision received
AS	Analytical skills
FR	Financial responsibility
IA	Impact of actions
SE	Nature of supervision received
HR	Scope of human resources impact
IC	Internal contacts
EC	External contacts
PE	Physical effort

Eliminating Jargon

One of the reasons computing and library jobs are considered to be two distinct groups or cultures is the richness of the jargon each uses to describe its own practices and activities. This was particularly evident in the final group of job descriptions. It was obviously necessary for the validity of the study, and for the anonymity of the individual descriptions, to eliminate as much jargon as possible.

A working glossary was developed that would neutralize library and computing vernacular, at least to the degree that "OPAC" became "campus-wide information system" and "debug" became "correct a problem." It was also intended to interpret professional shorthand into phrases that could be better understood by job analysts without

knowledge of a particular profession. Thus "performs descriptive/original cataloging" was translated into "creates and corrects records for inclusion in local, national, and/or international databases." This translation was considered to be critical since the assignment of points would be based on the words used to describe the skills, tasks, and responsibilities of a job. Thus, while many of the terms, such as "debug," have entered into general usage, the study could not assume a consistent interpretation without providing specific definitions. For the same reasons, terms used to describe actions associated with a job—"direct," "prepare," "implement"—could be subject to degrees of variation, and these were added to the working glossary as well.

Each job description was presented to evaluation teams at the three sites. The teams were comprised of individuals from both the library and the computing center who were familiar with the sets of jobs discussed. The principal investigator provided interpretive phrases when jargon meaning was unclear and ensured consistency in interpretation of terminology to enable interinstitutional comparability. With the principal investigator as both facilitator and mediator, the teams then determined the points on all eleven factors to be assigned each job in the sample from their own institution.

Findings

The results of the study indicate that, on several important factors, the correlations between library and computing jobs are strong enough to indicate job overlap, in total or in part (a full report of the data analysis will be made available in the final report to the Council on Library Resources and may be published by CAUSE as a separate occasional paper in 1992-1993). The degree to which this is shown would suggest that there is merit in re-examining the traditional two job family approach taken by most university job classification systems, particularly those whose information and organizational profile resembles those of the institutions in the study. For colleges and universities contemplating or currently in the process of changing organizational structure and/or compensation values, the methodology used in this study would provide a useful evaluation tool.

The degree of overlap in jobs followed a normal distribution: a small number in which there were no similarities, a majority of jobs that were similar in part, and another small number of jobs that were identical. While there is strong reason to look more closely at the "some" and "none" categories, it was obviously the group of identical jobs that were the most interesting in the present study.

In both libraries and computing centers, these identical jobs were found:

- Systems analysis and design which might include programming for microcomputer applications and micro-mainframe links, network design, implementation and maintenance, design or redesign of communications paths in the delivery of information, or preparing system usage guides and documentation.
- User services, involving problem solving, preparation of end user documentation, individual and group instruction in the use of online systems, applications software, networks, and peripheral equipment such as CD-ROM readers or scanners.
- Resource collection involving the acquisition of software and information products in a variety of formats for students, faculty, and staff and making these files, materials, and services available for use.
- Support services, such as data entry, remote user support, maintenance and development of databases for internal operating purposes (user lists and profiles, billing and administrative files), or preparation and analysis of operating reports such as transaction logs monitoring use levels by types and categories of users.

It is clear, even from this broad summary, that the commonality in jobs is attributable to their reliance on the use of various information technologies. In these particular campuses, already defined as being more "informated" than automated, the ubiquitous presence of one information technology or another in almost all jobs, not only those classified as information jobs, made it difficult to isolate the pieces of the large number of computing and library jobs that were partially overlapping. For these jobs, looking at the type and amount of skills in relation to the scope of the total job was more significant.

In comparing one library job to two different computing jobs, for example, it was found that the library job (a serials acquisition assistant) more closely equated in total points to the computing systems analyst job than to the data entry operator, a conclusion that might not have been drawn by looking only at the kind and degree of information technology use indicated in the description.

This particular job was also hobbled by its pre-study jargonized description: "Check in standing orders on XXXX system....Monitor problems and work on their resolution with OCLC." The systems analyst job, on the other hand, was described as: "Designs, tests, maintains, and modifies computer-based information systems...." The data entry operator's job description read: "Operates data entry devices and performs all types of data entry." By the description, the serials

assistant's responsibilities seemed remarkably like data entry, and it was only through the context of other factors in the analysis system that true impact and import of the job came into focus.

This single example points to at least three of the difficulties that confront job analysts in "informated" environments if they are still to be operating under automated job analysis systems:

1. lack of ability of incumbents and supervisors to describe the nature of the work done;
2. lack of standardized terminology or guidelines that enable intra-institutional uniformity; and
3. lack of a means to identify or adapt factors that can accommodate the impact of "informated" jobs.

These all point to the strategic role that human resources management must play in any effort to "transform" the organization's policies and practices as the information technologies proceed to transform the organization. The following section provides more details in support of the need to adjust organizational job analysis methods.

Analysis of Factors

The point system used results in data that are, by definition, at an ordinal level. As appropriate to data at that level and to the exploratory nature of the study, most of the analyses presented here are descriptive. However, because point assignments on each of the factors for all sixty-three jobs were made or facilitated by the same person, the data were assumed to have equal-appearing intervals in calculating correlation coefficients.

In looking at similarities between computing jobs and library jobs as shown in Table 2, the strongest similarities are found in Analytical Skills (AS), Human Resources Impact (HR), Internal Contacts (IC), and External Contacts (EC). Both library and computing jobs correlate these four factors strongly with Knowledge (KN), Amount of Supervision Received (SR), Impact of Actions (IA), Supervision Exercised (SE), Analytical Skills (AS), and Financial Responsibility (FR).

Interpreting these results narratively, the work in both organizations requires analytical skills equal to the complexity and scope of the functional areas covered. Most positions deal with work that is nonstandardized and widely varied, involving many complex and significant variables. Even at the lowest level of all jobs, a certain amount of analytical ability and inductive thinking is required to deal with extensive adaptation of policies, procedures, and methods to fit unusual or complex decisions. As analytical skills correlate with knowledge, supervision received, and impact of actions, the

interpretation is that educational level, degree of autonomy, and the breadth of potential consequences from actions taken were all characteristics that must be considered along with analytical ability.

TABLE 2
SIMILARITIES

Factor	*Library* $r =$	*Computing* $r =$
AS:KN	.70	.72
AS:SR	.81	.75
AS:IA	.69	.74
HR:SE	.71	.85
IC:KN	.69	.70
IC:AS	.74	.71
EC:FR	.68	.69
EC:SE	.71	.78

r = correlation

Within this group of correlations, supervision received can be considered the autonomy measure: the higher the point values assigned, the less amount of supervision an incumbent received. Considered with the high correlations to knowledge and analytical skills, this measure may indicate that significant individual "empowerment" is already in place on these campuses.

Supervisory levels were high in both computing and library jobs, as indicated by the correlations between human resources impact and degree of supervision exercised.

Internal and external contacts measured how widely a job's net might be cast throughout the organization and beyond its boundaries. Because the correlations with internal contacts were strongest with knowledge and analytical skills, there was indication that these abilities were being applied widely across each campus.

External contacts extended beyond the campus to outside resources such as hardware and software suppliers, consultants, and database and other product vendors and are thus shown in each unit in a strong relationship with amount of financial responsibility and amount of supervision exercised.

DESCRIPTIVE ANALYSIS

Correlations allow a specific focus on significant factors that stand out in such an analysis. For a broader view of the results, however, the shape and frequency values of the point assignments are more helpful.

Table 3 lists, for each of the factors, the point assignments available, how points were assigned, and the percentage frequency of their occurrence for library and computing jobs. The single dimension factors allowed point ranges from 1 to 8, the two-dimensional factors (FR, SE, IC, EC) ranged through 48, and three of these (FR, SE, EC) began at 0, indicating that jobs could have a complete absence of these factors.

TABLE 3
COMPARATIVE DISTRIBUTION OF RAW POINTS WITHIN FACTORS

1-KN			2-EX			3-SR		
Value	L	C	Value	L	C	Value	L	C
1	-	-	1	8.3	13.3	1	-	-
2	-	-	2	6.3	-	2	4.2	20.0
3	-	6.7	3	22.9	-	3	33.3	26.7
4	2.1	-	4	27.1	6.7	4	58.3	46.7
5	14.6	20.0	5	25.0	46.7	5	4.2	6.7
6	31.3	46.7	6	8.3	26.7			
7	52.1	20.0	7	2.1	6.7			
8	-	6.7						

4-AS			5-FR			6-IA		
Value	L	C	Value	L	C	Value	L	C
1	-	-	0	47.9	53.3	1	-	-
2	2.1	-	1	2.1	6.7	2	4.2	6.7
3	25.0	6.7	2	6.3	-	3	50.0	6.7
4	16.7	13.3	3	-	-	4	16.7	30.0
5	31.3	26.7	4	18.8	6.7	5	25.0	33.3
6	22.9	46.7	6	2.1	-	6	4.2	33.3
7	2.1	6.7	8	8.3	20.0			
			12	2.1	-			
			16	2.1	6.7			
			24	10.4	6.7			
			32	-	-			
			48	-	-			

7-SE			8-HR			9-IC		
Value	L	C	Value	L	C	Value	L	C
0	33.3	13.3	1	16.7	-	1	4.2	-
1	2.1	6.7	2	31.3	60.0	2	2.1	-
2	6.3	-	3	22.9	13.3	3	12.5	6.7
3	-	-	4	20.8	6.7	4	-	-
4	14.6	13.3	5	8.3	20.0	5	6.3	-
5	-	-	6	-	-	6	4.2	-
6	2.1	-				7	-	-
8	16.7	40.0				9	18.8	-
10	-	-				10	8.3	-
12	6.3	-				12	-	6.7
16	8.3	13.3				14	2.1	-
20	-	-				15	18.8	-
24	4.2	6.7				20	16.7	73.3
32	4.2	-				21	-	-
40	2.1	6.7				28	6.3	13.3

TABLE 3 (CONT.)
COMPARATIVE DISTRIBUTION OF RAW POINTS WITHIN FACTORS

10-EC			11-PE		
Value	L	C	Value	L	C
0	25.0	-	1	77.1	73.3
1	4.2	6.7	2	18.8	13.3
2	2.1	-	3	4.2	-
3	8.3	20.0	4	-	6.7
5	25.0	33.3	5	-	6.7
6	4.2	-	6	-	-
7	-	-			
9	-	-			
10	20.4	33.3			
14	2.1	6.7			
15	4.2	-			
21	2.1	-			

KN = Knowledge
EX = Experience
SR = Degree of supervision received
AS = Analytical skills
FR = Financial responsibility
IA = Impact of actions
SE = Nature of supervision received
HR = Scope of human resources impact
IC = Internal contacts
EC = External contacts
PE = Physical effort

L = Library jobs
C = Computing jobs

Knowledge (KN) is valued primarily by educational level. Point level 7 represents masters level preparation and thus reflects for the library jobs the importance of the M.L.S. in this environment.

Experience (EX) is measured in time units, from 0 to 3 months through 10 or more years. The majority of library jobs cluster in the ranges represented by three months to five years, while the computer jobs indicate somewhat higher experience requirements at the ranges two to nine years.

Degree of Supervision Received (SR), as indicated earlier, is an autonomy measure. No jobs in either library or computing centers were assigned a 1, which represents the need for close supervision. The most frequent assignment was 4, indicating "General direction, working from broad goals and policies only. Incumbent participates heavily in setting the work objectives."

Analytical Skills (AS) measures the amount of complexity, nonstandardized work, and inductive thinking. The library jobs showed a greater variation across all point values, while computing jobs were more concentrated at the levels where "previously unsolved problems" (6) would routinely be encountered.

Financial Responsibility (FR) was measured on both level of responsibility (payment authorization/ budget preparation) and size of budget administered. Approximately half the staff in both libraries and computing centers had no financial responsibility, but varying degrees of such responsibility were spread more evenly among library jobs than among computer jobs. This variability is, of course, locally and institutionally driven, being influenced, for example, by policy as well as management styles. It should be noted, however, that, until it was pointed out by the principal investigator, some teams "forgot" that librarians who were responsible for selection and acquisition of materials had budgets for which they were responsible and accountable to the entire campus community.

Possible Impact of Actions (IA) ranged from "minimal" through "major." While it is important to avoid reading into the data more than is present, it would seem that computer jobs were considered to have a much greater impact—86.6 percent ranged from "significant" to "major," while 91.7 percent of library jobs ranged from "moderate" through "substantial."

Supervision Exercised (SE) was measured by the number of different functions supervised and by the complexity that the supervision entailed—i.e., how technical or nonstandardized. One-third of the library jobs had no supervisory role, but the remaining two-thirds were spread throughout the levels more completely than the computing jobs were, with both groups having peaks at value 8—a moderately high degree.

Human Resources Impact (HR) measures the degree of hiring and compensation authority, responsibility for performance appraisals, and staff development. Among the library jobs, 83.3 percent had moderate to high responsibilities, particularly for interviewing and staff development and planning. Among the computing jobs, 100 percent of the jobs fell within this range. The absence of any jobs rated at the highest rating in either unit may be accounted for by the requirement at this level to coordinate human resources for more than one area.

Internal Contacts (IC) was measured by level of contact (across area, department, school, or administrative unit) and nature of contact (routine to diplomatic/negotiative). This is an area where computing jobs were heavily represented at the high end of the scale, while the library jobs, although weighting at the high end, were spread more completely throughout the range. This does not contradict the high correlations found in both groups of jobs in this category—the correlations were formed through the aggregate of all computer jobs and all library jobs; the frequencies indicated here are showing the spread of individual jobs.

External Contacts (EC) indicate nature and level of contact with people outside the immediate campus area. There is more variability among the library jobs, but concentrations at those levels where contact and negotiation with vendors and information agencies might be expected. The computer jobs ratings are at levels that particularly stress problem resolution with service and product representatives.

Physical Effort (PE) (lifting, climbing, moving heavy objects) as defined in the factor system had little implication for the purposes of this study and was not considered in further analysis.

Ranges in Total Weighted Points

The point factor analysis method, through the weighting of factors, produces a weighted total of points that is used to determine compensation. Because the total weighted points are used in this way, they were not considered valid for the analyses presented so far. However, these totals are extremely helpful in showing the spread of points that contribute to the overall responsibility level rating and potential compensation range.

The figure that follows and Table 4 compare library and computing jobs along the full range of total weighted points. In the figure, attention is focused on the interquartile (25 percent-75 percent) range to control for the few library and computing jobs that had extremely high and low values.

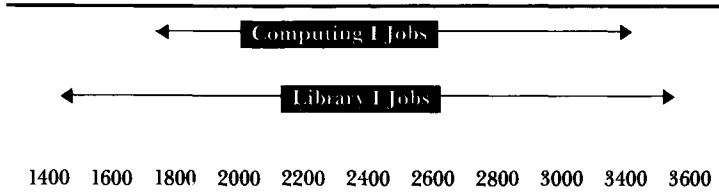

Figure 1. Distribution of total weighted points

The total weighted points in the interquartile range are lower for the library jobs than for the computing jobs, and the shape of the distribution of points (right-skewed) reflects the greater number of library jobs factored at lower values. The distribution of computing job weighted points is very nearly bell-shaped. Expressed as a percentage, 77 percent of the library jobs are rated below the median rating of computing jobs. In salary dollars, 58 percent of the library jobs are below the computer jobs' median salary of $27,702. Even though the point factor analysis formula used in examining these jobs does not consider the influence on salary of other factors such

as seniority, merit increases, or gender, when compared dollar for dollar, 42 percent of library salaries are still below the lowest computing salary. Among all the jobs in the study, the total factor points were 23 percent higher for the library group, but salaries were 13 percent higher for the computing group.

TABLE 4
INTERQUARTILE RANGES OF TOTAL WEIGHTED POINTS

Site	Smallest	Q1	Median	Q2	Largest
Computing	1690	2186	2511	2819	3369
Library	1462	1854	2277	2507	3569

CONCLUSION

The study discovered some missing factors for eventually understanding the impact of information technologies on jobs that are becoming increasingly similar. Some of these can be addressed immediately, others will take some arduous negotiation and vision-setting on a campus-by-campus and on a profession-by-profession basis.

Among those factors immediately addressable are instructions on how to write job descriptions so that they are at least intra-institutionally, if not inter-institutionally, comparable. This may mean developing thesauri that standardize technical terms and personnel terminology in a relational manner. Ideally they should catch the finer nuances of what a job is really all about, along with the impact of the results of the job. Needless to say, parameters for preparing job descriptions should be easier to use and allow less ambiguity than the more prescriptive glossaries of terms.

Dialogue must begin that leads to closer coordination of objectives, function, and work done by the various information partners on campus. At one of the institutions in this study, the library and computing center had jointly developed a clear understanding of their respective roles in most intersecting areas, recognizing, for example, who had responsibility for the acquisition, organization, delivery, and provision of user instruction for the institution's array of software and hardware. The fact that this kind of cooperative and openly recognized sharing of responsibilities was not in place elsewhere indicated that there is need for a greater human emulation of the behavior of information—viz. to move over between and through departmental and administrative barriers.

And certainly, based even on the small sample of sixty-three jobs in this study, rationalized salary and benefit policies between librarians and computing specialists must be developed that precede and not follow the introduction of the "informated" work environment.

Some deficiencies were found in the study itself. For any additional in-depth analysis, a much finer analytical measure should be developed, one that would probe beyond those factors that contribute most heavily to compensation analysis. There was no control built into the study for the effects of seniority, type of institution, gender, merit/promotional increases within a job category, nor for market forces such as geographic location, cost of living differentials, faculty status, or unionization. These elements were purposely not included. The complexity of analysis introduced would have been inappropriate in a study which sought only to demonstrate sufficient strength of relationship in the "generic" content of each job in order to substantiate the observed trend of job similarity and to generate questions for further research.

One of the heuristic values of this study is the emphasis it places on the central importance of human resource planning in the "informated" organization. It is hoped that further work will be done on developing a set of factors for job analysis that will be negotiated to fit the overall information vision within each institution. The definitions of factors say a great deal about the values of the organization and should be looked upon as a powerful and influential force for change.

Compensable factors also establish sets of relationships between people, values, and processes. For this reason, organizational context remains a central concern. The CIO is one variation in organizational structure, but as experimentation with other new less hierarchical and departmentalized forms takes place, internal job structures will need to be reexamined accordingly. It seems certain that more of a future issues orientation will be required as was suggested by Schneider and Konz (1989). This will place greater emphasis on information technologies planning and, more importantly, in valuing (and building systems that can evaluate) the outcomes of human effort at work rather than just events or tasks.

APPENDIX A

JOB EVALUATION FACTORS

1. **Knowledge (KN).** Measures seven degrees of knowledge, from basic knowledge of work processes, methods or equipment through a deep and comprehensive knowledge of what would normally be acquired through a formal doctoral level education or training in a recognized field of specialization that is directly related to the type of work being done.
2. **Experience (EX).** Seven degrees needed as the minimum to perform a job that ranges from no experience on up to three months experience required through to ten years or more.
3. **Supervision received (SR).** The degree of supervision received is measured by five degrees that begin with close supervision being needed for simple routine duties to ensure completion to a level where only policy direction is given and the incumbent sets virtually all goals and objectives.
4. **Analytical skills (AS).** Seven degrees define the extent to which work is routine, repetitive, and simple or broad in scope and covering several functional areas.
5. **Financial responsibility (FR).** Was defined on a grid of seven levels of responsibility and three levels of budget volume and allowed for up to 48 raw points to be assigned.
6. **Impact of action (IA).** This factor defined six degrees from minimal (where actions are limited to routine functions and impact is minimal) to major. The upper end of a job would have major responsibility for actions which often affect more than one division and sometimes the entire organization. Errors at this level would incur major problems and could affect long-term organizational performance.
7. **Supervision exercised (SE).** Diversity and complexity were measured against a grid that allowed for up to forty points for various permutations in this factor. Diversity addressed how many functions the job supervised and the complex nature of the work being supervised.
8. **Human resources impact (HR).** Six degrees measured the scope of human resources impact that a job had ranging from no responsibility to the coordination of the management of more than one area including responsibilities such as long-range human resource planning.
9. **Internal contacts (IC).** Four levels of contact within the institution (from within the immediate work area to across schools or

divisions) were combined with the four degrees that measured the nature on a 40 point scale with the lowest contacts being routine exchange of information and the highest being diplomatic and persuasive kinds of interactions about complex matters.

10. **External contacts (EC).** A grid of four levels of contact, from almost none to high level contacts with prominent people, was combined with four degrees to allow a range of up to 21 raw points to measure the nature of the contacts similar to those in the IC factor.
11. **Physical effort (PE).** Six degrees measured the amount of physical effort required to perform a job. The degrees ranged from largely sedentary to near-continuous physical activity—i.e., lifting heavy objects and climbing.

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