Information Systems and Technology Trends Occurring in the Workplace

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Introduction

The advancement of technologies in business is changing the world of work. Businesses find they must incorporate many of the new technological procedures, processes, policies, hardware, and software into their environment to remain competitive. The impact from these technological advances on how work is performed affects the workforce far differently now than what has been seen over the past 25 years. One of the greatest impacts has been on the workers themselves, and the challenge of training and preparing to remain abreast in today's workforce is tremendous. This challenge, which is facing today's workers, is something educators cannot afford to ignore. Technology has created a revolution in today's educational environment, and this change in education makes teaching more rewarding and far more challenging (Bryant, 2001).

Review of Literature

The field of information systems is constantly changing, and these changes are impacting the way workers think, the processes and procedures used to accomplish work, and the tools used to accomplish goals needed to be competitive in the workforce. In today's work environment "trends such as the globalization of the economy and the evolution of e-commerce are changing the very nature of work" and "success in the workplace of tomorrow belongs to those who can find, understand, process, and integrate information to solve a variety of problems" (Glenn, 2001, p. 10). Businesses are reengineering themselves to remain competitive in today's society, and as these changes occur, "increased demands are put on educational institutions to prepare" (McGrew, 2001, p. 91) students to face the rigors of a more complex and diverse work environment.

The changes impacting the workforce create a tremendous challenge for educators as well. The need to keep up to date with current trends is difficult, as businesses are demanding better-qualified employees to cope with an increasingly complex business environment. These rapid technological changes mean there is always a shortage of individuals with the latest skills, and the competition for information technologists has never been greater (Lewis, 2001). Educators must therefore strive to keep their curricula up to date because the work environment today is greatly different from what it was when students began their coursework (Head, 1999). And it is imperative that educators prepare educated workers who are able to utilize technology as effectively as the business world demands (Bryant, 2001).

The goal of all computer-related programs of study is to remain abreast of the many changes, challenges, and trends occurring in the information technology environment and to offer a curriculum which encompasses the requirements of the current workforce. This curriculum experiences change more rapidly than many other disciplines, and educators must contend with this constant change. "They must use change as a guide for updating,

refining, and revising their programs and courses, and as a mandate for professional renewal" (Brown, 2001, p. 3). It is imperative then, as information technologies continue to evolve, that educators identify trends, technologies, policies, and procedures used in business and industry. Because educators must strive to provide curricula that will help students obtain a grasp on today's work environment so the students will be competitive in the workforce.

Purpose of the Study

The technological changes we continue to see in business and industry affect the trends, systems, and policies used in the workforce. These changes redefine the working environment and force workers to be better prepared. Current workers must retool themselves so that they remain valued employees, and those just entering the workforce need to be better prepared than ever before. This need for better-qualified employees also impacts educators who must continuously assess new technologies, trends, and methods utilized in business and incorporate this information into their classrooms. One way to identify the technologies, trends, and skills needed in the workforce is to survey individuals in business. The purpose, therefore, of this study was to contribute to a better understanding of the trends and technologies occurring in business and industry, to assimilate this information to update equipment, curriculum, and faculty, and to strive to better prepare students entering the workforce.

Research Questions

Answers were sought to the following research questions:

1. What are some of the information technology trends, systems, and policies used today in business and industry?

2. Is there an association between the type of company and the information technology trends, systems, and policies occurring in business and industry?

Research Procedures

A national research study was undertaken during the summer of 2000 to assist in the identification of technologies incorporated in the workforce as well as to enhance curricula. A questionnaire was designed, pilot tested, and field tested. Based on input from the pilot test and field test, adjustments were made to the initial questionnaire to incorporate the suggested changes. The final instrument contained four sections. The four sections of the questionnaire were demographics, technologies utilized in business and industry, trends and policies utilized in business and industry, and technical and non-technical skills and knowledge needed by IS and IT graduates.

In May 2000, questionnaires were mailed to 620 randomly selected members of the Association of Information Technology Professionals (AITP). One hundred ten instruments were returned; however, the results were compiled from the 103 completed instruments. Responses were coded onto a computer sheet for optical scanning. Analyses were completed using the Statistical Analysis Systems, Version 6.07.

Findings and Results

Demographic Information

Statistical analyses were run on 103 completed questionnaires. Although 103 instruments were analyzed, some questions were not answered by all of the respondents. Responses were marked, however, by at least 98 of the respondents for questions relating to age, gender, level of educational, job title, years of experience, salary, size of company, and type of company.

Age and Gender

With regard to age, the largest number of respondents (42%) was between the ages of 46 and 55. Only 6% of the respondents were 35 years of age or younger, 26% were 36 to 45, and 26% were over the age of 55. Of the 99 individuals responding to the gender question, 70% were male and the remaining 30% were female.

Level of Education

When asked about their level of education, 41% had a bachelor's degree and 22% had some college credit. In addition, 21% had a master's degree and the remaining 16% had either some graduate credit or had a doctoral degree.

Job Title

Twenty-three percent of the respondents were information systems managers/administrators; 14% were chief information officers; 14% were information systems analysts; 10% were programmers/programmer analysts; 2% were communications/network managers, 1% was a database designer/developer, and 1% was a personnel/human relations manager. Thirty-five percent indicated they had a job title which fell in the "other" category. Of these, 9 were educators, 8 were managers in a business-related functional area, 7 were consultants, and 3 were CEOs. Also, there was one individual in each category of information security analyst, IS trainer, information processor, research analyst, chief technology officer, IS senior advisor, and sales engineer. There was also one individual who was retired.

Years of Experience

Regarding how many years of experience the respondents had within the profession, the largest number (42%) had 21 to 30 years of experience. Ten percent marked they had 1 to 10 years of experience, 23% had 11 to 20 years, 21% had 31 to 40 years, and 5% had more than 40 years of experience.

Salary

With regard to salary, the most often marked categories were $60,001 to $70,000 (17%) and over $110,000 (17%). The salaries earned by the respondents are shown in Table 1.

Table 1
Salary of Respondents

Salary Range	Number	Percent
$30,000 or Less	3	3.1
$30,001 - $40,000	5	5.1
$40,001 - $50,000	11	11.2
$50,001 - $60,000	11	11.2
$60,001 - $70,000	17	17.3
$70,001 - $80,000	9	9.2
$80,001 - $90,000	11	11.2
$90,001 - $100,000	10	10.2
$100,001 - $110,000	4	4.1
Over $110,000	17	17.3
Total	98	99.9

Size of Company

Thirty-three percent of the respondents indicated their company had less than 100 employees; 28% had 101 to 500 employees; 9% marked 501 to 1000 employees; 12% employed 1001 to 1500 people; 4% had 1501 to 2000 employees, and 15% employed over 2000 individuals.

Type of Company

Respondents were asked to indicate whether their company did business on an international basis. The responses showed that 65% indicated their company did not do

business on an international basis; 19% marked yes they do business internationally and indicated they had sites outside of their country; and 12% also marked yes, but indicated all of their company sites were located within their country. One percent indicated they did not know whether their company did business internationally.

The respondents were given 10 choices to mark when indicating the classification that best described their type of company. Twenty percent indicated a company classification of financial services, 14% were consulting/marketing, 13% were in information technologies, 11% were government, 10% were agriculture/mining/manufacturing, 4% were communications/transportation, and another 4% were marked hospital/medical facility. Twenty-five percent of the respondents marked the "other" category. Thirteen were educational institutions, 4 were chemical/pharmaceuticals, 3 were utilities, 2 were printing/publishing companies, and there was one credit bureau, one value-added reseller and one non-profit organization.

Findings for Research Question No. 1

The first research question was: What are some of the information technology trends, systems, and policies used today in business and industry?

Respondents were asked to indicate a wide range of trends and systems currently in use in their companies. Some of the more often marked trends and systems used today were relational database management systems (82%), management information systems (52%), transaction processing systems (51%), outsourcing (39%), non-relational database management systems (24%), and reengineering (20%).

Respondents were also asked about formal policies established within their business. Well over a majority had policies in all of the areas listed. The types of formal policies found in the companies are seen in Table 2.

Table 2
Established Policies

Formal Policy	Number	Percent
Access to Electronic Information	81	85.3
Disaster Recovery	80	82.5
Use of the Internet	82	82.0
Security of Electronic Information	77	78.6
Ownership of Email	71	71.7
Disaster Prevention	65	68.4

Almost all of the businesses (97%) had an Internet connection, and 69% of the businesses had an Intranet. When asked what type of policies existed with regard to security and

ownership of email messages, the response marked most often was that employees' email messages are private (43%). The second most often marked response was that employees' email messages are available to anyone within the company (19%). Responses for this question are detailed in Table 3.

Table 3
Policies for Security/Ownership of Email Messages

Policy	Number	Percent
Private for Employee Only	44	43.1
Private for Employee Unless Company Has to Investigate	6	5.9
Available to Anyone	19	18.6
Available Only to Specified People	6	5.9
Other	7	6.9
Don't know	5	4.9
No Policies Exist	2	2.0
No Email Within the Company	5	4.9

Findings for Research Question No. 2

The second research question was: Is there an association between the type of company and the information technology trends, systems, and policies occurring in business and industry?

This research question was answered by use of a chi square test of independence. A chi square is used to test the significance between the observed and expected or theoretical frequencies (Slavin, 1992).

There were 35 different trends, systems, and policies listed throughout the survey instrument. Respondents were asked to indicate which of these were being used in their businesses. A chi square was run to determine if there were any significant associations between these 35 trends, systems, and policies based on the type of company. In order to avoid making a Type I error, the researchers used the Bonferoni adjustment, which involves dividing the experiment-wise alpha rate by the number of contrasts made. The experiment-wise alpha of 0.05 was divided by 35, which gave a contrast-wise alpha of 0.001. Since a chi square may not be a valid test when expected cell counts are less than 5 for more than 20 percent of the cells, a Fisher's exact test was run; however, on many it failed to converge. Therefore, in Table 4 the regular probability was reported except on those that were significant which show the Fisher's exact probability. The chi square test of independence showed a significant association between the type of company and (1) the use of both working copies and backup copies of records, (2) the use of film as a storage medium for working documents, and (3) the use of film as a storage medium for

backup documents. As shown in Table 4, no dependencies were attributed to the other 32 trends, systems, and policies.

Table 4
Dependencies of Trends, Systems, and Policies on Type of Company

Trends, Systems, and Policies	Chi Square Value	p	n
Outsourcing	2.942	0.8160	102
Reengineering	3.911	0.6890	102
Downsizing	8.055	0.2340	102
Enterprise Resource Planning	3.737	0.7120	102
Alliances/Joint Ventures	8.286	0.2180	102
Transaction Processing Systems	9.112	0.1670	102
Management Information Systems	3.494	0.7450	102
Decision Support Systems	8.843	0.1830	102
Artificial Intelligence Systems	7.399	0.2860	102
Relational Database Management Systems	4.118	0.6610	102
Non-Relational DBMS	7.868	0.2480	102
Object Oriented DBMS	12.777	0.0470	102
Data Warehouses	2.936	0.8170	102
Online Analytical Processing	4.441	0.6170	102
Data Mining	5.983	0.4250	102
Disaster Prevention Policies	8.485	0.7460	95
Disaster Recovery Policies	9.990	0.1250	90
Access to Electronic Information Policies	4.873	0.5600	88
Security of Electronic Information Policies	8.146	0.2280	89
Ownership of Email Policies	7.474	0.2790	88
Use of Internet Policies	10.442	0.1070	97
Internet Connections	9.315	0.1570	101
Intranet Site	5.170	0.5220	99
E-commerce Site	9.849	0.1310	102
Online Storage	3.340	0.7650	102
Offline Storage	3.820	0.7010	102
Nearline Storage	6.215	0.3990	102
Offsite Storage	8.998	0.1740	102
Working Copies and Backup Copies	13.821	0.0002*	94
Paper Working Documents	8.315	0.2160	102
Electronic Working Documents	7.825	0.2510	102
Film Working Documents	28.850	0.0002*	102
Paper Backup Documents	6.660	0.3530	102
Electronic Backup Documents	3.669	0.7210	102
Film Backup Documents	26.645	0.0001*	102

Note. df =34, $p < .001$, Fisher's two-tailed probability (significant)*.

Conclusions and Recommendations

Based on the findings of the study, the following conclusions were made:

1. Trends and systems found in today's business environment include the use of outsourcing, reengineering, management information systems, transaction processing systems, relational database management systems, and non-relational database management systems.
2. Policies that have been developed in business and industry address areas that are a direct result of the technological advances found in today's workforce. Some of these policies cover access to electronic information, use of the Internet, security of electronic information, and ownership of email.
3. The use of the Internet is found in almost all business settings, and most businesses use an Intranet.
4. Email is a widely used medium for communication for today's workers. Many employers feel that email used in the workforce is private for those individuals who use this medium. However, some employers feel the use of email within their business means that information is available to anyone in the business.
5. The type of company impacts the use of both working copies and backup copies of records as well as the use of film as a storage medium for working documents and backup documents.

With regard to this research study, the following recommendations were made:

1. Educators must prepare students to be competitive in today's workforce. Students need to be knowledgeable of the trends and systems being used today. Some of these include outsourcing, reengineering, management information systems, transaction processing systems, relational database management systems, and non-relational database management systems.
2. Students must be well trained in the use of the Internet and of Intranets. Educators must make sure that students understand email information generated within a work environment is not necessarily their own but belongs to their employers.
3. Students must be encouraged after they enter the workforce to remain up to date on policies relating to electronic information and security and ownership of email messages.
4. Collaboration between businesses and educators should continue to be encouraged. Results of collaboration produce a better quality workforce. Collaborative efforts provide opportunities for students such as job shadowing, internships, guest speakers, and advisory boards.
5. More research should be conducted to continue to identify trends, systems, policies, and procedures incorporated into information systems to assist educators in remaining abreast of technological changes.

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