

Introducing Information Systems Approach for Acquiring IT Competence Needed For Business Applications

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ABSTRACT

This article reports the findings of Information Systems Approach (ISA) and commonly used Traditional Approach (TA) on the acquisition of IT (Information Technology) competence of undergraduate students taking an introductory IT course in a business college. The ISA begins with the conceptual understanding of business activities followed by the introduction of databases, spreadsheets and the word-processing in line with the IT applications in business activities. While the Traditional Approach (TA) begins with conceptual understanding of business activities like the ISA, but followed by IT modules in sequence of word-processing, spreadsheets and then databases. Several groups were randomly selected from the same pool of students and introduced ISA and the TA for the acquisition of IT competence. The results indicated that the ISA group is more effective in enhancing IT competence in comparison to the TA group.

Keywords: IT, IT competence; IT skills; Approaches for delivering IT skills; IT modules, Word-processing (WP), Spreadsheets (SS) and Databases (DB)

1. INTRODUCTION

In recent years it has been recognized that the success of a business organization largely depends not only upon IT, but also the way in which its workers use it. Continuous innovation in IT and global competitive pressure are forcing many organizations to re-think the manner in which they do business and require that, in almost all cases, they should utilize the support of IT. As organizations increasingly depend on computerized Information Systems, the construction, use, management and maintenance of these systems become essential to the welfare or even survival of many organizations. These organizations need workers with more IT competence and not just with data entry or word-processing expertise. Before we explore different approaches for enhancing IT competence, let us begin with:

1.1 What is IT Competence?

Competence is the possession and development of sufficient skills. Competence in general can be understood as: "competence is an outcome which is primarily concerned with doing, but which embraces both specific task skills and the understanding, knowledge, attitude and personal skills required to carry out that task effectively." (UDACE 1989:3).

Whitty & Wilmott (1991:309) commented: "Competence-based approaches to education are often considered problematic because of the central focus of competence upon outcomes rather upon course content and learning process."

When we look at competence in relation to education and training, Hillier (1997:34) argued that: "When applied to education and training, the common feature is that competence is about being able to do things. It concentrates on the outcome of education and training rather than the process. Traditional forms of education have been concerned with the process of acquiring knowledge, training has concentrated on assessing if people can do something".

An adjustment to this model is to incorporate underpinning knowledge and understanding into a Competence-based approach. This can move us closer to an idea that can be directly applied to course development for students needing to acquire basic IT skills used in business in higher educational institutions expectations i.e. beginning with the conceptual understanding of computer model followed by the introduction of software modules such as databases, spreadsheets and word-processing.

Twining (1995) suggested goals for IT training which include the basic computer knowledge and then followed by the software packages in support of business applications. There is a general recognition that students in secondary, further and higher education need to acquire IT skills, and that these IT skills should include word processing, spreadsheets, graphics and databases (Rowley & Coles 1996; Freeman & Rowley 1995).

In general, information processing is an integral part of our business and personal lives. Students of today need to be able to understand and apply this technology to be more proficient in IT skills used in business. Today, every student, regardless of his or her area of specialization, must have a solid foundation in the theory and principles of information systems. There are several reasons for this. First, in an information-based society, the primary output of organizational workers consists of information and knowledge. As the complexity and sophistication of managing businesses increase, global and international economic pressures mount, political forces reshape the world in which we live and technology becomes intricately woven into the fabric of business, knowledge of computers and information systems is becoming essential for most employees and employers.

Clearly, there are enough reasons here to explore possible approaches for developing IT competence as needed by the business organizations using word-processing, spreadsheets/graphics and database software. To develop the IT skills used in business a course is needed which includes the basic concepts of IT applications in business and is followed by the introduction of business software such as word-processing, spreadsheets/graphics and databases. One issue is what the order of presentation of these software packages should be. There are three well-known approaches based on the importance and order of presentation of these software modules. These are the Word-processing First Approach, Spreadsheets First Approach and the Databases First Approach. The word-processing first approach is usually known as the Traditional Approach while the Database First Approach is called as the Information Systems Approach.

1.2 Traditional Approach

The Traditional Approach (TA) starts with word-processing, followed often by spreadsheets and graphics and finally, students will usually, but not always, be introduced to databases and database software (Freeman & Rowley 1995). The researcher calls this approach the Traditional Approach (TA) as it is the most commonly used approach for developing basic IT skills used in business applications (Freeman & Rowley 1995).

There are several possible approaches practiced in the higher educational institutions to developing basic IT skills used in support of business activities. The most commonly used approach is the Traditional Approach.

1.3 Spreadsheets First Approach

The Spreadsheets First Approach (SFA) starts with spreadsheets and graphics, followed often by word-processing and then students will usually, but not always are introduced to databases and database software (Freeman & Rowley 1995). This approach is not commonly used in educational institutions, because it alone is restricted to handling quantitative data.

1.4 Information Systems Approach

Very few instructors consider database software to be an appropriate starting point for an IT course. The Database First Approach starts with databases followed by spreadsheets and graphics and finally by word-processing and could be called a Database First Approach or, as Freeman & Rowley (1995) called it, an Information Systems Approach (ISA). The essential characteristic of this approach is that it focuses on the quantitative and qualitative information commonly used in business environments. This approach is more in line with the IT applications used in businesses (Freeman & Rowley 1995).

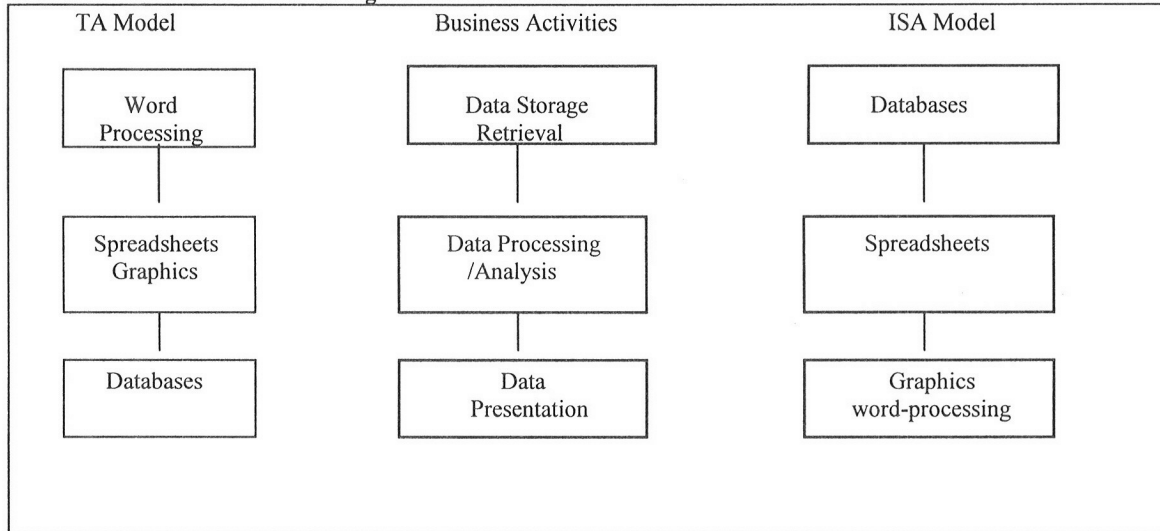
The Information Systems Approach, as proposed by Freeman & Rowley (1995), aims at enhancing the IT skills used in businesses. Freeman & Rowley (1995) proposed the ISA for the development of IT skills, which lends itself to a more direct focus on the range of data, numerical and textual, that is stored, managed and retrieved in support of information handling, a vital activity in contemporary businesses. Moreover, the ISA offers new users of IT a more realistic perspective on the contribution of IT to the effective operation of a business.

This view is suggested by Freeman & Rowley (1995:5): "This approach encourages students to consider information first, and then to progress to tools for its analysis and presentation. This is more in keeping with developing an appreciation of the way in which information systems are used in business."

Business activities such as data storage and retrieval, data processing and data presentation in the view of TA and the ISA model sequence is shown in Figure 1.

The database software supports data storage and retrieval activity and spreadsheet software supports data processing and analysis, while word-processing software supports data presentation activities of business organizations. Database software is vital for businesses and if presented in the sequence of the ISA model as shown in Figure 1, appears more logical and understandable (Naqvi 2001). With these concepts and understanding learners have great appreciation of the role of databases in business and are encouraged to acquire more IT skills (Freeman & Rowley 1995).

Figure 1: TA and ISA in the context of Business Activities



The TA does not appear to be in line with business activities as compared with the ISA. There is hardly evidence of any empirical study conducted on the ISA and this has therefore led to this present study.

1.5 Is ISA more effective than TA?

The focus of this study is on whether the ISA in training is more effective on students IT competence regarding Databases, Spreadsheets and Word-processing, in comparison to the TA. For this purpose a longitudinal study at the College of Commerce and Economics in Oman, was conducted. To increase the validity and reliability of the results, comprising a Phase I study followed by Phase II and Phase III in different semesters.

In a study of this nature pretest data needed to be collected to assess the initial IT abilities of students and posttest data for comparison, to see the effectiveness of the approaches followed on the acquisition of IT competence on word-processing, spreadsheets and databases. A pretest-posttest control group research design was selected and mainly questionnaires were used as data collection tools to assess the merits of the proposed ISA on word-processing, spreadsheets and databases skills in comparison to the TA.

2. METHODOLOGY

All sessions took place in a computer class equipped with 28 Pentium computers loaded with Microsoft Office in a network setup. All students were given similar access procedure to computer facilities. A questionnaire was developed and used to collect initial and final data on students IT confidence and their skills. The questions on IT skills were general and related to word-processing, spreadsheets/graphics and databases. The responses to each

item was based on a Likert scale ranging from 1 to 5, where 1 = Unable, 2 = Slightly Able, 3 = Uncertain, 4 = Able and 5 = Strongly Able see Appendix 1 (Naqvi 2002). Data were collected from nearly 150 students in all the six groups with similar academic standards. All these groups were drawn from the College of Commerce and Economics, where this research was conducted, where two different groups were randomly selected for each phase of study.

The same questionnaires were used to collect data from the groups. The questionnaires were administered during normal classroom lesson time by the course facilitator. For Phase I, one group was introduced IT through the ISA, while the other group used the TA. The data collection process was repeated in similar fashion for Phase II and III taking two groups at a time in each phase (Naqvi 2002).

The initial and final data was collected using the questionnaires to assess the students IT competence in each IT module presented in the course. The initial IT abilities of both the groups were compared to assess the similarity between them. If the two groups were similar in their initial abilities then the final abilities of the two groups were considered. Otherwise, these initial IT abilities were then compared with their final IT abilities to see the effectiveness of the approach.

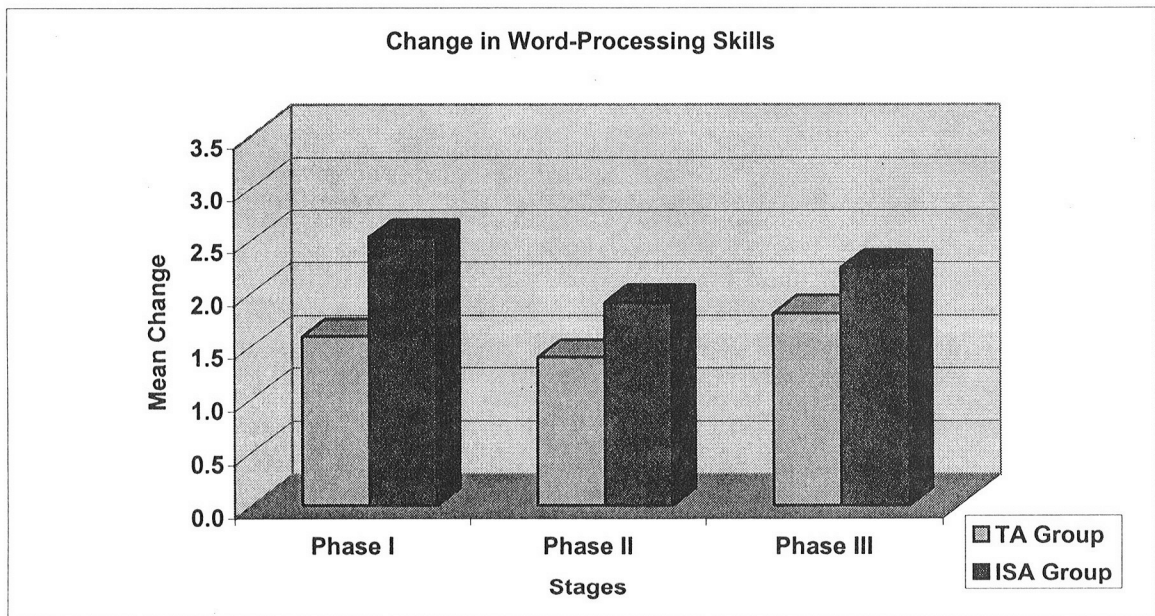
Statistical tests were used to analyze the data including the "Sign Test" to compare the positive and negative responses and using simple group means to assess the size of change in ISA and the TA groups. The results of these statistical tests were incorporated to examine the merits of the ISA in comparison to the TA.



Table 1: Word-Processing Skills (ISA versus TA) Change: After - Before

Q.	Statements related to word processing	ISA Group (Mean)			TA Group (Mean)		
		Phase I	Phase II	Phase III	Phase I	Phase II	Phase III
14	WP simple formatted text.	2.69	2.00	2.29	1.58	1.36	1.93
15	WP to do spell check	2.04	1.17	1.62	1.33	1.06	1.27
16	WP to insert picture	2.89	1.78	2.51	1.83	2.06	1.85
25	Overall Competent in WP	2.52	2.67	2.52	1.63	1.11	2.19
	Mean	2.53	1.91	2.24	1.59	1.39	1.81

Figure 2: Comparison of Phase I, II and III on Word-Processing Skills



3. RESULTS AND DISCUSSION

ISA and Word-Processing Skills: the size of the change and their means of the ISA and the TA groups on overall word-processing competence corresponding to each phase of study is shown in Table 1 and graphically presented in Figure 2.

The word-processing skills were improved remarkably by the ISA group compared to the TA group.

ISA and Spreadsheet Skills: The size of change and the means on spreadsheets skills of both the groups for each phase of study is shown in Table 2 and presented graphically in Figure 3 below.

When comparing the size of change on issues related to spreadsheets skills, the ISA appeared more effective in bringing about more positive change compared to the TA. However, in summary, the results indicated that the ISA group contributed to more development not only in word-

processing, but also in spreadsheets. It appeared that the ISA was more effective in developing IT skills in spreadsheet applications.

ISA and Database Skills: Similarly the sizes of change in both the groups were computed and displayed in Table 3 and graphically presented in Figure 4.

The groups, which followed the ISA, however, gained more IT skills not only in spreadsheets and word-processing but also in databases.

4. FINDINGS

The results obtained of the present study appear to show that the ISA has more effects on the acquisition of IT skills in comparison to the TA. The findings of this study appears in line with Freeman & Rowley's view



Table 2: Spreadsheets Skills (ISA versus TA) Change: After - Before

Q	Statements related to Spreadsheets	ISA Group (Mean)			TA Group (Mean)		
		Phase I	Phase II	Phase III	Phase I	Phase II	Phase III
20	SS manipulate numerical data	3.08	2.61	2.93	1.88	2.47	2.35
21	SS using built in functions	3.12	2.73	2.89	1.96	2.42	1.96
22	SS graph using corresponding data	3.20	3.28	3.15	2.09	2.47	2.16
27	Overall Competent in Spreadsheets	2.98	2.45	2.56	1.92	2.53	1.96
	Mean	3.01	2.77	2.88	1.96	2.47	2.11

Figure 3: Comparison of Phase I, II and III on Spreadsheet Skills

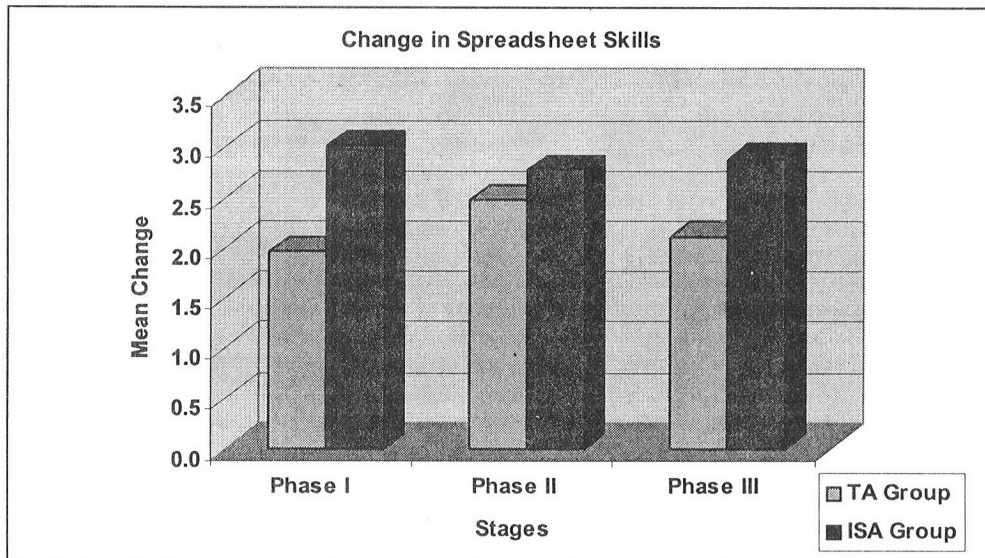


Figure 4: Comparison of Phase I, II and III on Databases Skills

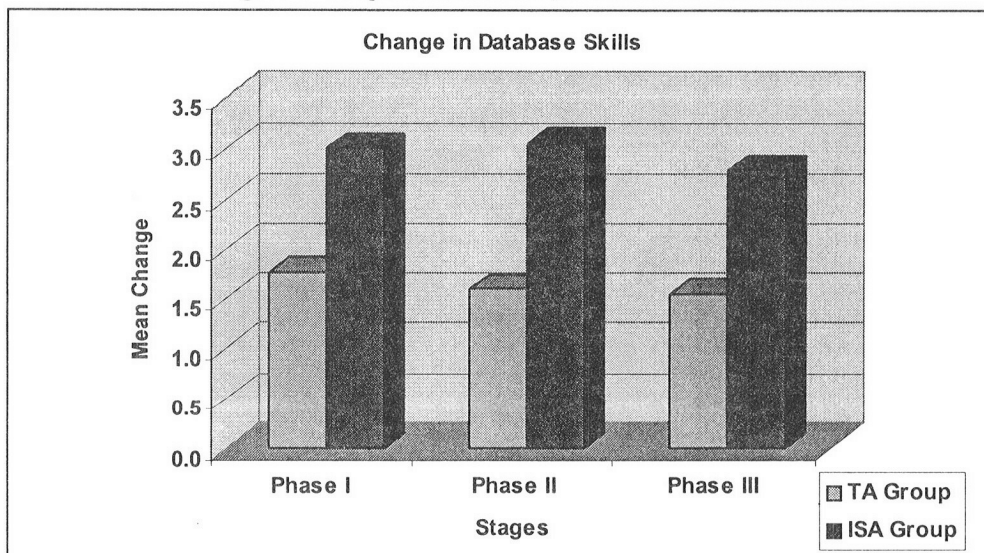


Table 3: Database Skills (ISA versus TA) Change: After - Before

Q	Statements related to databases	ISA Group (Mean)			TA Group (Mean)		
		Phase I	Phase II	Phase III	Phase I	Phase II	Phase III
17	DB create database file	2.88	3.30	2.89	2.00	1.70	1.57
18	DB sort records	3.04	3.17	2.74	1.75	1.59	1.43
19	DB manipulate records	3.04	2.89	2.96	1.67	1.53	1.70
26	Overall Competent in Databases	3.05	2.89	2.56	1.66	1.59	1.50
	Mean	3.01	3.06	2.79	1.77	1.60	1.55

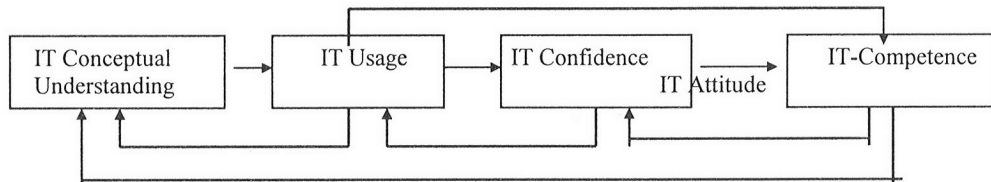
regarding TA in believing that this approach is more word-processing dominated and students do not get enough exposure to the wider applications of IT in support of business activities. Moreover, the emphasis on word-processing has been so strong that information technology has been regarded in some circles as synonymous with word-processing.

The findings related to the students following the ISA are in line with the views of Freeman & Rowley (1995), who believed that the ISA offers new users of IT a more realistic perspective on the contribution which IT can make to the effective operation of a business and also offers a platform from which it is possible to demonstrate the links between databases, spreadsheets and word-processing software, and to offer a fully integrated approach. The ISA lends itself to a more direct focus on the range of data stored, managed and retrieved in support of business activities than the more traditional approach.

In an optimistic frame of mind, it appears that the ISA had made the students more aware of IT applications used in business organizations and because the appropriate pedagogical steps followed in delivering the IT skills enabled them to see the relevance of IT to themselves personally and particularly in relation to their future role in business organizations. The ISA offers new users of IT a more realistic perspective on IT in support of business activities, by developing more and better conceptual understanding of IT; it enhances IT confidence and gives a more positive attitude to the development of IT skills, which in turns enhances IT competence.

This finding is also supported by the relationships diagram as shown in Figure 5 between IT conceptual understanding, IT usage, IT attitudes, IT confidence and IT competence (Naqvi 2000).

Figure 5: IT concepts, usage, confidence and competence relationship diagram



Greater conceptual understanding motivates the students to use IT more and more use brings about more IT confidence and competence. The findings of this study suggest that since the ISA puts more emphasis on information literacy and on IT applications in business, the business students in the ISA group could relate their class work to the IT applications used in business organizations. The students felt the immediate usefulness of the material learnt in class, which brought them closer to the IT to use it more with enthusiasm.

The findings of this study are in line with several others findings (Hunt et al. 1993, Kohang 1989 and Soule 1995), as these findings lead us to believe that more use of IT, especially in the direction of its intended use, bring about more positive attitudes and hence give more confidence to

the users. This enhanced confidence turns students to use IT more often and so paved the way for more IT skills.

The findings of this study also support that the groups with more positive attitudes towards IT is generally expected to be more confident in IT, in turn enhances IT skills (Buckland 1995, Leavenworth 1994, Zoraini 1995).

5. SUMMARY AND CONCLUSION

This paper examined the effects of the ISA on the acquisition of IT competence in the fields of word-processing, spreadsheets and databases in comparison to the TA. Theoretical evidence suggests that the TA enhances IT skills in word-processing, but not as much in spreadsheets and databases, when used in an introductory IT course for business students. However, ISA, which



presents the business software in line with business activities improves more IT skills not only in word-processing but also in spreadsheets and databases. To validate the presumptions, groups were randomly selected and the ISA and TA approaches were introduced in corresponding groups to see their effects on the acquisition of IT competence in IT modules presented in the course.

The ISA appears more effective in developing IT skills, it could be followed in any institute of higher learning in their introductory IT course, to acquire more information handling skills and not merely word-processing. In addition, the scope of the ISA needed to be extended to cover also the topics, such as the Internet, e-Mail, a World Wide Web (WWW) of computers and on line information searching techniques to meet the changing needs of IT in businesses.

Though there are many merits of ISA, still learning IT through the ISA would not make the students fully conversant with all of the IT applications used in businesses, but it may help to form a firm foundation on which to explore advanced techniques of IT.

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Appendix 1

College of Commerce and Economics
Pre/Post Course Questionnaire form
Introduction to Computers (INFS 1411)

Dear Student:

The purpose of this form is to get your feedback regarding this course. Your input will help us in understanding and improving the course delivery process and will not at all affect the assessment of your work. Please rate your competence with the following statements both at the start and at the end of the course. Circle 1 if you felt/feel unable, Circle 5 if you were/are expert, Circle a number in between (1 through 5) if you had/have some competence.

Thanks for your help	Competence Before Course					Competence After Course				
	Unable.....				Expert	Unable.....				Expert
14. To use a wordprocessor to produce a simple formatted page of text.	1	2	3	4	5	1	2	3	4	5
15. To use a wordprocessor to check spellings.	1	2	3	4	5	1	2	3	4	5
16. To use a wordprocessor to insert a picture in the text.	1	2	3	4	5	1	2	3	4	5
17. To use a database program to create a database file.	1	2	3	4	5	1	2	3	4	5
18. To use a database program to sort records.	1	2	3	4	5	1	2	3	4	5
19. To use a database program to manipulate selected records.	1	2	3	4	5	1	2	3	4	5
20. To use a spreadsheet program to manipulate numerical data.	1	2	3	4	5	1	2	3	4	5
21. To use a spreadsheet program to process data using built in functions.	1	2	3	4	5	1	2	3	4	5
22. To use a spreadsheet program to produce a graph representing corresponding data.	1	2	3	4	5	1	2	3	4	5
23. To integrate database, spreadsheet/graph with word-processing document.	1	2	3	4	5	1	2	3	4	5
24. To use an E-Mail program to send or receive messages.	1	2	3	4	5	1	2	3	4	5
25. Overall, I am competent in using word-processing software.	1	2	3	4	5	1	2	3	4	5
26. Overall, I am competent in using database software.	1	2	3	4	5	1	2	3	4	5
27. Overall, I am competent in using spreadsheet software.	1	2	3	4	5	1	2	3	4	5