Difficulties that may be encountered by students in searching the Dow Jones News/Retrieval Database and the UMI ProQuest Full-Image Databases

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Abstract: *This research studied the kinds of difficulties encountered by students when searching the Dow Jones News/Retrieval database and UMI ProQuest full-image/text CD-ROM databases. The reason for choosing these two databases is that they are the most heavily used at my college.*

Today, the most difficult kind of databases for students to use are probably the online databases. This was not a problem in the past because searching online databases used to be carried out by librarians who were experienced in online searching; students were generally not allowed to search on their own because searching without the proper skills could cost a fortune. However, in recent years, online database providers such as Dow Jones, LEXIS/NEXIS and Dialog have put out flat fee plans that are much cheaper than charging libraries on a per-use basis. The number of institutions subscribing to these databases is growing exponentially. Students can now search on their own. Nevertheless, this has become a mixed blessing for students. There is indeed much useful information in online databases but some of them are very difficult to use. My library allows students to search the Dow Jones News/Retrieval database themselves. My library colleagues and I knew that students had problems in making good use of this valuable resource. However, we did not exactly know what kinds of problems students have. Very little research, if any, has been done in this area.

Half my research examined problems encountered by students when using the Dow Jones database. Understanding the kinds of problems faced by students will help librarians plan effective user education programmes. Librarians will then be able to teach what students need to learn instead of what we think students should learn. The other half of my research was done similarly on two of the UMI ProQuest full-image/text CD-ROM databases: Business Periodicals Ondisc (BPO) and Social Sciences Index/Full-text (SSI). Although these two CD-ROM databases are easier to use when compared to the Dow Jones database, many of our students are not making the best use out of them. The results from the two areas of my research are compared to show their similarities and differences.

Keywords: *Dow Jones News/Retrieval, DJN/R, online databases, online searching, UMI ProQuest Full-Image Databases, BPO, Business Periodicals Ondisc, SSI, Social Science Index/Full-text, user education, bibliographic instruction, end-user searching*

1. Introduction

This research was carried out between 10 April 1995 and 16 June 1995. The subjects of this research were undergraduates at Lingnan College in Hong Kong. April to June was the best time of the academic year to carry out this research because this was the last part of the academic year. Students should have had some understanding of BPO, SSI and Dow Jones databases by that time. They would have formed their ways of searching these databases. The research would then be able to test their consistent behaviours in using these databases.

Dow Jones puts out many database services. This research focuses on the Text Library in Dow Jones NewsRetrieval (DJN/R). The Text Library contains approximately 2200 publications published worldwide. These publications are mainly newspapers, newswires and trade journals. Most of the information is available in full text. Our library started to use the database in November 1994.

UMI's BPO is one of the most popular databases (if not the most popular) offered by UMI. It indexes approximately 1200 business related journals, of which 500 are available in full-text/image format. SSI indexes about 400 social sciences journals and over 200 of them are available in full text. These two databases became available to our students in April 1994.

Other than our online public access catalogue (OPAC), which mainly provides bibliographic information on books and journals, the two UMI full-text databases are the most popular among our students. The two databases are accessible at a workstation which is used by our students more than 90% of the time during regular school term. They are so popular because students can find journal articles right from the workstation, instead of searching the non-full-text CD-ROM databases and then locating the articles elsewhere. Locating the articles elsewhere is always a frustrating exercise for students. Very often our library does not hold the journal, or the journal is out for binding. The Dow Jones database is the third most popular database in our library. It is popular because it also provides students with much full-text information.

2. Objectives

The main objectives of this research are: (1) to understand the kinds of difficulties encountered by our students in using the Dow Jones News/Retrieval database and the UMI ProQuest Full-Image/Text databases, and (2) to apply the insights gained from this research to designing training programmes that meet the needs of our students.

3. Literature review

I have carried out searches in LISA, Business Periodicals Ondisc, Dow Jones News/Retrieval, LEXIS/NEXIS and ERIC. I could not find any research similar to mine. A list of some of the articles I have examined is included in the bibliography. The following is a review of two of the most relevant articles.

Karen Svenningsen's article 'Incorporating and instructing Dow Jones News/Retrieval (DJN/R) in an academic setting' pointed out that DJN/R provides a wide range of up-to-date full-text business and financial databases. For example, rather than use static, boring textbook examples, instructors could bring up-to-date news and quotes to students in class to stimulate students' interest. Svenningsen also said that 'Computer-generated databases have modified the role of the librarian as an educator and as a manager of information' (Ref 1). I do agree that the educator role of librarians is increasingly important these days because we are being flooded with computer-generated databases. Some databases are so complex to use. Without being properly trained by librarians, students may find it hopeless to retrieve anything useful from some of these databases. However, the article did not mention the difficulties students encountered in searching DJN/R, nor did it mention how we should go about teaching students to use DJN/R.

The article 'Effective instruction for searching CD-ROM indexes' by Rebecca Bostian and Anne Robbins is worth mentioning too. It focused on the relationship between successful searching of CD-ROM databases and various types of instruction. The research divided student subjects into four groups. Group A did not receive any instructions; Group B received handouts for CD-ROM searching; Group C received handouts plus a lecture on computer searching; Group D had handouts, a lecture on computer searching and a live demonstration of several searches. The results of the research were that Group D did the best in a CD-ROM searching test. The authors then suggested incorporating a demonstration of a CD-ROM search in a library instruction session whenever possible (Ref 2). The findings of the research did not surprise me because I would imagine those who receive the most instruction (Group D in this case) should perform the best.

4. Methodology

4. 1. Study population

The subjects for this research were selected randomly from the undergraduates at the Lingnan College in Hong Kong. Sixty students participated in each of the two studies.

4. 2. Questionnaires

Two questionnaires were made: one for Dow Jones (Appendix 1) and another for UMI (Appendix 2).

4. 2. 1. Dow Jones News/Retrieval database. There were nine questions for the Dow Jones research. The first six questions were for the students. They were:

(1) Department and year of study?
(2) Have you attended a library class on Dow Jones Database (Y/N)?
(3) How many times have you used the database before?
(4) What are you searching for?
(5) What was/were your search statement(s)?
(6) How many results did you find?

The other three questions were for the Reference Librarian (myself). They were:

(7) What was/were the librarian's search statement(s)?
(8) How many results did the librarian obtain?
(9) Difficulties encountered by the student?

To answer question (9), I divided mistakes/errors into 10 categories: choice of database, concepts, choices of words, Boolean operators, parentheses, proximitors, field search, spacing, singular/plurals, and others.

4. 2. 2. UMI Full-Image/Text CD-ROM databases. There were eleven questions for the UMI research. The first seven questions were for the students. They were:

(1) Department and year of study?
(2) Have you attended a library class on searching CD-ROM Databases (Y/N)?
(3) How many times have you used the full-text databases before?
(4) What are you searching for?
(5) Which database did you use — BPO or SSI?
(6) What was/were your search statement(s)?
(7) How many results did you find?

The other four questions were for the Reference Librarian. They were:

(8) Which database was used by the librarian — PPO or SSI?

(9) What was/were the librarian's search statement(s)?

(10) How many results did the librarian obtain?

(11) Difficulties encountered by the student?

To answer question (11), I divided mistakes into ten categories: choice of database, concepts, choices of words, Boolean operators, parentheses, subject search, field search, spacing, truncations, and singular/plurals.

4. 3. Actual research

The Reference Librarian (myself) asked the selected student, who was doing a search, whether he or she was willing to participate in the research. The student filled out the first half of the survey and I filled in the rest. Based on the search statement(s) used by the student, I then checked the kinds of mistakes made by the student.

4. 4. Data coding

Coding guides were made for defining and coding the data. Seventeen variables were used for Dow Jones (Appendix 3) and nineteen variables were used for UMI (Appendix 4). The data collected from the research were entered into Excel 5.0 for Windows. Appendix 5 is the data sheet for Dow Jones and Appendix 6 is for UMI. The raw data in Appendix 5 and Appendix 6 were regrouped and two tables were created out of these new groupings (Appendices 7 and 8).

5. Findings and analysis

5. 1. Students' results versus the librarian's results

This is the most alarming part of the research. Forty-one out of the 60 students (68%) who searched Dow Jones did not find anything, or found thousands of irrelevant items. For UMI, the failure rate was 50% — 30 out of the 60 students did not find anything (Appendices 5 and 6).

Those who managed to find something useful did not do that well either. Only one out of the 60 students found the same number of results as the librarian when using Dow Jones, and only three out of the 60 students did as well as the librarian when using UMI. On average, the librarian found 94 more articles than the student when using Dow Jones, and the librarian retrieved 35 more articles than the student when using UMI. The librarian's search result was 66 times better than the student when searching Dow Jones, and the librarian was 26 times better than the students when searching UMI (Appendices 7 and 8).

5. 2. Ranking of mistakes made by students

For Dow Jones, the mistakes made by students were ranked from the most common to the least common as follows (Appendix 5):

(1) Choices of words (87% of the students made a mistake);

(2) Proximitors (83%);

(3) Concepts (70%);

(4) Singular/plural forms of words (67%);

(5) Parentheses (62%);

(6) Boolean operators (53%);

(7) Field search (27%);

(8) Spacing (22%);
(9) Choice of database (5%);
(10) Other mistakes (5%).

For UMI, the ranking was as follows (Appendix 6):
(1) Subject search (68%);
(2) Choices of words (67%);
(3) Concepts (67%);
(4) Truncations (63%);
(5) Boolean operators (38%);
(6) Field search (30%);
(7) Parentheses (10%);
(8) Choice of database (10%);
(9) Singular/plural forms of words (8%);
(10) Spacing (5%).

The general belief regarding students' major problems in database searching is that they are not familiar with database search commands. However, the above findings have indicated that this belief is wrong. Half the mistakes made by the students had nothing to do with search commands. In the case of Dow Jones, four of the top six problems were not database search commands: 'choices of words', 'concepts', 'singular/plural forms of words' and 'parentheses'. In the case of UMI, two of the top four mistakes were not searching commands —'choices of words' and 'concepts'. The use of parentheses is a mathematical concept that is being taught in secondary school. Many people might assume that students know how to use them. However, 62% of the students who searched Dow Jones had problems with them. The problem of using parentheses is not so serious when using UMI and it will be explained in Section 5.7: 'Parentheses'.

5. 3. Choice of database

When using Dow Jones, choosing 'ALL' in the text library will lead students to the largest news database. Three students mistakenly chose other smaller databases that provided them with fewer resources. For UMI, six out of the 60 students chose the wrong database. For example, a student was looking for `fixed exchange rates and floating exchange rates' and used SSI, which gave two articles. The student should have used BPO and would have obtained 76 articles.

5. 4. Concepts

When using Dow Jones, 42 out of the 60 students (70%) made a mistake in deciding how many concepts were there in their search, and 40 out of the 60 students (67%) made a mistake in concepts when using UMI. For example, a student was looking for information on `organ donation' in UMI-SSI and typed '**organ donation**' as the search statement, and found five articles. The student treated 'organ donation' as one concept and searched `organ donation' as a phrase. The librarian separated 'organ donation' into two concepts and searched with two truncated keywords, '**organ? and donat?**'. This search yielded 37 articles. (See Section 5.11: `Truncations' for the use of truncations.)

5. 5. Choices of words

Choices of words are the biggest problem for students when using Dow Jones. Fifty-two out of the 60 students (87%) made a mistake here. It is the second most serious mistake for students when using UMI, with 40 out of the 60 students (67%) failing the test. Many students did not find anything, or did not find enough articles because they were not able to use the appropriate terms and synonyms. For example, when searching for 'pirat-

ed CDs in Hong Kong' with Dow Jones, many students would not use terms other than those suggested in the topic — 'pirated', 'CDs' and 'Hong Kong'. They found very few articles as a result. The librarian used the following terms for the three concepts and obtained many more results:

Pirated: Pirate(s), pirated, pirating, piracy, counterfeit, counterfeiting, forged, forging, fake(s), faking

CDs: CD(s), compact disc(s), compact disk(s)

Hong Kong: Hong Kong, Hongkong, HK

5. 6. Boolean operators

When searching Dow Jones, 32 out of the 60 students (53%) made a mistake with the Boolean operators: AND, OR and NOT. When searching UMI, 23 out of the 60 students (38%) made a mistake with the Boolean operators. For example, a student was looking for articles on `democracy in Taiwan and in South Korea'. She typed **`democratization AND taiwan AND south korea'** in UMI-SSI and found one article. The student was confused with the AND and OR Boolean operators: she should have typed **`SU(democracy?) AND (taiwan OR south korea)'**, and would have obtained four articles. (See Section 5.9: `Subject search' for `SU'.)

5. 7. Parentheses

Parentheses are used for giving order in searching; things inside the parentheses are searched first. When using Dow Jones, 37 out of the 60 students (62%) made a mistake on parentheses. When using UMI, six out of the 60 students (10%) made the same mistake. Why was there a big difference in students' results between Dow Jones and UMI? The main reason is that UMI is `smarter' than Dow Jones in the use of parentheses. For example, to search for information on `artificial intelligence and portfolio management', a student only need type **`artificial intelligence AND portfolio management'** when using UMI. The computer program in UMI will recognise `artificial intelligence' and `portfolio management' as two phrases and put two parentheses around them. Hence, the search statement becomes **`(artificial intelligence) AND (portfolio management)'**. This artificial intelligence in UMI has helped many students who do not understand how to use parentheses.

However, if the student types in the same search statement **`artificial intelligence AND portfolio management'** when using Dow Jones, he or she will find many useless articles because the computer program in Dow Jones will interpret the search statement as **`(artificial intelligence) AND portfolio AND management'**. When using Dow Jones to search on this topic, the student should type **`(artificial intelligence) AND (portfolio management)'**, or more precisely, **`(artificial ADJ intelligence) NEAR5 (portfolio ADJ management)'**. (See Section 5.10: `Proximitors for `ADJ' and `NEAR5''.)

5. 8. Field/section search

Searching in a field/section always yields more precise results. When using Dow Jones, 16 out of the 60 students (27%) made a mistake in field searching. When using UMI, 18 out of the 60 students (30%) made the same mistake.

With Dow Jones, the most common field searching is to search in the lead paragraph — the first paragraph. Field searching is a good way to cut down on the number of articles you retrieve. For example, for the topic `Disneyland in Europe', the search statement **`(euro OR europe OR european) NEAR3 (disney OR disneyland)'** yields 6159 results, but doing a field search in the lead paragraph **`(euro OR europe OR european).LP. NEAR3 (disney OR disneyland).LP.'** yields 2457 results. Searching in the lead paragraph (.LP.) is always recommended because things being mentioned in the lead paragraph usually indicate what the article is about.

In UMI, the most useful field search is the subject search, but I have put it in a separate category because of its uniqueness. Some other commonly used fields for field searching in UMI are geographic, company, title and so forth. For example, for information on `the stock market in Hong Kong', if we type `**(hong kong) AND (SU(stock?) OR SU(securities?))**' we will retrieve 243 articles. If we search with the geographic field `GEO', `**GEO(hong kong) AND (SU(stock?) OR SU(securities?))**', we will find 117 articles. Without using GEO, the computer retrieves records that mention the phrase `hong kong' anywhere in the records. With the geographic limitation, the phrase `hong kong' has to appear in the geographic field of the records. With this limitation, we are able to retrieve articles that talk about the stock market in Hong Kong but exclude those that just happen to mention Hong Kong.

5. 9. Subject search

Subject searching is the biggest problem for students when searching UMI. Forty-one out of the 60 students (68%) did not know how to use it. Articles in UMI are assigned with subject terms that show what the articles are about. Searching with subject terms always yields precise results, which usually means retrieving fewer articles when compared to searching with keywords. In UMI there were four students who retrieved more articles than the librarian because the students were unable to eliminate the irrelevant items by a subject search. For example, a student wanted information on `age discrimination' and performed a keyword search. The student typed `**age discrimination**' in UMI-BPO and found 97 articles. The librarian did a subject search instead — `**SU(age discrimination)**' — which found 70 items. Making good use of the subject search has eliminated 27 unrelated articles. The records of these four students, who found more results than the librarian, were not included in calculating how many times the librarian was better than the student in searching UMI (Appendix 8).

Occasionally, a subject search will help students find more related articles. For example, a student was searching for `the international role of Taiwan', typed `**taiwan AND international role**' in UMI-BPO and found one article. The librarian browsed the subject list in UMI-BPO and found the term `international relations'. Since `international role' and `international relations' are closely related to each other, the librarian then searched with `**GEO(taiwan) AND SU(international relations)**' and retrieved 18 articles.

Subject searching is generally not available with Dow Jones and so it is not discussed in this research.

5. 10. Proximitors

Proximitors are the second most serious problem for students when searching Dow Jones. Fifty out of the 60 students (83%) did not know how to use them. The two main proximitors with Dow Jones are NEAR and ADJ.

Among the 41 students who did not find anything when searching Dow Jones, 19 of them actually found something but they were irrelevant results. When searching UMI, only five out of the 30 `failed' students found irrelevant results (Appendices 5 and 6). The number of students who found irrelevant results when searching Dow Jones was about four times as high as that in UMI. The main reason is that Dow Jones searches on whole articles, while UMI searches on citation records. In order to obtain precise results with Dow Jones, students always need to use the proximitor NEAR. Many students did not know how to use NEAR but used the Boolean operator AND instead. That is why so many students found irrelevant results. For example, a student wanted articles on `Singapore Airlines' Training', typed `**training and singapore airlines**' as the search statement when searching Dow Jones and retrieved 1158 articles. This search found all the articles that mentioned `training' and `singapore airlines' as long as the two search terms appear somewhere in the articles. Many of the retrieved articles were irrelevant because the two terms were far apart from each other. For example, the word `training' may appear in the headline and `singapore airlines' appears somewhere in the content of

the article, but the article is not talking about the training programme of Singapore Airlines: it just happens that both terms appear in the article. For this search, the librarian typed '**((singapore ADJ airline) OR (singapore ADJ airlines)) NEAR5 training$**'. The search statement retrieved 36 articles. Most of them were relevant. The proximitor NEAR5 restricts the computer to search only those articles where the two terms are not more than five words apart from each other.

The ADJ (adjacent) in '**(singapore ADJ airlines)**' restricts the two search terms so that they must be next to each other, and in the order you type them. That is why it is always important to use ADJ when searching for phrases with Dow Jones.

In UMI, the proximitors are W/n and PRE/n. Because UMI searches on citation records which are mostly short, not knowing how to use the two proximitors does not usually cause problems. In addition, searching by subject is more precise than searching by proximitors in UMI. Our students were not taught how to use proximitors in UMI, so students were not assessed in this area for the research.

5. 11. Truncations

When using UMI, 38 out of the 60 students (63%) made a mistake with truncations. Not knowing how to use the truncation method in UMI is a serious problem. For example, in Section 5.4: 'Concepts' the librarian searched with two truncated keywords, '**organ? and donat?**', for 'organ donation'. '**organ?**' will retrieve both 'organ' and 'organs', while '**donat?**' will find 'donate', 'donates', 'donating' and so on.

The truncation method in UMI can be used in subject searching as well. For example, a student was looking for 'shipping industry in Asia', typed '**SU(shipping industry) AND GEO(asia)**' in UMI-BPO and obtained two articles. The librarian typed '**SU(shipping?) AND GEO(asia)**' and found 12 articles. The subject list in UMI-BPO contains a number of terms started with the word 'shipping'. Using the truncation method '**shipping?**' included all those terms in the search and thus achieved better results.

The truncation symbol in Dow Jones is '$', which should only be used with caution. When too many '$' are used or when the truncation method includes too many words, it will take the computer a long time to search. Sometimes the computer will even freeze. Because of that, students are discouraged from using the truncation method when using Dow Jones unless they are familiar with it. Therefore, the use of truncations when using Dow Jones is not tested in this research.

5. 12. Singular/plural

When using Dow Jones, 40 out of the 60 students (67%) did not make good use of the singular/plural forms of the words. For example, a student wanted information on 'contract law in Hong Kong'. The student only used the singular form of 'contract' and 'law', but the librarian used both the singular and the plural forms of the two words and retrieved many more articles.

When using UMI, only five out of the 60 students (8%) had problems with the use of the singular and plural forms of words. The problem of using the singular/plural forms of words was so serious when searching Dow Jones and not so serious when searching UMI because, when using UMI, students usually could avoid the problems of using the singular/plural forms of words by doing a subject or truncation search. For example, when using UMI, a subject search '**SU(contract law)**' will find all articles that talk about contract law without the need to know whether the terms should be in singular or in plural forms. Alternatively, a search by the truncation symbol '?' — '**contract? AND law?**' — will also avoid the need of taking care of the singular and the plural forms of the two words, because '**contract?**' will retrieve any words starting with 'contract' — contract, contracts, contracting and so on. However, there is no subject search in Dow Jones. Besides, using the truncation method in Dow Jones is not always a good idea, as was mentioned in Section 5.11: 'Truncations'. That is why, when searching Dow Jones, it is always important to type in both the singular and the plural forms of the search terms.

5. 13. Spacing

When searching Dow Jones, 13 out of the 60 students (22%) made mistakes on spacing. The figure when searching UMI was three out of the 60 students (5%). Students' mistakes in spacing in Dow Jones were four times as many as those in UMI, because the commands in Dow Jones are more complex than those in UMI. Therefore, it is easier to make a mistake in spacing in Dow Jones. For example, a student typed '**NEAR 4**' in Dow Jones, but it should be '**NEAR4**'. Another student typed '**.L.P**', which should be '**.LP.**'. A mistake in spacing will sometimes gives students zero results or hundreds of irrelevant results.

5. 14. Other mistakes

A few other mistakes were made when using Dow Jones. Two students used '[ ]' instead of '( )'. Another student made a typing error.

5. 15. Trained students versus non-trained students

Our training sessions were 45 minutes long for Dow Jones as well as for UMI. Twenty-eight out of the 60 students attended our class for Dow Jones; the other 32 students did not. Eight out of the 28 students (29%) who have attended our class found something in their searches. Eleven out of the 32 students (34%) who did not attend our class found something in their searches (Appendix 7).

For UMI, 33 out of the 60 students attended our class; the other 27 students did not. Seventeen out of the 33 students (52%) who have attended our class found something in their searches. Thirteen out of the 27 students (48%) who did not attend our class found something in their searches (Appendix 8).

Combining the two groups of students, 61 out of the 120 students attended our class; 59 did not. Twenty-five out of the 61 students (41%) who have attended our class found something; 24 out of the 59 students (40.7%) who did not attend our class found something. Overall, students who have taken our class were not any better in database searching than students who did not take our class. In the 1994/95 academic year, our library has provided about 250 training class hours for our students. Does that mean my library colleagues and I are wasting our time? It is not so. A 45-minute class is not solid enough to enable students to use the databases effectively. In many library schools, it takes a whole term to teach online searching. It is not surprising to see that students had difficulties with Dow Jones or UMI after a 45-minute class. The 45-minute classes served as the library's promotional efforts on the two databases rather than to teach students anything concrete. In this regard, our library classes have been very successful. The two databases have been very well used by our students after those training classes.

5. 16. Limitation of this research

In checking the difficulties encountered by students in using the two databases, the librarian based his analysis on the students' search statements. There are limitations in this approach because certain searches might not require students to use some of the searching commands in the two databases. There is no way for the librarian to tell if these students know how to use the commands that were not being used. For example, a student was looking for 'the economic conditions in Guangdong Province', did a subject search with '**SU(guangdong province [china]/economic conditions)**' in UMI-SSI and found 12 articles. That is exactly the same way that the librarian would have done it. The student did not get a chance to use other commands such as Boolean operators or truncations. The librarian has no way of knowing if the student knows how to use those commands.

6. Conclusions and recommendations

6. 1. Teaching Dow Jones database — text library

Ideally, when teaching the Dow Jones database we should spend a lot of time training students in all the areas in which they may make a mistake. Realistically, many user education classes only have a very limited time. If that is the case, librarians should focus on areas where students tend to make the most mistakes. In Section 5.2: `Ranking of mistakes made by students' we have identified the top six problems students commonly made. They are: (1) choices of words (87% of the students had problems); (2) proximitors (83%); (3) concepts (70%); (4) singular/plural forms of words (67%); (5) parentheses (62%); and (6) Boolean operators (53%). These six problems can be separated into three kinds/steps of training. The first step is to teach `concepts', `choices of words' and `singular/plural forms of words' that have nothing to do with database searching commands. The second step is to teach the mathematical concept of `parentheses'. The third step is to teach the use of two types of database searching commands for Dow Jones — proximitors and Boolean operators. If time allows, students should also be reminded about `field searching' and the problem of `spacing', since over 20% of them made mistakes in these areas.

6. 2. Teaching UMI full-image/text CD-ROM databases

When teaching UMI, the emphasis should be on the top four mistakes students usually make. They are: (1) subject search (68%); (2) choices of words (67%); (3) concepts (67%); and (4) truncations (63%). These four problems can be solved in two steps. The first step is to teach `concept' and `choices of words', as in Dow Jones. The second step is to teach the use of two UMI searching commands: subject search and truncations. If time allows, librarians should also teach the use of Boolean operators and field searching as over 30% of the students had difficulties in using them.

6. 3. Database design

In Section 5.1: `Students' results versus the librarian's results' we have seen that 68% of the students who searched Dow Jones did not find anything and 50% of the students who searched UMI did not obtain any results. In Section 5.2: `Ranking of mistakes made by students', we noticed that students made a lot less mistakes in UMI than in Dow Jones. This suggests that the database design in UMI is more user friendly than the design of Dow Jones. In Section 5.10: `Proximitors', it has been pointed out that UMI is citation record searching, while Dow Jones is whole article searching. Whole article searching is more complex than citation record searching. From this research, we found that UMI's approach in providing full-image/text is better than the Dow Jones' approach in providing ASCII full-text. Database providers have to take this into account when designing databases.

6. 4. Longer training sessions

In Section 5.15: `Trained students versus non-trained students', we have discussed that a 45-minute training session for Dow Jones or UMI is not long enough for students to absorb the skills of database searching. In Section 3: `Literature review', the article `Effective instruction for searching CD-ROM Indexes' by Bostian and Robbins has demonstrated that those who receive more library instruction on database searching do better on database searching than those who receive less training. Clearly, longer training sessions are needed for Dow Jones and UMI. What cannot be answered in this research is how much longer the training should be.

6. 5. Further studies

Replication of this research in other institutions will be a worthwhile project, because the kinds and levels of difficulties students encountered in searching these databases will be slightly different from what I found at my college. For example, if the research were to be carried out in a country where English is the main medium for education, I would expect to see students make fewer mistakes with the choices of words. In order to rectify the problems mentioned in Section 5.16: `Limitation of this research', a replicated research should build in more controls. It should define the topics to be searched and should list the commands that students have to use. In this case, students will be tested on every kind of mistake they might make.

In Section 6.4: 'Longer training sessions', we have seen that longer training sessions are needed for training students on Dow Jones and UMI. However, the question is how much and what kinds of training are needed to equip students to become effective searchers. Research to answer this question will be very useful.

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Appendix 1

LINGNAN COLLEGE LIBRARY

No. ____

A Study on Students' Use of Dow Jones News/Retrieval Database

<< This study is designed to understand the difficulties encountered by our students when using Dow Jones Database. Please take a few minutes to fill out the questionnaire. >>

1. Department: _____ Year: _____

2. Have you attended a library class on Dow Jones Database (Y/N)? ____

3. How many times have you used the database before?

   0-2 times ____ 3-6 times ____ 7-10 times ____ >10 times ____

4. What are you searching for?

   _____

   _____

5. What was/were your search statement(s)?

6. How many results did you find? _____

***** This part is to be filled out by the librarian *****

7. What was/were the librarian's search statement(s)?

8. How many results did the librarian obtain? _____

9. Difficulties encountered by the student:

___	choice of database	___	concepts	___	singular/plural
___	choices of words	___	boolean operators	___	others
___	parentheses	___	proximitors		
___	field search	___	spacing		

Appendix 2

LINGNAN COLLEGE LIBRARY

No. ____

A Study on Students' Use of UMI ProQuest Full-Image/text Databases (BPO & SSI)

< < This study is designed to understand the difficulties encountered by our students when using full-text databases. Please take a few minutes to fill out the questionnaire. > >

1. Department: _____ Year: _____

2. Have you attended a library class on searching CD-ROM Databases (Y/N)? ____

3. How many times have you used the full-text databases before?

   0-2 times ____ 3-6 times ____ 7-10 times ____ > 10 times ____

4. What are you searching for?

   _____

5. Which database did you use? BPO ____ SSI ____

6. What was/were your search statement(s)?

7 How many results did you find? _____

***** This part is to be filled out by the librarian *****

8. Which database was used by the librarian? BPO ____ SSI ____

9. What was/were the librarian's search statement(s)?

10. How many results did the librarian obtain? _____

11. Difficulties encountered by the student:

___ choice of database	___ concepts	___ truncations
___ choices of words	___ boolean operators	___ singular/plural
___ parentheses	___ subject search	
___ field search	___ spacing	

Filename: Fulltext.stu Updated on 11 April 1995

Coding Guide - Dow Jones Database

Appendix 3

Variables and their Definitions:

1. Ctrl #	Control number - unique case identification number.
2. Dept	The Department the student belongs to.
3. Year	Year of study of the student.
4. At'd Clas	Whether the student has attended a library class for using the database.
5. Time Used	The number of times the student used the database before.
6. St Re	The number of results/articles found by the student.
7. Ln Re	The number of results/articles found by the librarian.
8. Da	Did the student choose a wrong database.
9. Co	Did the student make a mistake in deciding how many concepts s/he should use in searching.
10. Wd	Did the student make a mistake in the choices of words.
11. Bo	Did the student make a mistake in using the boolean operators (AND, OR, NOT).
12. Pa	Did the student make a mistake in using the parentheses.
13. Pr	Did the student make a mistake in using the proximitors (NEAR and ADJ).
14. Fd	Did the student make a mistake in field searching.
15. Sp	Did the student make a mistake in spacing.
16. Pl	Did the student make a mistake in using the singular/plural forms of a word.
17. Ot	Did the student make other kinds of mistakes such as spelling or wrong brackets.

Data Coding:

Variables	Attributes	Value Codes
1. Ctrl #	Actual number	actual number
2. Dept	Accounting	ACT
	Bachelor of Business	BBA
	Information Systems	IS
	Management	MGT
	Marketing	MKT
	Social Sciences	SOC
	Translation	TRA
3. Year	Year 1 Student	1
	Year 2 Student	2
	Year 3 Student	3
4. At'd Clas	Attended a class for the database	Y
	Did not attend a class	N
5. Time Used	Used the database 0-2 times	1
	Used the database 3-6 times	2
	Used the database 7-10 times	3
	Used the database > 10 times	4
6. St Re	Number of articles found	actual number
	Found hundreds of irrelevant articles	*
7. Ln Re	Number of articles found	actual number
8. Da	Mistake in the choice of database	1
9. Co	Mistake in concepts	1
10. Wd	Mistake in the choices of words	1
11. Bo	Mistake in boolean operators	1
12. Pa	Mistake in parentheses	1
13. Pr	Mistake in proximitors	1
14. Fd	Mistake in field searching	1
15. Sp	Mistake in spacing	1
16. Pl	Mistake in using the singular/plural forms of words	1
17. Ot	Other kinds of mistakes	1

Coding Guide - UMI Full-text Databases

Appendix 4

Variables and their Definitions:

1. Ctrl #	Control number - unique case identification number.
2. Dept	The Department the student belongs to.
3. Yr	Year of study of the student.
4. At'd Clas	Whether the student has attended a library class for using the database.
5. Time Used	The number of times the student used the database before.
6. Db-S Used	The database used by the student.
7. St Re	The number of results/articles found by the student.
8. Db-L Used	The database used by the librarian.
9. Ln Re	The number of results/articles found by the librarian.
10. Da	Did the student choose a wrong database.
11. Co	Did the student make a mistake in deciding how many concepts s/he should use for searching.
12. Wd	Did the student make a mistake in the choices of words.
13. Bo	Did the student make a mistake in using the boolean operators (AND, OR, AND NOT).
14. Pa	Did the student make a mistake in using the parentheses.
15. Su	Did the student make a mistake in subject searching.
16. Fd	Did the student make a mistake in field searching.
17. Sp	Did the student make a mistake in spacing.
18. Tr	Did the student make a mistake in using the truncation method.
19. Pl	Did the student make a mistake in using the singular/plural forms of a word.

Data Coding:

Variables	Attributes	Value Codes
1. Ctrl #	Actual number	actual number
2. Dept	Bachelor of Business	BBA
	Information Systems	IS
	Management	MGT
	Marketing	MKT
	Social Sciences	SOC
3. Yr	Year 1 Student	1
	Year 2 Student	2
	Year 3 Student	3
4. At'd Clas	Attended a class for the database	Y
	Did not attend a class	N
5. Time Used	Used the database 0-2 times	1
	Used the database 3-6 times	2
	Used the database 7-10 times	3
	Used the database > 10 times	4
6. Db-S Used	Used BPO	B
	Used SSI	S
7. St Re	Number of articles found	actual number
	Found hundreds of irrelevant articles	*
8. Db-L Used	Used BPO	B
	Used SSI	S
9. Ln Re	Number of articles found	actual number
10. Da	Mistake in the choice of database	1
11. Co	Mistake in concepts	1
12. Wd	Mistake in the choices of words	1
13. Bo	Mistake in boolean operators	1
14. Pa	Mistake in parentheses	1
15. Su	Mistake in subject search	1
16. Fd	Mistake in field search	1
17. Sp	Mistake in spacing	1
18. Tr	Mistake in using the truncation method	1
19. Pl	Mistake in using the singular/plural forms of words	1

Dow Jones Database

Ctrl #	Dept	Year	At'd Clas	Time Used	St Re	Ln Re	Difficulties Encountered by the student: Da	Co	Wd	Bo	Pa	Pr	Fd	Sp	Pl	Ot
1	MGT	3	Y	2	3	359		1	1						1	
2	MKT	3	Y	3	*	33		1	1		1					1
3	MKT	3	N	4	5	10		1	1	1	1	1			1	
4	SOC	1	Y	1	0	59						1	1	1		
5	SOC	1	Y	1	0	138		1	1	1		1		1		
6	BBA	1	Y	2	*	30			1		1	1		1		
7	SOC	1	Y	1	0	20	1	1	1	1	1	1	1		1	
8	SOC	1	Y	1	0	20		1	1			1	1	1		
9	BBA	1	Y	4	36	36			1							
10	MKT	2	Y	1	*	244			1			1	1			
11	SOC	1	N	1	0	31		1	1	1	1	1	1		1	
12	MGT	2	N	1	*	36			1	1	1	1			1	
13	SOC	1	Y	2	*	159		1	1	1		1		1	1	
14	SOC	3	N	1	4	74		1	1	1	1	1			1	
15	BBA	1	Y	2	10	235		1	1	1		1			1	
16	SOC	1	Y	1	*	210		1	1	1		1				
17	MKT	3	Y	1	0	74		1	1						1	
18	MKT	3	N	1	*	35					1	1		1	1	
19	MKT	2	N	1	3	144		1	1				1			
20	MGT	3	Y	1	7	42		1	1	1	1	1			1	
21	BBA	1	N	1	0	19		1	1	1	1	1			1	
22	SOC	3	N	1	*	23		1		1		1			1	
23	MKT	2	Y	1	*	45		1	1	1	1	1			1	
24	SOC	3	Y	4	*	36		1	1	1		1				
25	BBA	1	N	1	0	20		1	1	1			1	1	1	
26	BBA	1	N	2	*	20		1	1	1	1	1		1	1	
27	BBA	1	N	1	*	30		1	1	1	1	1		1	1	
28	IS	2	N	4	3	38			1	1		1			1	
29	MGT	2	N	1	0	237		1	1	1	1	1		1	1	
30	MKT	2	Y	1	3	320		1	1			1			1	
31	MKT	2	N	1	1	5		1	1	1		1				
32	SOC	3	N	1	8	98		1	1		1	1	1	1	1	
33	SOC	3	Y	1	14	328			1	1	1		1	1		
34	SOC	3	Y	2	0	43			1		1	1				
35	BBA	1	Y	4	2	19		1	1		1	1			1	
36	MGT	3	N	1	43	98			1		1	1			1	
37	MKT	2	N	1	4	25		1	1		1	1			1	
38	MGT	3	N	1	*	34					1					
39	SOC	1	Y	2	0	10		1	1				1	1		
40	MKT	2	Y	2	*	330						1			1	1
41	SOC	3	N	2	0	19		1	1		1	1			1	
42	MKT	2	Y	4	*	164			1	1	1	1	1		1	
43	SOC	3	N	1	14	108		1	1	1	1	1			1	
44	SOC	3	N	1	1	5					1	1				1
45	SOC	3	N	1	0	4	1	1	1			1			1	
46	SOC	1	Y	2	0	2		1	1		1				1	
47	SOC	3	N	1	*	20		1			1	1				
48	SOC	3	N	1	0	386		1	1		1	1				
49	MKT	3	N	1	*	185			1			1	1			
50	SOC	3	Y	1	17	136		1	1			1			1	
51	SOC	2	N	2	5	182		1	1	1	1	1	1		1	
52	SOC	2	N	1	0	112		1	1	1	1	1	1		1	
53	BBA	1	Y	1	*	61		1	1	1	1	1	1		1	
54	ACT	3	Y	1	0	109		1	1	1	1	1	1		1	
55	MGT	2	N	1	*	14	1		1		1	1				
56	BBA	1	N	1	0	13				1	1	1			1	
57	ACT	3	Y	2	0	159		1	1	1	1	1			1	
58	MKT	3	N	1	0	171		1	1	1	1	1			1	
59	SOC	3	N	2	0	159			1	1	1	1			1	
60	TRA	3	N	1	0	20		1	1	1		1			1	
							3	42	52	32	37	50	16	13	40	3
						Total	60	60	60	60	60	60	60	60	60	60
						%	5%	70%	87%	53%	62%	83%	27%	22%	67%	5%

22 zeros
19 *

41

Full-text Databases (BPO & SSI)

Ctrl #	Dept	YR	At'd Clas	Time Used	Db-S Used	St Re	Db-L Used	Ln Re	Difficulties Encountered by the student: Da	Co	Wd	Bo	Pa	Su	Fd	Sp	Tr	Pl
1	MGT	3	Y	4	B	27	B	117						1				1
2	SOC	1	Y	1	S	1	S	113		1	1			1		1	1	
3	SOC	1	Y	1	S	5	S	36			1	1					1	
4	SOC	1	N	1	S	1	B	7	1									
5	SOC	1	N	1	S	0	S	15		1	1	1	1	1				
6	MKT	3	N	4	B	14	B	65						1				1
7	SOC	1	N	1	B	3	B	16		1	1	1					1	
8	SOC	1	Y	1	S	1	S	8		1	1						1	
9	MGT	2	N	1	B	0	B	5		1	1			1				
10	SOC	1	Y	1	S	0	S	35		1	1			1			1	1
11	SOC	1	Y	1	S	2	S	26		1	1	1		1		1	1	
12	SOC	1	N	1	B	0	B	29			1			1	1		1	
13	MKT	3	Y	1	B	1	B	75		1	1	1		1	1			
14	SOC	1	Y	1	B	0	B	146		1	1	1					1	
15	MKT	2	Y	3	S	2	B	76	1	1	1	1		1				
16	MGT	3	N	3	B	67	B	117						1				1
17	SOC	3	N	4	B	8	B	6						1	1			1
18	MKT	2	N	3	B	0	B	2		1	1	1			1			
19	MKT	3	N	4	B	21	B	21									1	
20	SOC	1	Y	1	B	0	S	13	1	1	1						1	
21	SOC	3	N	1	S	2	S	10		1		1					1	
22	SOC	1	Y	1	S	0	S	67		1	1		1	1			1	
23	MGT	3	Y	2	B	*	B	74		1	1	1		1				
24	BBA	1	Y	1	B	*	B	30		1	1	1		1			1	
25	MKT	2	Y	2	B	2	B	12			1						1	
26	SOC	3	N	3	S	6	S	43		1	1						1	
27	SOC	3	Y	2	B	2	B	2		1		1	1	1	1			
28	MKT	2	Y	1	S	2	B	127	1	1	1			1				
29	BBA	1	N	2	B	97	B	70						1				
30	MKT	2	Y	4	B	0	B	12		1	1	1		1	1		1	
31	MKT	2	Y	4	B	0	B	172						1			1	
32	BBA	1	N	1	S	0	B	181	1	1	1			1	1		1	
33	SOC	3	Y	4	S	2	B	10	1		1			1			1	
34	SOC	3	Y	2	B	0	B	12		1				1				
35	SOC	3	Y	4	B	0	B	12		1	1	1			1		1	
36	SOC	3	Y	4	B	1	B	18						1	1			
37	IS	2	N	1	B	0	B	22		1				1				
38	SOC	3	N	2	B	0	B	11		1	1	1		1	1		1	
39	MKT	2	N	4	B	8	B	20			1			1			1	
40	SOC	3	N	2	B	*	B	12		1	1				1		1	
41	SOC	1	Y	1	S	0	S	5		1	1	1		1			1	
42	SOC	3	Y	3	B	6	B	104		1	1	1		1	1		1	
43	SOC	1	Y	2	S	0	B	1						1			1	
44	SOC	3	N	3	B	213	B	177						1	1			
45	SOC	3	N	4	S	68	S	67						1			1	
46	SOC	2	Y	2	S	1	B	6		1		1		1			1	
47	SOC	3	N	4	B	0	B	3			1					1		
48	SOC	3	N	2	B	0	B	11		1	1						1	
49	SOC	3	N	4	S	1	S	4		1	1	1	1	1			1	
50	SOC	3	N	4	B	*	B	9		1	1			1	1		1	
51	SOC	3	Y	2	B	12	B	12										
52	SOC	3	Y	4	S	3	S	7		1	1						1	
53	SOC	2	Y	2	B	5	B	120		1				1	1		1	
54	SOC	3	N	4	S	*	S	59		1	1	1	1	1	1		1	
55	SOC	2	Y	2	S	0	S	7		1	1	1					1	
56	MKT	2	Y	3	B	0	B	16			1			1			1	
57	SOC	3	N	1	B	0	B	4		1	1	1			1		1	
58	SOC	2	Y	1	S	0	S	13		1	1	1	1	1			1	
59	MKT	2	Y	2	B	0	B	2		1				1	1			
60	SOC	3	N	4	S	0	S	62		1	1			1				
									6	40	40	23	6	41	18	3	38	5
								Total %	60 10%	60 67%	60 67%	60 38%	60 10%	60 68%	60 30%	60 5%	60 63%	60 8%

25 zeros
5 *

30

Dow Jones - Table 2 Appendix 7

Ctrl #	BUS	SOC	Yr1	Yr2	Yr3	At'd Clas	N At CIas	Use1	Use2	Use3	Use4	Ln-Stu	Ln/Stu
1	1				1	1			1			356	119.67
2	0				0	0				0		33	33.00
3	1				1		1				1	5	2.00
4		0	0			0		0				59	59.00
5		0	0			0		0				138	138.00
6	0		0			0			0			30	30.00
7		0	0			0		0				20	20.00
8		0	0			0		0				20	20.00
9	1		1			1					1	0	1.00
10	0			0		0		0				244	244.00
11		0	0				0					31	31.00
12	0			0			0	0				36	36.00
13		0	0			0		0				159	159.00
14		1			1		1		0			70	18.50
15	1		1			1		1				225	23.50
16		0	0			0			1			210	210.00
17	0				0	0		0				74	74.00
18	0				0		0	0				35	35.00
19	1			1			1	0				141	48.00
20	1				1	1		1				35	6.00
21	0		0				0	1				19	19.00
22		0			0		0	0				23	23.00
23	0			0		0		0				45	45.00
24		0			0	0					0	36	36.00
25	0		0				0	0				20	20.00
26	0		0				0		0			20	20.00
27	0		0				0	0				30	30.00
28	1			1			1				1	35	12.67
29	0			0			0	0				237	237.00
30	1			1		1		1				317	106.67
31	1			1			1	1				4	5.00
32		1			1		1	1				90	12.25
33		1			1	1		1				314	23.43
34		0			0	0			0			43	43.00
35	1		1			1					1	17	9.50
36	1				1		1	1				55	2.28
37	1			1			1	1				21	6.25
38	0				0		0	0				34	34.00
39		0	0			0			0			10	10.00
40	0			0		0			0			330	330.00
41		0			0		0		0			19	19.00
42	0			0		0					0	164	164.00
43		1			1		1	1				94	7.71
44		1			1		1	1				4	5.00
45		0			0		0	0				4	4.00
46		0	0			0			0			2	2.00
47		0			0		0	0				20	20.00
48		0			0		0	0				386	386.00
49	0				0		0	0				185	185.00
50		1			1	1		1				119	8.00
51		1		1			1		1			177	36.40
52		0		0			0	0				112	112.00
53	0		0			0		0				61	61.00
54	0				0	0		0				109	109.00
55	0			0			0	0				14	14.00
56	0		0				0	0				13	13.00
57	0				0	0			0			159	159.00
58	0				0		0	0				171	171.00
59		0			0		0		0			159	159.00
60		0			0		0	0				20	20.00
	12	7	3	6	10	8	11	12	3	0	4	5613	3988
Total	34	26	19	14	27	28	32	40	13	1	6	60	60
%	35%	27%	16%	43%	37%	29%	34%	30%	23%	0%	67%	94 (average)	66

All the business students are grouped under BUS; others are under SOC.
1 (The student found sthg); 0 (The student found nothing /irrelevant items)
Total: Total no. of business students, total no. of first year students, etc.
% (% of students who found something among a specific group)
Ln-Stu (Librarian's Result minus Student's Result)

Full-text Databases (BPO & SSI) - Table 2 Appendix 8

Ctrl #	BUS	SOC	Yr1	Yr2	Yr3	At'd Clas	N At Clas	Use1	Use2	Use3	Use4	Ln-Stu	Ln/Stu
1	1					1					1	90	4.33
2		1			1	1		1				112	113.00
3		1	1			1		1				31	7.20
4		1	1				1	1				6	7.00
5		0	1				0	0				15	15.00
6	1		0				1				1	51	4.64
7		1			1		1	1				13	5.33
8		1	1			1		1				7	8.00
9	0		1				0	0				5	5.00
10		0		0		0		0				35	35.00
11		1	1			1		1				24	13.00
12		0	0				0	0				29	29.00
13	1		1			1		1				74	75.00
14		0	0			0		0				146	146.00
15	1			1		1				1		74	38.00
16	1				1		1			1		50	1.75
17		1			1		1				1	2	
18	0			0			0			0		2	2.00
19	1				1		1				1	0	1.00
20		0	0			0		0				13	13.00
21		1			1		1	1				8	5.00
22		0	0			0		0				67	67.00
23	0				0	0			0			74	74.00
24	0		0			0		0				30	30.00
25	1			1		1			1			10	6.00
26		1			1		1			1		37	7.17
27		1			1	1			1			0	1.00
28	1			1		1		1				125	63.50
29	1		1				1		1			27	
30	0			0		0					0	12	12.00
31	0			0		0					0	172	172.00
32	0		0				0	0				181	181.00
33		1			1	1					1	8	5.00
34		0			0	0			0			12	12.00
35		0			0	0					0	12	12.00
36		1			1	1					1	17	18.00
37	0			0			0	0				22	22.00
38		0			0		0		0			11	11.00
39	1			1			1				1	12	2.50
40		0			0		0		0			12	12.00
41		0	0			0		0				5	5.00
42		1			1	1				1		98	17.33
43		0	0			0			0			1	1.00
44		1			1		1			1		36	
45		1			1		1				1	1	
46		1		1		1			1			5	6.00
47		0			0		0				0	3	3.00
48		0			0		0		0			11	11.00
49		1			1		1				1	3	4.00
50		0			0		0				0	9	9.00
51		1			1	1			1			0	1.00
52		1			1	1					1	4	2.33
53		1		1		1			1			115	24.00
54		0			0		0				0	59	59.00
55		0		0		0			0			7	7.00
56	0			0		0				0		16	16.00
57		0			0		0	0				4	4.00
58		0		0		0		0				13	13.00
59	0			0		0			0			2	2.00
60		0			0		0				0	62	62.00
	10	20	8	6	16	17	13	9	6	5	10	2082	1483
Total	20	40	17	15	28	33	27	22	14	7	17	60	56
%	50%	50%	47%	40%	57%	52%	48%	41%	43%	71%	59%	35 (average)	26

All the business students are grouped under BUS; others are under SOC.
1 (The student found sthg); 0 (The student found nothing /irrelevant items)
Total: Total no. of business students, total no. of first year students, etc.
% (% of students who found something among a specific group)
Ln-Stu (Librarian's Result minus Student's Result)