CHAPTER THREE

METHODOLOGY

The primary purpose of this study is to find out whether the word processor has any discernible influence on the subject’s writing behaviour and whether the tool used would affect text quality.

Research Design

As detailed information was necessary in order to find possible answers to the research questions posed in Chapter One, it was decided that the most feasible approach would be the case study. The study involved only one subject because detailed investigations involving multiple perspectives were needed to identify variations in writing behaviour when different writing tools were used. The subject composed with the pen-and-paper and the computer equipped with Microsoft Word, Version 7.0. Writing behaviours and products written with these two writing tools were analysed and compared for differences.

To counter factors that could have a confounding effect on the findings, several precautions were taken. To avoid factors that could cause the subject to write below capacity, the writing sessions were held using the subject’s personal computer. The researcher made direct observations of all the writing processes but care was taken not to inhibit the subject in any way. The subject was given a free hand in determining the course of the writing. All the essay topics were given to the subject on the spot but ample time was allowed for her to read and understand the topics. The subject was required to complete all the writing tasks under impromptu conditions. No time limit was imposed. In fact, she was encouraged to take any amount of time needed to
complete the writing tasks. No composing off-line was allowed for the computer-
writing sessions. This precaution was taken because the validity of the results would
be affected if the computer were used only for the partial development of texts. All
these steps were taken to allow the writing to take its natural course so that the
influence of the writing tools could present itself.

Another important point to note was that the subject variable, the writing tasks
and data collection procedures were kept constant in the design of the study.
Therefore, the only planned difference was the writing tool for each writing task
within any one writing session, that is, either word processor or pen-and-paper. By
keeping all other factors constant, differences in writing behaviour and product
quality could then be attributed to the writing tool used.

Subject

Underlying the criteria for the selection of the subject was the contention among
researchers that the positive effects of word-processing was most significant among
junior elementary (Dalton & Hannafin, 1987; Daiute 1986; Jones, 1994) and
intermediate level students (Owston, 1996; Snyder, 1990).

As such, the subject selected for the study was a Form Two girl in a secondary
school in the district of Klang. She was a suitable subject for the study because she
fulfilled the following requirements: a student at the intermediate school level and an
experienced computer user. She completed the Computer Literacy course conducted
by the school last year and often wrote on the computer at home. This was an
important consideration due to the short time period available for the study.
Incompetent computer users using the 'hunt-and-peck' style would not be suitable for
the study as this would adversely affect typing speed and by extension, text
productivity. It would also be unrealistic to evaluate the written productions if the subject was still adapting to the computer.

The linguistic and discourse demands of the argumentative essays are such that writers are required to have fairly strong commands of the English Language. Hence, the subject was selected based on her overall academic performance as well as her performance in the English Language paper. From her response to questions in the Information Questionnaire (Appendix A), the following information was gathered: In 1997, she scored an 'A' (distinction) for English Language in the UPSR (Primary School Assessment Examination). She also scored a distinction (A) in the end-of-term examination in 1998 and performed equally well in the 1999 mid-year examination held in June. Hence, the subject was considered proficient enough to handle the language and discourse demands of writing argumentative essays.

Instruments

An integration of data gathered from multiple sources was important to the study. As such, instruments for the collection and analysis of data were as follows:

- Questionnaire to gather information on the personal particulars, academic background and computer literacy levels of the subject (Appendix A).
- A coding system to record the writing behaviours of the subject during observations (see Coding System below).
- Semi-structured interviews held immediately after the writing sessions
- Analyses of texts in terms of productivity, complexity, precision and holistic assessments.
- A post-writing questionnaire to elicit information on the subject's perception of the writing tools used (Appendix E).
CODYING SYSTEM  
(after Sufumi So, 1989)

| Prewriting | Observable planning activities like outlining and list making before starting to write |
| Actual Writing | Actual writing when script is being produced. |
| Pausing | Reflecting while the writer is engaged in cognitive planning, decision making and/or reviewing activities. |
| PD | Pausing to consult a dictionary/spelling & grammar checker. |
| Po | Pausing for extraneous reasons |
| Reading | Reading segments ranging from a few words or sentences to whole paragraphs. |
| Rw | Reading the entire draft following the completion of the essay. |
| Ro | Reading or referring to topic, notes or prewriting outline made earlier and other materials. |
| Editing | Physically making a change/changes in the text such as using the liquid eraser/cut/copy/paste. |

**Procedure**

*Weeks 1 - 2*

The first two weeks of the study was devoted to instructing and providing guidelines on writing argumentative essays and orientating the subject to the word processor. Although the subject had experienced writing on the computer, she was further given a brief orientation to the word processor, particularly the editing functions and accessory programmes available in the software, Microsoft Word.
Version 7.0, which were thought to be useful for writing and revising purposes. These editing functions included enlisting the help of the spelling and grammar checker, the global "find and replace", scroll up and scroll down to read and revise as well as block text, cut and paste to move sentences to link ideas in a coherent manner. Short exercises involving the use of all these functions were given to add to her basic familiarity with the use of the word processor. This was to ensure that the subject was fully aware of and knew how to use all these facilities.

Weeks 3 - 5

Data collection processes, which commenced on Week 3, were spread out over three weeks, on a 7-day cycle. During the first writing session, Week 3, the subject answered questions in a questionnaire on her academic background and computer literacy level (Appendix A). The subject was then given Writing Task 1A, with "Instructions for Writing" attached to it, to be written with the pen-and-paper provided. In this session, as in all subsequent pen-and-paper sessions, the Oxford Advanced Learner's Dictionary (Fifth Edition, 1995) and Roget's II, The New Thesaurus (1980) were provided.

After handing in the essay written with the pen-and-paper, the subject was given a short break following which she went to the computer and was given Writing Task 1B. In all the word processing sessions, a pen-and some paper were made available to the subject only if she chose to plan or make written outlines before writing with the word processor. This was to ensure that actual writing was strictly done on the word processor and no drafting on paper was allowed during all the word processing sessions.
Immediately after the completion of both the writing tasks, each with a different tool, a semi-structured interview was conducted, while the memory of the writing experience was still fresh. The purpose was to elicit the subject’s views on writing with the two different writing tools and to clarify the causes and meaning of certain behaviours exhibited by the subject.

Throughout the writing processes in this session and subsequent sessions in the weeks that followed, the researcher made close observations of the subject’s composing activities and recorded the writing behaviour onto the coding sheets. The composing strategies and habits were coded according to the coding system developed by Sufumi So (1989).

The whole process was replicated a week later, Week 4, with the order of the writing tools reversed. This was to avert a possible order effect. The subject first wrote Task 2A using the word processor and subsequently completed Task 2B using the conventional pen-and-paper. On Week 5, the subject was given a choice of writing tool to start first. She chose to write Task 3A with the word processor and subsequently wrote Task 3B using the pen-and-paper.

**Week 6**

From the three writing sessions, 6 essays were produced; 3 with the pen-and-paper and 3 with the word processor. Essays written with the word processor were labelled Text 1B(WP), Text 2A(WP) and Text 3A(WP) while essays written with the pen-and-paper were labelled Text 1A(PP), Text 2B(PP) and 3B(PP). All the essays were analysed for productivity, syntactic complexity, precision and subjected to a holistic evaluation by the researcher and two independent raters. Figure 1 summarises the sequence of data collection and writing sessions.
Figure 1
Sequence of Data Collection and Writing Sessions

Week 1
Writing Instruction – Argumentative essay writing
Orientation to word processor

Week 2
Writing Instruction – Argumentative essay writing
Orientation to word processor

Week 3
Administration of questionnaire
Text 1A - Writing Tool: Pen-and-Paper
Text 1B - Writing Tool: Word Processor
Semi-structured Interview

Week 4
Text 2A - Writing Tool: Word Processor
Text 2B - Writing Tool: Pen-and-Paper
Semi-structured Interview

Week 5
Text 3A – Writing Tool: Word Processor
Text 3B - Writing Tool: Pen-and-Paper
Semi-structured Interview
Post-writing Questionnaire

Week 6
Scoring of Compositions
Data Analysis
Analysis of Data

The research design and methods of data collection yielded five kinds of data:

1. information on the academic and computer literacy background of the subject
2. field notes from direct observations and the resultant coded writing behaviours
3. transcripts from the semi-structured interviews
4. six pieces of essays (three written with the conventional pen-and-paper and three with the word processor).
5. subject's perception towards the writing tools in a post-writing questionnaire.

Process Data

Data on the writing process were obtained through direct observations of the writing process. It consisted of composing activities that occurred during the writing process, which have been coded according to the coding system given above (p. 18). The composing activities were coded to show, among others, activities involving planning, actual writing, reading and making changes in the text. During the observations, each change in the observable writing behaviour was marked on the corresponding square on the coding sheet (Appendix E). These were then transformed into graphic representations and presented in the form of coded writing behaviour charts (see Appendix F1, F2 and F3). These coded writing behaviour charts provide information on which composing behaviours or activities have occurred and recurred, when, how long, how frequently and in what sequence. The amounts of time spent on each composing activity and their respective frequencies of occurrences within each writing process were compared and the differences identified, to provide answers to the first research question.
Product Data

Data on the quality of written products were obtained through analyses of the six pieces of argumentative essays produced, three with the pen-and-paper and three with the word processor. The instrument for text analysis is a combination of three measures of text quality and a holistic evaluation scale developed by Snyder (1990) (see Appendix I). To arrive at an index of quality, explicit features of an essay were quantified and compared for differences. These features included:

- Productivity (writing output)
- Complexity (syntactic complexity)
- Precision (grammatical and mechanical accuracy)

In order to evaluate the quality of essays written with different tools, essays written with the pen-and-paper and those written with the word-processor were analysed in terms of the measures mentioned above. All these measures, as explained below are indicators of quality, to a more or less extent (Snyder, 1990).

Text Productivity

This was used as a measure of quality as it had been established by Hillocks (1986), and reaffirmed by Snyder (1990) that there was a positive correlation between text length and rated quality. Snyder stated that word count or text productivity by itself, is inadequate as an indicator of text quality, hence it has to be combined with other features of the text like syntactic complexity and text precision.

Text Complexity

A T-unit is a minimal terminable unit, so called because it contains a main clause and subordinate clause/s (Hunt, 1965). According to Hunt, a T-unit is,
"... a single main clause (or independent clause) plus whatever other
subordinate clauses or non clauses are attached to, or embedded within,
that one main clause" (p. 93).

The number of T-units for each sample is obtained by segmenting each essay into its
component T-units and then the number of T-units totalled (see Appendix G).
Syntactic complexity is measured by calculating the mean T-unit length, obtained by
dividing the number of words in the essay with the number of T-units (Hunt, 1965).
Differences in syntactic complexity among essays written with the pen-and-paper and
essays written with the word processor are determined through analyses of T-units.
According to Crowhurst and Piche (1979) syntactic complexity in written texts is a
fairly reliable source of information on the quality of texts.

Text Precision

This refers to the grammatical and mechanical accuracy of the essays. Errors in
three categories; spelling, punctuation and grammar are identified and counted (see
Appendix H). There is an inverse relationship between the number of errors and the
overall merit of the essay. This means that the lower the number of errors, the higher
the quality of the essay. According to Hillocks (1986), there is a positive correlation
between correctness and quality of essays. Thus, error counts and mechanical
accuracy can provide information on the writer’s mastery of the surface features of the
text. The purpose of quantifying these features was to provide a systematic method for
distinguishing differences in text quality. Thus, a comparison of the features of essays
written with the pen-and-paper and the word processor would provide answers to the
second research question.
In addition to the above measures of text quality, a five-point scale for holistic evaluation developed by Snyder (1990) was used to determine the quality of the essays.

Holistic Evaluation

The 5-point holistic scale used in the present study was developed by Snyder (1990). In contrast to the quantifiable features above, a holistic approach requires the rater to consider the essay as a total entity and give an overall impressionistic response to the whole essay to arrive at an index of quality (Snyder, 1990). As holistic assessments can provide an understanding of the whole text, Snyder (1990) stated, “impressionistic measures could be used to provide invaluable data on the quality of a writing sample” (p. 120). She added that it was possible to effectively judge the general quality of a writing sample as well as discriminate the good writer from a poor one through impressionistic measures. Hence, the results of these holistic evaluations would provide answers to the third research question.

Two independent raters were appointed to provide a holistic evaluation of the essays. One was a holder of a Masters degree in English Language (University of Indiana, USA) and the other was a graduate student pursuing a degree in Masters in Education. Both the raters are presently teaching ESL Writing and Public Speaking in a local institution.

Essays written with the pen-and-paper were keyed into the same computer with all the errors intact and printed out with the same font using the same printer as the computer-written essays. This was done so that the independent raters could not differentiate between essays written with the word processor and essays written with the pen-and-paper.
Writing Task

The writing task involved writing a total of 6 argumentative essays, 3 with the pen-and-paper and 3 with the word processor (see Appendix B). The topics have been chosen with the potential interests, experiences and abilities of the average student writer in mind. These topics touched on matters pertaining to school, studies and hobbies, all of which fell within the areas of interest of the average school-goer of lower secondary school level. The writing tasks have been worded for easy comprehension with a particular purpose, audience and authentic situation built into the task instructions. In an attempt to avoid the potentially biasing influence of the essay topics, the three sets of writing tasks were adapted to ensure that all the tasks were of comparable levels of difficulty.

Word Processing Equipment and Facilities

The word processing software used in the present study was the Microsoft Word Version 7.0. This word processing software enables writers to enter texts, save, edit and print written documents. The word processing software turns the computer into an ‘intelligent’ electronic typewriter in which texts appear on the computer's display screen as they are being keyed in. Texts can be saved in a file in the computer's memory or stored in removable diskettes. In addition, this software contains accessory programmes like the spelling and grammar checker with an error- prompting device. Errors in spelling, grammar and style are indicated with coloured wavy underlines so that the writer can be alerted to such errors.

The next chapter presents analyses of data on the writing process and products. More importantly, it reports the findings of the study and attempts to answer the research questions posed in Chapter One.