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The effect(s) of word processing software on the equality of the composing process, product, and attitudes of adult academic ESL (English as a second language) writers

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THE EFFECT(S) OF WORD PROCESSING SOFTWARE ON THE QUALITY OF THE COMPOSING PROCESS, PRODUCT, AND ATTITUDES OF ADULT ACADEMIC ESL (ENGLISH AS A SECOND LANGUAGE) WRITERS.

BY

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Abstract

The focus of this study was on the effect of word processing on the quality of the composing process, product, and attitudes of adult academic ESL writers. Twenty adult ESL students, comprising an 'intact' EAP (English for Academic Purposes) group, completed a number of written assignments as part of their ESL unit, using either word processing or conventional 'pen and paper' composition methods. Their handwritten and word processed work was analysed and compared through the use of an holistic/analytic scale of writing quality. In addition to this analysis of the 'finished product', texts were analysed in terms of the frequency, nature and extent of revisions made within the composition process. Statistical analysis of the writing quality and revision data - as well as audio-taped verbal protocols from selected subjects, interviews, and observational notes, were used to determine the effect(s) of word processing on the composing process, product and attitudes of these subjects. The data indicate that word processing *does* improve writing quality - and that it also influences revising behaviours and subject attitudes towards writing. There does not appear, for these subjects, to have been any significant correlation between revision and writing quality.

DECLARATION

I certify that this thesis does not incorporate, without acknowledgment, any material previously submitted for a degree or diploma in any institution of higher education and that, to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where due reference is made in the text.

Signature

Date 20/12/93

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CHAPTER ONE

Introduction

1.1 Background to the Study

An area of composition research to receive much attention in the last 10 years has been that of computer-aided writing. The majority of this research has dealt with native English speakers (McAllister & Louth, 1988; Rodrigues, 1985; Grow, 1988; Hawisher, 1987; Reed, 1990; Robinson-Stavely & Cooper, 1990; Sudol, 1990). The use of word processing software specifically with ESL writers (English as a second language) did not receive much attention until the late 1980s (Pierson, 1987; Benesch, 1987; Johnson, 1988; Neu & Scarcella, 1990; Pennington, 1990).

An approach frequently used in attempting to measure the impact of the word processing medium on composition has been the specific focus on a single aspect of the writing process - namely revision (McAllister & Louth, 1988; Bean, 1983; Curtis, 1988; Hawisher, 1987; Chadwick & Bruce, 1989). These studies have generally been based on the assumption that more revising (or more extensive instances of revision) is indicative of 'higher quality writing'. This assumption would appear to have been seldom tested empirically. After an extensive review of literature, only one such study that attempted to do so has been found (Hawisher, 1987).

Only a few studies have attempted to specifically address the issue of how the word processing medium affects 'writing quality' (Pennington, 1989, 1991a; Pierson, 1987; Reed, 1990; Robinson-Stavely & Cooper, 1990). Of

these studies, even fewer (Hawisher, 1987; Reed, 1990; Robinson-Stavely & Cooper, 1990) have applied any sort of writing quality instrument to word processed texts produced by subjects.

1.2 Significance of the Study

Computer and word processing technology have had an increasing impact on writing and composing in the last ten years, and this process can be expected to accelerate in the future. The significance of the present study is best summed up in the following quote from Anderson:

> ...Computer-based technologies are changing our notions of literacy and changing how students learn...the tools we use change us - and so as new educational uses are developed for computers, the very concepts of text that we have held until now are changing, and will continue to change (1991, p. 50).

A number of writers have identified computers as central to the definition of a 'new literacy' (Levine, 1986; Hyland, 1990; Verhoeven, 1992). Hyland goes further in saying that, "...word processing is a new creative environment which demands a radically different approach to writing...to make effective use of the medium" (1990, p. 335).

No study reviewed has attempted an in-depth analysis and comparison of the writing process, product, and attitudes of writers across the two writing environments of word processing and 'pen and paper'. It would also seem that word processing studies to date have largely neglected the target group at which the present research is aimed - namely adult academic ESL writers. Notable exceptions to this trend are the studies of Chadwick and Bruce (1989) and Raimes (1987).

Currently, significant numbers of non-native English speaking background (NNESB) students are enrolled in undergraduate and postgraduate courses in this, and other universities throughout the country. There is a need for those educators directly involved in the instruction of such students to have an understanding of what word processing can and cannot do, for adult academic ESL writers - and how the resulting process differs from conventional 'pen and paper' composition.

1.3 The Purpose of the Study

The main purpose of this study is to identify how the use of word processing software as a writing 'tool' affects the quality of the writing process, product, and attitudes of adult academic ESL writers. A secondary purpose of the study is to determine if any discernible relationship(s) between the revising component of the writing process, and the quality of the finished product, exist. Any such relationship will be subjected to analysis.

1.4 Statement of Research Questions

(1) In what way(s) does the use of word processing software affect the quality of the adult academic ESL writer's:

   (a) composing process?

   (b) composing product?

   (c) attitudes towards the writing process and him/herself as a writer?

Subsidiary Question

(2) What is the relationship (if any) between the revising behaviours of adult academic ESL writers and the holistic/analytic quality ratings achieved by their texts?

1.5 Operational Definitions

The terms and definitions in this section are derived from the work of Halliday (1985a, 1985b), Martin (1985a, 1985b), Heuring (1985), and Hayes and Flower (1983, 1986). Many of the operational definitions have come from the work of David Heuring and have been modified as considered appropriate for the present study. Two subsections deal with the terminology applied throughout the study to the component parts of 'writing quality' and the classification of specific revision types.

The Writing Process:

This term refers to the total writing process; beginning with the initial impulse to write something and ending when the writer has finished the work and no longer needs, wants, or is able, to make further changes (Heuring, 1985).

The Writing Situation:

According to Heuring (1985) and Hayes and Flower (1983, 1986), the writing situation has three major components: the Long-Term Memory (LTM), the Composing Processes, and the Task Environment (See Appendix 1 and Figure 3.1).

The Long-Term Memory Component (LTM):

The long-term memory (LTM) consists of learned strategies (such as 'brainstorming') and internalised knowledge (such as personal writing style): much of which (in the case of NNESBs) was probably acquired in a language other than English (Heuring, 1985).

The Composing Processes Component:

The composing processes component is the 'operational apparatus' of the writing process. It depicts the cognitive activities involved in composing and consists of three major sub processes: planning, transcribing and reviewing. The composing processes component also illustrates the interactive and recursive nature of the writing process (see Figure 3.2). Although these processes are cognitive operations, they can be *inferred* from the analysis of writing behaviours and verbal protocols.

The Task Environment Component:

This component is made up of anything that influences the performance of the writing task, including such intangibles as: topic, intended audience and purpose - in addition to the text already produced (Heuring, 1985). The task environment component represents (to a large extent) what this writer refers to as the 'rhetorical concerns' inherent in any composition task. This is best explained by Christie (1992) who, from a systemic-functional perspective, refers to the production of text thus:

> ...a text is to be understood as functioning in a context, where context is said to operate at two levels: at the level of register, where field (social activity), tenor (the interpersonal

> relationships among people using the language), and mode (the part played by language in building communication) all have consequences for the choices made in the linguistic system; and at the level of genre, where the social purpose in using language also has consequences for the linguistic choices made. For any given instance of language use, a genre is selected (be that a report, narrative, a trade encounter, etc.), and particular choices are made with respect to field, tenor, and mode, all of which are in turn realised in language choices (pp. 142-143).

The two levels of contextual considerations referred to in the preceding quote are the product of the systemic functional model of language production - this model being the synthesis of Halliday's (1985a) functional grammar, and Martin's (1985a, 1985b) work on the relationship of text to context - with its particular focus upon genre or text type. These items can be seen in Appendix 2 - in a model representing Heuring's (1985) task environment. The interpersonal, ideational, and textual functions referred to by Christie (1992) all occur at the level of genre.

Genre:

Genre, "...is realised through a **congruent** expression of ideational, interpersonal and textual meanings in the formal items of a text" (my bolding) (Couture, 1985, p. 76). Halliday (cited by Couture) explains that while genre is reflected through the use of cohesive devices and, "...relevant selections from various textual grammars associated with certain genres" (1985, p. 76), it is also, "...displayed in patterns of ideational and interpersonal meaning" (Halliday, 1978, p. 136).

Genre then, starts with the writer and his/her attitude to the referent of the discourse in a particular communication situation, "...and describes whether the approach to this referent is typical for the situation" (Fawcett, 1980, pp.

91-92). Put simply then, genre can be seen as the resulting choice and consistent use of formal items in a text - these items taken from 'textual grammars', ideational and interpersonal systems most appropriate to what Heuring (1985) calls the 'task environment'. Before moving on to the specific elements of 'writing quality', there still remain a few important definitions to consider.

Text:

> The word TEXT is used...to refer to any passage, spoken or written, of whatever length, that does form a unified whole. We know, as a general rule, whether any specimen of our own language constitutes a TEXT or not. This does not mean there can never be any uncertainty. The distinction between a text and a collection of unrelated sentences is in the last resort a matter of degree, and there may always be instances about which we are uncertain - a point that is probably familiar to most teachers from reading their students' compositions. But this does not invalidate the general observation that we are sensitive to the distinction between what is text and what is not (Halliday & Hasan, 1976, p. 1)

This definition implies that, to a certain extent, the definition of a stretch of discourse as a 'text', is a value judgment. Overall, this value judgment occurs when we (the readers) evaluate the extent to which a text does represent a unified whole. Specifically, it occurs when the reader examines a text for those elements (whether it be cohesion, syntax, grammar, or spelling) that he/she values as important indicators of writing quality. The same can also be said of 'writing quality' itself. Any attempt to measure an attribute like 'quality', is inherently controversial. This study, however, will avail itself of the most reliable, valid, instrument that this researcher has

been able to locate. It is an instrument that has proven itself over time, and with large numbers of ESL writers (Canale et al., 1988). The component parts of this instrument will be examined in section 1.5.1.

Writing Quality:

It would be unrealistic to expect the present study to do what so many others have failed to do in the last twenty-five years or so of composition research - that is, to provide the reader with a precise definition of 'writing quality'. When evaluating writing, different people value different things.

For the purposes of the present study, 'writing quality' will be defined and measured in terms of the 'holistic/analytic' measure devised by Canale et al. (1988). This instrument measures writing 'quality' in terms of 20 characteristics that are considered by the majority of studies reviewed, to be indicative of writing quality. A given text will be capable of achieving a maximum quality rating of five and a minimum of zero - on any of these 20 characteristics (see Table 3.1).

Whilst some criticism can be levelled at this approach, it does have a number of important strengths. Most obvious of these, is the fact that it allows for the measurement of quality to be based on *reader response* to the text - and, for this measurement to occur *in context*. Minor modifications have been made to the Canale et al. (1988) instrument - these will be discussed in section 4.3.1. A final definition that should be considered before moving on to the next section is that of attitude.

Attitude:

The study of attitude has long been considered the realm of social psychology. Within this discipline, there are a number of views of what constitutes 'attitude' (Lloyd, Mayes, Manstead, Meudell, & Wagner, 1984). The most widely held is the 'three-component view' - which, "...distinguishes between affective, cognitive and conative (behavioral) components" (Lloyd et al., 1984, p. 606). These three components are seen to be highly related and there is some empirical support that they are internally consistent (Lloyd et al., 1984)

An alternative view to the 'three-component view' is the 'expectancy-value approach'. This view, "...holds that a person's attitude towards a given object is a function of his or her beliefs about the object and the evaluations he or she associates with these beliefs" (Lloyd et al., 1984, p. 608).

Secord and Backman (1964) define attitude in terms of, "...certain regularities of an individual's feelings, thoughts, and predispositions to act toward some aspect of his environment" (p. 97). This definition is the one adopted by the present study. The three components (feelings, thoughts, and predispositions) are all intangible items. They are, "...not directly open to observation but (can be) inferred from verbal expression or overt behavior" (Secord & Backman, 1964, p. 98). The present study will utilise both verbal expression (unstructured interviews) and overt behaviour (writing/revising behaviours recorded) to develop an attitudinal profile on the subjects at the conclusion of the study.

1.5.1 Classification of aspects of writing quality

Reference to Table 3.1 will enable the reader to see that the Canale et al. (1988) instrument of writing quality consists of multiple interval scales. Each of the 20 items can receive a score of zero (least proficient) to five (most proficient). The items are also listed here for convenience. Some of these items are self-explanatory, others require brief definition. It will be noticed that Canale et al. (1988) have grouped their components of writing quality under four main headings, namely:

A. Writing as a reflection of community standards:

*** Standards of language usage**

1. Spelling and capitalisation
2. Grammar and vocabulary

*** Standards of written documents**

3. Neatness (e.g. handwriting/text formatting, spacing, and margins)
4. Punctuation
5. Paragraphing

*** Standards of appropriate formality**

6. Appropriate language register, purposes, subject matter, length

Some terms may require further explanation. 'Register' refers to whether or not the text is appropriate to the field, tenor and mode of the communicative act (see section 1.5 for the definitions of these terms). In the context of the present study, this will refer to the formal register of an academic written assignment.

The 'purpose' of the text should represent the combination of the interpersonal, ideational and textual functions. This should be evidenced by the selection and organisation of linguistic items appropriate to the field, tenor and mode of the writing situation.

*** Standards of mode or genre of writing**

7. Elements and layout (e.g., address, date, and salutation in a business letter)

'Elements' is a specific reference to what Lucas (1988) refers to as 'organisational form' - the 'form' that is appropriate/expected for a given genre. At its simplest, 'form' will comprise a:

- **Beginning** - "Identification of time, place, person, and theme",
- **Middle** - "Thematically unified description of event, person, issue, or object accompanied by some reflection on its significance for the writer",
- **End** - "Concluding reflection on the significance of the event, person, issue, or object described in the middle" (Lucas, 1988, p. 7).

Whilst the form described above is a simplistic representation, it demonstrates what a rater will actually be evaluating when applying item seven of the Canale et al. (1988) instrument to a text.

B. Writing as a reflection of individual personality:

8. Originality and interest of ideas presented
9. Ease, confidence, and maturity of expression

Here we are confronted with items of text quality that are not easily definable. Item eight requires the reader/rater to make a value judgment. It is similar to the 'ideas' component of Diederich's (1974) holistic/analytic scale of writing quality or Marsh and Ireland's (1987) 'content/ideas' component of their writing quality instrument.

For the purposes of this study, Diederich's (1974) explanation of his 'ideas' component will be used:

> ...The student has given some thought to the topic and writes what he really thinks. He discusses each main point long enough to show clearly what he means. He supports each main point with arguments, examples, or details; he gives the reader some reason for believing it. His points are clearly related to the topic and to the main idea or impression he is trying to convey. No necessary points are overlooked and there is no padding (p. 55).

Since item eight comes under the subheading of 'Writing as a reflection of individual personality', Diederich's definition is appropriate. It requires that the reader 'hear' the writer's 'voice'. Item nine will also require a subjective evaluation on the part of the rater or reader.

C. Writing as unity of form and ideas:

*** Cohesive devices to unify sentence forms**

10. Lexical cohesive devices (e.g., use of pronouns, synonyms and conjunctions or transition expressions such as *however, on the one hand...on the other hand, in addition,* and *finally*)
11. Structural cohesive devices (e.g. use of ellipsis, parallel sentence structures)

The definitions of Halliday and Hasan (1976) will be relied on for the operational definitions of cohesion and of lexical and structural cohesive devices:

Cohesion:

> The concept of cohesion is a semantic one; it refers to relations of meaning that exist within the text, and that define it as a text. Cohesion occurs where the INTERPRETATION of some element in the discourse is dependent on that of another. The one PRESUPPOSES the other, in the sense that it cannot be effectively decoded except by recourse to it. When this happens, a relation of cohesion is set up, and the two elements, the presupposing and the presupposed, are thereby at least *potentially* integrated into a text (my italics) (Halliday & Hasan, 1976, p. 5).

Cohesion then, is the semantic interdependence of items within a text. It is achieved through the use of cohesive devices - which can be either lexical or structural.

*** Coherence elements to unify ideas**

12. Development: the sense of direction and order of presentation of ideas
13. Continuity: the consistency of facts, opinion and writer perspective, as well as the reference to previously mentioned ideas and the relevance of newly introduced ideas
14. Balance: the relative emphasis accorded each idea
15. Completeness: the degree to which all ideas in a piece of writing work together as an integrated, thorough discourse

Items twelve to fifteen all deal with different aspects of coherence. These items collectively address the sorts of things commonly associated with 'coherence'. They also provide a suitably broad (yet functional) definition that no other literature reviewed has done.

Coherence:

For the purposes of the present study, 'coherence' will be defined in terms of items twelve to fifteen of the Canale et al. (1988) instrument. That is, 'coherence' will be defined as the extent to which a given text achieves development, continuity, balance and completeness - appropriate to the 'context of situation'. In sum, for a text to achieve a high score on this section of the instrument - it will be expected to *cohere* - or to 'hang together' as a unified whole.

D. Writing as an effective act of communication:

16. Clarity of writer's purpose and desired response from his or her audience
17. Sense of audience (e.g., suitable degree of detail or background provided)
18. Effectiveness of ideas (e.g., arguments, examples, analogies, and depth of insight)
19. Effectiveness of the choice and variety in language (e.g., precise vocabulary and varied sentence structure)
20. Effectiveness of literary devices (e.g., effective use of imagery and sentence rhythm)

Text as a Communicative Act:

The final five items in the Canale et al. (1988) instrument relate to the relative success or failure of a text as a communicative act. That is, 'has the text appropriately and successfully communicated to the reader what was intended?'. The writer does not intend to examine the work of Austin, Grice or Searle here - or to analyse speech act theory. Suffice it to say that these final items will rely on a reader/rater using what is 'in the head' just as much as what is on the page. In the end, a value judgment will be required of the rater - but an informed one.

1.5.2 Classification of revision changes

For the purposes of this study, the term 'revision', has two specific meanings. In its broadest sense, 'revision' refers to any change made to a text. In terms of the specific classification of changes made to text, it also refers to meaning-altering (or 'Text-base') changes (see Appendices 3 and 4). To avoid confusion, where the first definition is intended, the generic term 'revision' will be used 'as is'. Where a *specific type of revision* is referred to, it will be;

1. referred to as an instance of 'editing' or 'non-meaningful revision' (in the case of non-meaningful changes) or specifically categorised according to its Faigley and Witte taxonomy sub-type (e.g., *meaning-preserving addition, abbreviation*), or

2. referred to as an instance of 'meaningful revision' (in the case of meaningful changes) or specifically categorised according to its Faigley and Witte taxonomy sub-type (e.g., *microstructure addition, macrostructure deletion*).

The classification of revision types is referred to in Section 4.3.1 (the description of instruments). Revision consists of both a cognitive and physical (conative) activity. It normally occurs when three things happen: a writer decides that something he/she has written is inappropriate, decides how to change it and finally, physically makes the change. To revise successfully, a writer relies on the revision strategies that he/she has developed over time or (with ESL writers), has transferred from the L1 (Heuring, 1985). Revision is not 'locked in' to one specific stage of a linear writing/composing model. It is (like writing itself) a *recursive* process.

To sum up: a revision is any change made to a text. It may or may not affect its meaning. For the purposes of this study, all specific instances of revision will be coded according to the Faigley and Witte taxonomy (see Appendices 3 and 4).

CHAPTER TWO

Review of Literature

2.1 General Literature - Composition Research

The field of composition research comprehends the work of hundreds of individuals with different academic and professional backgrounds. The research reviewed here spans a period of approximately 25 years and involves diverse philosophies and approaches. There are two main sections to this review. The first deals with the dominant philosophies/approaches underpinning composition studies over the last 25 years. The second section deals with the studies themselves.

2.1.1 Perspectives on the composing process

Of importance when considering composition research is that:

> ...there can be no disinterested, objective, and value-free definition of literacy: The way literacy is viewed and taught is always and inevitably ideological (Auerbach, 1992, p. 71).

Auerbach (1992) reminds us that researchers and educators bring their own particular ideological perspective to the field of literacy. Even if the reader sees literacy as a neutral, objectively definable set of skills - this definition is itself, part of a specific ideological perspective.

The main viewpoints that will be examined here are those of the cognitivists (Hayes & Flower, 1983, 1986; Heuring, 1985), the information processing advocates (Perkins et al. 1991), the social constructionists (Rorty, 1979; Geertz, 1983), and the systemic functional linguists (Halliday, 1985a,

1985b; Martin, 1985a, 1985b). It is appropriate here for the researcher to identify his own ideological/theoretical perspective towards composition as a synthesis of the cognitive process model of composing and of the systemic functional approach to text (see Chapter 3).

The Composing Process:

An area of composition research that has received a large amount of attention is that directed towards the definition and description of the 'composing process' itself (Perl, 1984; Blau, 1983; Faigley & Skinner, 1982; Hayes & Flower, 1983, 1986; Heuring, 1985; Raimes, 1985; Silva, 1989). Much of this work has been based on a 'cognitive process model' taken from the work of Hayes and Flower (1983, 1986) and the protocol analysis research of Perl (1984).

Composing - The Cognitive View:

Whilst the cognitive perspective is not the only one brought to the study of composition, it has, for a number of years, been a dominant one (Blau, 1983; Hayes & Flower, 1983, 1986; Flower, Hayes, Carey, Schriver, & Stratman, 1986; Gebhardt, 1983; Heuring, 1985; Johnson, 1992; Kemper, 1987; Raimes, 1985, 1987; Silva, 1989; Perl, 1984; Smagorinsky, 1989; Swarts, Flower, & Hayes, 1984; Lai, 1986; Faigley & Witte, 1981).

Simply stated, cognitive theory can be viewed in terms of the *feedback loop* (Faigley, 1986). The term, taken from Norbert Wiener's theory of *cybernetics*, is defined by Faigley (1986) thus, "...the regulating mechanism receives information from the thing regulated and makes adjustments" (p.

533). The 'regulating mechanism' referred to is the human mind and (in terms of composition research), the 'thing' regulated is the text. This 'regulating' process can be seen as an attempt to reduce what Faigley and Skinner (1982) refer to as *dissonance* - "...the writer's sense of incongruity between what was intended and what was executed" (p. 23). This process is one of narrowing the 'gap' between what was *intended* and what was actually *produced.* Operationally, it can be seen as consisting of successive approximations (usually occurring in revision/editing process), enabling the writer to move from 'dissonance' to 'agreement' with the text.

The cognitive approach then, views writing as, "...a problem-solving exercise which entails thinking and process" (Perkins, Brutten, & Dare, 1991, p. 142). The problem solving component refers to the writer's successive attempts to bring intended meaning and actual text closer together (reduction of 'dissonance'). In cognitively-oriented studies, the 'thinking' component is usually inferred on the basis of protocol analysis (Hayes & Flower, 1983, 1986; Heuring, 1985; Johnson, 1992; Raimes, 1985, 1987; Oliver, 1992) and related to the Hayes and Flower model of composing or one of its derivatives (*cf.* Heuring, 1985).

Composing - The Information Processing View:

The information processing approach to human cognition is best summed up by Simon (In Perkins, Brutten, & Dare, 1991). Such an approach, "...uses a computer to model the human mind. The way the computer

processes information is used as a model of how the human mind processes information..." (p. 141). In simple terms, information processing models define the cognitive processes involved in composition as replicable by a computer program. That is, a 'good' programmer could write computer code that would replicate the thought processes of a research subject.

The limitations to this information processing paradigm are obvious. Brand (1990) lists a number of concerns regarding the ability of such models to explicate the writing process. Among these, he specifically identifies their inability to account for the emotional, social and communicative components of the writing process - within the 'situation of context'. In terms of an information processing model, the question that must be asked is, 'can a computer *think*?'

This review of literature is *not* an attempt to answer a question of such magnitude. The point is made however, that until this question *is* answered satisfactorily, the suitability of this paradigm for conceptualising and understanding the composing process of *human beings*, must remain (at the very least) questionable.

Composing - The Social Constructionist View:

There are several alternatives to cognitivist and information processing models. One of the best known is the social constructionist perspective. This approach arose as an answer to a perceived inability of cognitivism in general to address social and emotional aspects of composition (Brand, 1990, Foley, 1991). This perception is very much the product of Vygotsky's, "...theory that (language) development occurs on the social

level, within the cultural context" (In Foley, 1991, p 18). It has implications that were later drawn on by Halliday and Martin in the development of a systemic-functional model of language.

The social view holds that writing is *not* universal - but that it is social in nature and cannot be removed from culture (Faigley, 1986). The main criticism levelled at cognitivist research is that it 'isolates the part from the whole' (Faigley, 1986; Hammond & Hood, 1990). Some researchers see the cognitivist perspective as an attempt to remove written language from its 'context of situation' in an attempt to analyse it as a discrete entity. The issue of 'context', however, is central to the *systemic-functional* view.

Composing - The Systemic Functional View:

Couture (1985) provides an excellent summary of the systemic functional model. She considers the systemic functional paradigm more appropriate to composition studies because of its emphasis on the relationship(s) between *text* and *context*. According to Couture:

> ...only a *semantic* systemic network will explain how quality texts 1) work as directed multifunctional social interaction, 2) achieve thematic unity, and 3) incorporate characteristics which assure favorable reader response (1985, p. 73) (my italics).

Couture (1985) goes on to say that, "A systemic network based on Halliday's three-function semantic system can work to explain texts as directed, multifunctional social interaction because this system assumes that the text, not the sentence, is the unit of meaning and that meaning is sociosemantic" (p. 73). What Couture is saying here is of vital importance to the present study. Firstly, the 'text' needs to be understood as directed

(that is, towards a specific audience), multifunctional social interaction (serving interpersonal, ideational and textual functions - these functions moderated by the contextual constraints of field, tenor, and mode). Secondly, the focus of any analysis is at the 'discourse level' (that is, at the level of 'text'). This 'discourse level' focus is necessary (and desirable) if analysis of text is to consider semantic features such as textual cohesion and coherence.

Halliday (1978) describes his three-function semantic system by saying it:

> ...can explain formal items as they direct social interaction because the system is overtly sociosemantic. It assumes that meaning is dependent on an addresser and those elements which are linked to the addresser in any communication event: the referent situation, the audience, and the language code (p. 73).

On the basis of these remarks, Couture (1985) proposes that a sociosemantic system is superior to a cognitive semantic system for explaining written composition. The researcher, however, will argue that his 'cognitive/systemic-functional' approach is even more appropriate to the present study and context.

2.1.2 Composition research to date

Over the last quarter of a century, many composition studies have been conducted with both L1 (first language) and L2 (second language) subjects. These studies have utilised a number of methodologies and attempted to answer a wide range of questions.

Syntactic Complexity, Revision, and Writing Quality:

Many composition studies from the eighties examined a perceived relationship between syntax and 'writing quality'. A large majority of the composition studies reviewed have examined either;

a) a perceived relationship between 'syntactic complexity' and 'writing quality' or,

b) a perceived relationship between 'revision' and 'writing quality'.

Several studies have explored the 'syntax/quality' relationship (Reed et al., 1983; Crowhurst, 1983; Witte, Daly, & Cherry, 1986). The researchers in these studies have generally attempted to establish a linear relationship between syntactic complexity and quality of writing. Although Witte et al. (1986) did find some relationship between syntactic complexity and writing quality, this relationship was not consistent. It tended to only operate at the lowest levels of syntactic complexity (these texts received the lowest holistic quality scores by raters).

The majority of composing studies reviewed here then, have one thing in common - they attempt to look (directly or indirectly) at 'writing quality'. Of these studies, a large number infer textual quality from the extent and nature of *revisions* that have occurred within the text (Beach & Eaton, 1984; Flower, Hayes, Carey, Schriver, & Stratman, 1986; Heuring, 1985; Raimes, 1985; 1987; Urzua, 1987; Faigley, 1981; Lai, 1986). Several of these studies have used native English speakers as subjects (Beach & Eaton, 1984; Flower, Hayes, Carey, Schriver, & Stratman, 1986; Faigley, 1981).

Others have concentrated on L2 subjects (Heuring, 1985; Raimes, 1985; 1987, Urzua, 1987; Lai, 1986). The methods used have generally been verbal protocol analysis (Perl, 1984; Ericsson & Simon, 1984) and/or revision analysis (see Appendices 3 and 4).

Whilst analysis of revision and syntactic complexity represent two of the most common methods used to examine writing quality, other methods such as holistic and 'holistic/analytic' rating have also been used.

Holistic and 'Holistic/Analytic' Rating and Writing Quality:

In holistic rating, the reader responds to the impact of the text as a whole. The typical procedure is for the researcher to use three or four raters to evaluate a number of texts using an holistic writing quality scale (Canale et al, 1988, 1982a, 1982b; Cooper, 1977; Diederich, 1974; Myers, 1980). In several studies, holistic rating has been followed up with the application of an 'holistic/analytic' scale of writing quality. This scale has usually been developed by identifying the most important (from the readers' perspectives) and common factors that influenced the raters' judgments of holistic quality. Researchers who have used this approach include Diederich (1974), Canale et al. (1982a, 1982b, 1988), Marsh and Ireland (1987), Perkins (1982) and Perkins and Brutten (1990).

In the quoted studies, large sample sizes, consistent results, and high inter-rater reliabilities have established the suitability of such instruments to composition research. It is of particular interest that those studies that have applied an holistic/analytic instrument to high school and university ESL

writers' texts (Perkins & Brutten, 1990; Canale et al., 1982a, 1982b, 1988; Perkins, 1982) have generally achieved higher inter-rater reliability coefficients (R = .92 in the case of Canale et al., 1988) than similar L1 studies (Diederich, 1974; Marsh and Ireland, 1987). An alternative to holistic/analytic measurement of writing quality is primary trait scoring.

Primary Trait Scoring and Writing Quality:

Researchers such as McCulley (1985) and Lloyd-Jones (1977) have proposed 'primary trait scoring' as an alternative to holistic/analytic scoring:

> A primary trait scale refers to one and only one writing situation. The scale is based on a stylistic analysis of texts that are rated by readers as high-quality responses to a given writing assignment. It incorporates Jakobson's view of language as it works within a communication event (1960) and rhetorical theory emphasizing audience elaborated by Kinneavy (1971) and Britton (1970) (Lloyd-Jones, In Couture, 1985, p. 70).

Primary trait scoring is extremely 'labour-intensive'. It requires approximately 60 hours to develop a primary-trait scale (Couture, 1985). In his study, McCulley (1985) used primary trait scoring with a random sample of 17-year-old (L1) high school students' texts. His definition of writing quality however, was restricted to, "general coherence...and...the lexical cohesive features of synonym, hyponym, and collocation" (p 269).

Summary:

A variety of methods and conceptual frameworks have been brought to the field of composition research over the last twenty-five years. Cognitive and information processing views of composition have employed such methods as verbal protocol analysis, analysis of revision, and analysis of structural (syntactic) complexity (for example, t-unit analysis). Those researchers whose ideology is more aligned with the social or social constructionist viewpoint, have attempted to use such methods as holistic or semantically-oriented methods of analysis.

The approach to measuring/analysing writing quality that stands out as most suitable for the purposes of the present study is that of Canale et al. (1988). Whilst the cognitivist will find that the Canale et al. measures of writing quality are specific enough to relate to the underlying cognitive processes that produced them, the social constructionist and systemic functionalist will find that rhetorical and sociosemantic considerations have not been neglected. In essence, the Canale et al. model represents a successful synthesis of cognitive- and systemic functional-based text analysis.

2.1.3 Word processing research with native and non-native English speakers

Word processing studies have generally focussed on the L1 writer (Bean, 1983; Bridwell et al., 1984; Collier, 1983; Curtis, 1988; Hawisher, 1987, 1991; McAllister & Louth, 1988; Grow, 1988; Reed, 1990; Robinson-Stavely & Cooper, 1990). They have produced a range of findings - which often conflict. A variety of data collection and analysis methods were used -

with subjects ranging from 'basic' (McAllister & Louth, 1988) to 'expert' writers (Grow, 1988).

Reed (1990) and Robinson-Stavely & Cooper, (1990) were among the first L1 word processing studies to examine the effect of word processing on writing quality itself. Reed's (1990) work involved 23 education undergraduates in a 15-week computer-based composition course. Robinson-Stavely and Cooper (1990) looked at the compositions of 79 undergraduates - enrolled in composition units.

Robinson-Stavely and Cooper (1990) found that essays written on the computer were judged to be of a higher quality, were longer, and contained fewer errors than those written by hand. Reed (1990) found that writing quality, and subject attitudes to writing, improved in the word processing condition. Several other studies, in comparing word processing to 'pen and paper', have found word processing to be easier and more efficient, and that more text is produced using the computer than with 'pen and paper' (Bean, 1983; Bridwell et al., 1984; Sudol, 1990; Anderson, 1991; Selfe, 1985; Oliver, 1992).

Some researchers (Bridwell et al., 1984; Oliver, 1992) found that meaningful revision could be done more quickly and easily using the computer. Not only was more text produced using the computer, but also fewer grammatical and syntactic errors tended to pass undetected when compared with conventional pen and paper writing (Bean, 1983; Robinson-Stavely & Cooper, 1990; Anderson, 1991). Of the studies reviewed by the

writer, few (Harris, 1985; Hawisher, 1987) found that computers had any substantial adverse effect(s) on composing. Those that did, indicated that writers made fewer meaningful revisions (and less comprehensive ones) on the computer (when compared to pen and paper composing).

A most comprehensive review of previous research into the effects of word processing on student writers, was made by Pennington (1990). Her review incorporates both L1 and L2 word processing studies. It addresses a number of the points made in this chapter and lists potential benefits and disadvantages of the use of computers with student writers. Pennington's (1990) lists of word processing advantages and disadvantages (as well as a list of variables identified as affecting the results of word processing studies) can be found in Appendices 5 to 7. Pennington's article is significant in that it represents the only exhaustive attempt at explaining the variation in the findings of word processing research to date.

The few word processing studies that have looked at adult ESL subjects, have identified consistent and positive effects on composition. Neu and Scarcella (1990) found that word processing enabled their 54 undergraduate ESL writers to develop more positive attitudes towards the writing process. By the end of the study, many subjects expressed a strong preference for word processing over 'pen and paper' methods of transcription.

Phinney (1989) found that, "...second language students can derive many of the same benefits from computer-assisted composition as native language writers, and possibly more" (p. 81). This claim is based on the assumption that ESL writers, "...approach the writing process similarly to native

writers..." (p. 81). She (Phinney) goes on to say that research in L1 composition is applicable to the L2 and that, "...second language composition teaching needs to adopt the findings and techniques of native composition research" (1989 p. 83).

It is worth noting here that the majority of word processing research to date (both L1 and L2) has followed what has been until recently, a predominantly process-oriented paradigm. This is evident in the way a majority of studies rely exclusively on instruments that analyse *writing process* - but *not writing product*. At least one writer (Pendreigh, 1990) has voiced his concern that process-oriented methodology is in fact, unsuitable for research or instruction in computer-based composition. He attributes the conflicting findings of word processing studies (at least partially) to the unsuitability of the process-oriented approaches used.

This view is supported by Péry-Woodley (1991) who points out that the three main areas of writing analysis must be adequately addressed in any composition study. These are analysis of; product, cognitive process(es), and communicative function. She goes so far as to say that any approach to analysing composition that does not address all three components, is inadequate. In short, a process-oriented approach to composition research will (and must) miss 'a large part of the picture'.

Another important concern raised by Dunn and Reay (1989) is that few (if any) word processing studies have adequately addressed the issue of how 'keyboard proficiency' or transcription rate affects the quality of word processed texts. Dunn and Reay point out that most word processing

studies attempt to draw a direct 'like-to-like' comparison between the two writing modes (word processing and 'pen and paper'). Unfortunately, these studies fail to take into account the differing transcription rates/proficiency levels of subjects in 'pen and paper' and word processing composition modes. Dunn and Reay (1989) conclude that the majority of word processing studies have not been as methodologically rigorous as they should have been - because they have failed to consider level of mastery of both modes as a factor in the analysis.

Conclusion

Despite conflicting results in some areas, the majority of previous research findings indicate that the use of computers can be beneficial in the writing process of student writers. The specific benefits (and their relative importance) as well as the nature of potential problems, are all issues on which the studies reviewed differ. The conflicting results in many of these studies may (at least partially) be explicable in terms of the methodological weaknesses already mentioned.

2.1.4 Similarities and differences: L1 and L2 composing and revising

Most comparisons of L1 and L2 composition have focused specifically on revision. This work offers us valuable insights into the similarities and differences of composing in a first and second language.

In her study, Raimes (1987) used think-aloud protocols to compare the composing strategies of adult L1 and L2 writers. She found them to be similar: consisting of the same processes of idea generation, planning, organising, writing, meaningful revising and editing. She also found that the difficulties of her ESL writers were not so much due to L2/L1 'interference' as they were to the constraints of the writing task itself. These included such factors as time, topic and audience.

One noteworthy difference that seems to exist between the composing processes of L1 and L2 writers is the process Heuring (1985) refers to as 'translating'. In the L1 context, this term refers to the transforming of ideas into actual written text. The translating process that Heuring (1985) discusses however, is only available to second or multilanguage speakers. It is the process of recoding ideas from one language into another before encoding them into the written form.

Despite some differences, the overall composing processes of L1 and L2 writers are remarkably similar (Flower, Hayes, Carey, Schriver, & Stratman, 1986; Bridwell et al., 1984; Faigley & Skinner, 1982; Heuring, 1985).

2.2 Literature on Methodology

In the majority of composition studies reviewed, methods of analysis have been specific to the writing *process* - usually focusing on revision. In a few studies however, there has been a focus on the quality of the finished *product*. These studies have generally relied on holistic or holistic/analytic evaluation of texts by trained raters. These and other methods of evaluating finished text quality were also discussed in section 2.1.2.

Methods of Evaluating the Writing Product:

In holistic rating, the reader responds to the impact of the text as a whole. The typical procedure is for the researcher to use three or four raters to evaluate a number of texts using an holistic writing quality scale (Canale et al, 1988, 1982a, 1982b; Cooper, 1977; Diederich, 1974; Myers, 1980). In several studies, holistic rating has been followed up with the application of an 'holistic/analytic' scale of writing quality. This scale has usually been developed by identifying the most important (from the reader's perspective) and common factors that influenced the raters' judgments of holistic quality. Researchers who have used this approach include Diederich (1974), Canale et al. (1982a, 1982b, 1988), Marsh and Ireland (1987), Perkins (1982) and Perkins and Brutten (1990). These studies have generally used large sample sizes and achieved consistent results and high inter-rater reliabilities (there was an overall inter-rater reliability coefficient of .92 in the case of the Canale et al. instrument). This is the approach the present study will take to measuring the quality of the written product: The instrument to be used is presented in Table 3.1.

Methods of Evaluating the Writing Process:

Two main methods (both relating to revision), have been used for the analysis of composing processes. In some studies, the 'think-aloud' protocols of subjects have been tape-recorded and analysed (Raimes 1985, 1987; Swarts, Flower, & Hayes, 1984). In other studies, a taxonomy of revision types has been used to analyse and code revision changes made to text. In some cases, these methods have been combined (Raimes, 1985, 1987; Heuring, 1985).

The most frequently used method for categorising and recording revisions (in both L1 and L2 studies) is Faigley and Witte's taxonomy of revision changes (Faigley & Witte, 1981; Faigley & Skinner, 1982; Faigley, 1981; Faigley & Witte, 1984; Daiute, 1986; Harris, 1985; Hawisher, 1987; Heuring, 1985). Heuring (1985) recommends that future ESL composing research use the Faigley and Witte taxonomy as the standard method for evaluating revision. Where the Faigley and Witte taxonomy has been used, inter-rater reliability has generally been established by the use of up to five independent coders and each revision category has been checked for agreement by at least one other researcher.

There are two schools of thought regarding the use of think-aloud protocols in composing research. On the one hand, some researchers express the concern that the use of think-aloud procedures may affect the naturalness of a writing situation - but that the amount of otherwise unobtainable information provided makes this risk worthwhile (Heuring, 1985; Raimes, 1985, 1987; Bridwell et al., 1984; Cumming, 1989). On the other hand, researchers such as Ericsson and Simon (1980) believe that there is no evidence that the use of think-aloud protocols affects the nature of the composing process.

2.3 Specific Studies Similar to the Current Study

Of L2 word processing studies, few have dealt with adult academic ESL writers (Neu & Scarcella, 1990; Chadwick & Bruce, 1989). Neu and Scarcella (1990) focused on the effects of word processing on writer attitudes whilst Chadwick and Bruce conducted a longitudinal study to

examine the effects of word processing on the revision strategies of undergraduates at the University of Hong Kong. In both cases, the subjects were all Asian.

The focus of the present study is on the quality of the writing process, product and attitudes of adult academic ESL writers and it represents a different (and more comprehensive) approach to L2 word processing. A few similar L1 word processing studies have been conducted - these will be examined now.

Hawisher's (1987) study focused on the revision strategies of 20 'advanced' native English speaking background (ESB) university undergraduates. Whilst her major focus was on the writing *process* (revision), she also utilised Diederich's (1974) holistic/analytic measure of writing quality to analyse the written *product*.

Hawisher's (1987) research found that;

- more revision was done with pen and paper than with word processing,
- revision did not have a direct impact on quality,
- the computer is not necessarily a more effective revising tool.

Two other L1 word processing studies reviewed are sufficiently similar to the present study to merit mention here. The first was done by Reed (1990). Reed's subjects were 23 education undergraduates. They were all given a 15-week computer-based course in writing instruction. Subjects were required to produce five essays of different genres - these were all analysed for holistic quality. In addition, subjects responded to writing apprehension and computer anxiety questionnaires. Holistic rating scores were

determined by three trained raters using a scale of one to four - four represented highest quality. Although word processing did produce better quality writing in some instances, the results were not consistent.

Robinson-Stavely and Cooper's (1990) study involved 79 remedial and introductory university composition students. The subjects were required to complete their normal course assignments - using either computer or pen and paper. The researchers found that:

> Analysis of their final essays revealed that those subjects assigned to use computers wrote better essays than those assigned to work on paper. Essays written on computer were judged of higher quality, were longer, and contained fewer errors....attitudes towards writing and the course did not differ (p. 41).

Although only three studies have been reviewed in this section, it is apparent that they differ on a number of points. Hawisher found that word processing did *not* improve revision or writing quality - but Reed (1990) found that word processing *did* improve writing quality (although not consistently). Reed found that writing *topic* had a more significant and consistent effect on writing quality. On the other hand, Robinson-Stavely and Cooper (1990) found that word processing produced texts that were longer, had fewer errors, and were of a higher quality. They also found that word processing had a positive effect on writer attitudes.

Whilst the findings outlined here are obviously in conflict, this is understandable. The writing process *is* a complex phenomenon, and there are always many potential confounding influences. The results of any such study will be influenced by many variables - some obvious, some not. Potentially confounding influences will be considered in Chapter 4.

CHAPTER THREE

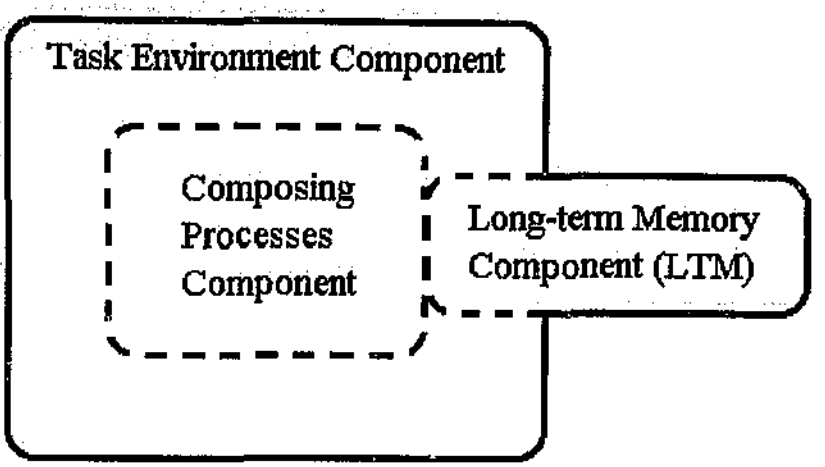
Conceptual Framework

The conceptual framework for the present study will be considered at two 'levels'. Firstly, it will be considered in terms of the total writing process - incorporated within the total writing process will be 'revision'. Secondly, in terms of the quality of the written *product*. Although interrelated and interdependent, it is logical to separate process and product to conceptualise the underlying philosophy of the present study. The main instrument - the 'holistic/analytic' scale of writing quality (Canale et al., 1988) will also be presented here (rather than in the instruments section of this proposal). As well as being the principal instrument, it is also the conceptual framework of writing 'quality' for the present study.

3.1 The Writing Process

The work of researchers such as Hayes and Flower (1983, 1986) has given us a clearer insight into the complexity of composing processes and the central role of revision. Their cognitive process model of composing clearly shows that revision is one of several interacting processes in composing (see Appendix 1). This theoretical model is based on data obtained from several years of collection and analysis of think-aloud protocols. This same model was the basis for Heuring's (1985) L2 writing process model (Figure 3.1) and his composing processes component (Figure 3.2). It is on the basis of Heuring's composing processes component model (Figure 3.2) and his L2 adaptation of Hayes and Flower's model of composing (see Figure 3.1) that

the theoretical and philosophical assumptions about the writing process are made. The two models provide the overall conceptual framework for this study. This approach is taken because Heuring's (1985) composing processes component is in fact one of the three main components of his model of composing (see Figure 3.1)



Heuring (1985) modified the L1 writing model to take into account the unique translating process that only second language writers have. There are three components to his model: the long-term memory (LTM), the composing processes and the task environment.

* **The LTM (or long-term memory)** consists of internalised knowledge often acquired in another language.

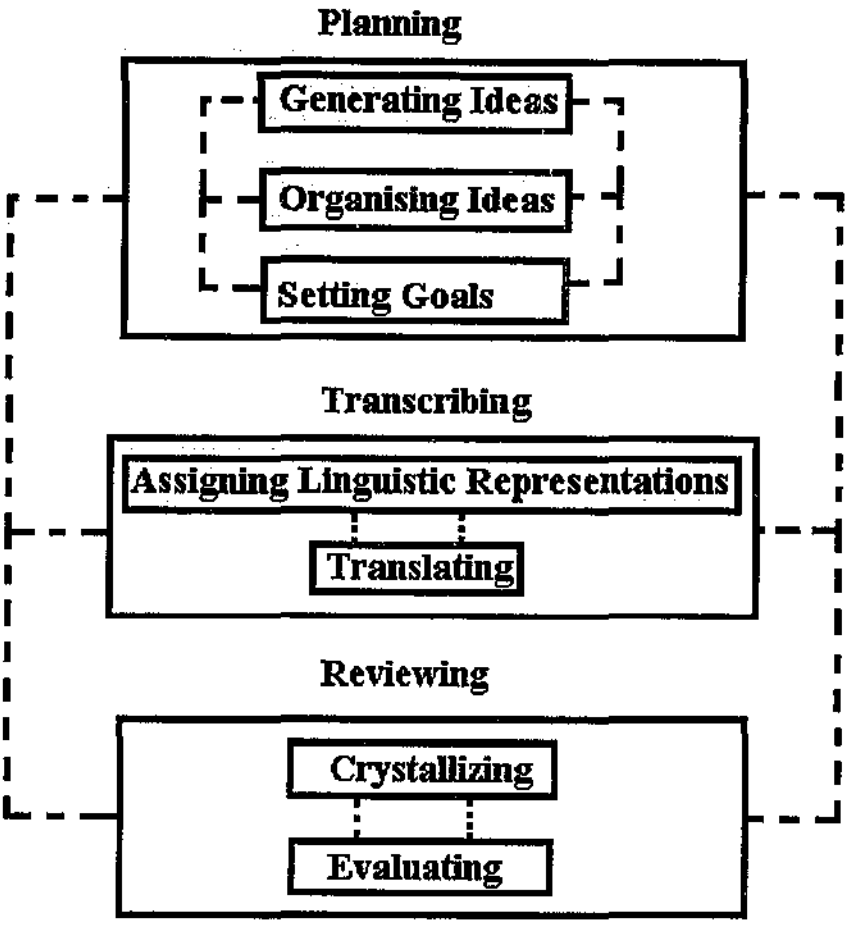
* **The Composing Processes Component** consists of the three major composing processes: planning, transcribing, and reviewing.

* **The Task Environment** refers to anything that influences the performance of the task, including such intangibles as: topic, intended audience and purpose - in addition to the text that a writer has already produced.

(One significant modification to the above model. The three components in Heuring's (1985) original model were surrounded by continuous (unbroken) borders. This could be construed to indicate a certain 'discreteness' of the three components. The continuous borders have been replaced by a combination of continuous and dotted-line borders. The reasoning behind this is that there is NO clearly defined point where one component 'ends' and another 'begins'. They are *interactive* and *recursive*: They are interrelated and interdependent. If any definite boundary can be said to exist - it is that which surrounds the writing process *in toto*. This has been indicated by the use of continuous outside borders).

(Heuring, 1985, p. 22.)

Figure 3.1: Heuring's Writing Process Model



* **Translating** - "...an option that only second or multilanguage speakers can utilise since only they are capable of recoding ideas from one language to another".

* **Crystallizing** - "...is a process in which writers reexamine [sic] the text produced so far in order to stimulate further idea generating, organizing, and goal setting".

* **Evaluating** - "...the writer examines what has previously been written in order to determine if improvements are necessary...in other words, a writer checks to see whether the transcribing process has accurately approximated the intentions resulting from the planning process".

In contrast to Figure 3.1, the above composing processes component IS made up of three discrete processes. And each of these, in turn, is made up of sub-processes. Only one sub-process can occur at a given moment - although it can be interrupted by another sub-process at any time. This is due to the non-linear (or recursive) nature of the writing process.

(Heuring, 1985, pp. 25-26).

Figure 3.2: Heuring's Composing Processes Component

The assumptions made in the present study are;

1. Heuring's (1985) models provide the researcher with a suitable model of composing (Figure 3.1) and an accurate and functional representation of the specific composing processes component of that model (Figure 3.2),

2. this has been (and can be) established through elicitation and analysis of written work and verbal protocols,

3. Hayes and Flower's model of the revising process (Flower et al., 1986) is an accurate representation of the complex cognitive processes involved in revision (Heuring's 'reviewing' component) and a suitable basis for a 'theory of revision' as described by them (see Appendix 8),

4. Heuring's composing processes component assists the researcher in identifying the different components of the writing process and in describing any relationships that he infers as the result of his research,

5. just as Heuring's composing processes component represents the cognitive processes related to the physical activity of revising, so do Halliday's six 'text-related components' represent the text-related features of the task environment (see Appendix 2),

6. the Canale et al. (1988) holistic/analytic writing quality measure is an appropriate instrument to measure 'writing quality' - one that takes into account the characteristics valued by readers as indicators of quality (see Table 3.1),

7. that the Faigley and Witte categories of revision changes to text are *generally* discrete categories, forming part of a rational taxonomy, that is an appropriate instrument for the analysis of the revising behaviours of adult ESL writers (see section 1.5.2),

8. that the use of verbal 'think aloud' protocols is an appropriate and valid means for eliciting information on revising and composing behaviours that will not *significantly* impact on the writing of the adult ESL writer.

While Heuring's composing processes component model (Figure 3.2) and L2 adaptation of Hayes and Flower's model of composing (see Figure 3.1) form the overall conceptual framework for this study, the specific conceptual framework for 'revision' is provided by Hayes and Flower's cognitive processes in revision model (see Appendix 8).

3.2 Writing Quality

'Writing quality' will be defined and measured in terms of the 'holistic/analytic' scale devised by Canale et al. (1988). This instrument measures writing 'quality' in terms of twenty characteristics that are considered by the majority of studies reviewed, to be indicative of writing quality. Table 3.1 (following page) presents the twenty items of the Canale et al. (1988) instrument in tabular form. Each of these has been defined and discussed in some depth in section 1.5.1.

As stated in chapter one, this study will not attempt to offer a definition of 'writing quality' beyond that given above.

Table 3.1

Holistic/Analytic Scale of Writing Quality (Canale et al., 1988)

Category and its component parts:		Items for scoring: (0 to 5) (0 = least proficient, 5 = most proficient)
A. Writing as a reflection of community standards	*** Standards of language usage**	1. Spelling and capitalization 2. Grammar and vocabulary
	*** Standards of written documents**	3. Neatness 4. Punctuation 5. Paragraphing
	*** Standards of appropriate formality**	6. Appropriate language register, purposes, subject matter, length
	*** Standards of mode or genre of writing**	7. Elements and layout
B. Writing as a reflection of individual personality		8. Originality and interest of ideas presented 9. Ease, confidence, and maturity of expression
C. Writing as unity of form and ideas	*** Cohesive devices to unify sentence forms**	10. Lexical cohesive devices 11. Structural cohesive devices
	*** Coherence elements to unify ideas**	12. Development: the sense of direction and order of presentation of ideas 13. Continuity: the consistency of facts, opinion and writer perspective, as well as the reference to previously mentioned ideas and the relevance of newly introduced ideas 14. Balance: the relative emphasis accorded each idea 15. Completeness: the degree to which all ideas in a piece of writing work together as an integrated, thorough discourse
D. Writing as an effective act of communication		16. Clarity of writer's purpose and desired response from his or her audience 17. Sense of audience 18. Effectiveness of ideas 19. Effectiveness of the choice and variety in language 20. Effectiveness of literary devices

CHAPTER FOUR

Method of Investigation

4.1 Design of the Study

This is a 'within-group' design in which each subject completed four writing tasks - using either word processing or 'pen and paper' transcription methods. To minimise any potential task-related confounding influence(s), half of the subjects word processed the first writing assignment while the other half manually wrote it. This was followed by a 'changeover' in which the subjects who were word processing assignment one changed to 'pen and paper' mode for assignment two, and those who were writing assignment one changed to word processing mode for assignment two. This procedure was repeated with assignments three and four. At the beginning of the research and at each 'cross-over' point, the researcher recorded transcription rates (keyboard and manual) - and the total number of errors, for all subjects.

The design is illustrated in Figure 4.1. In week one the subjects received word processing instruction, in weeks two to nine they completed their written and word processed assignments, and in week ten they were interviewed by the researcher. In total, the data collection involved a period of ten weeks.

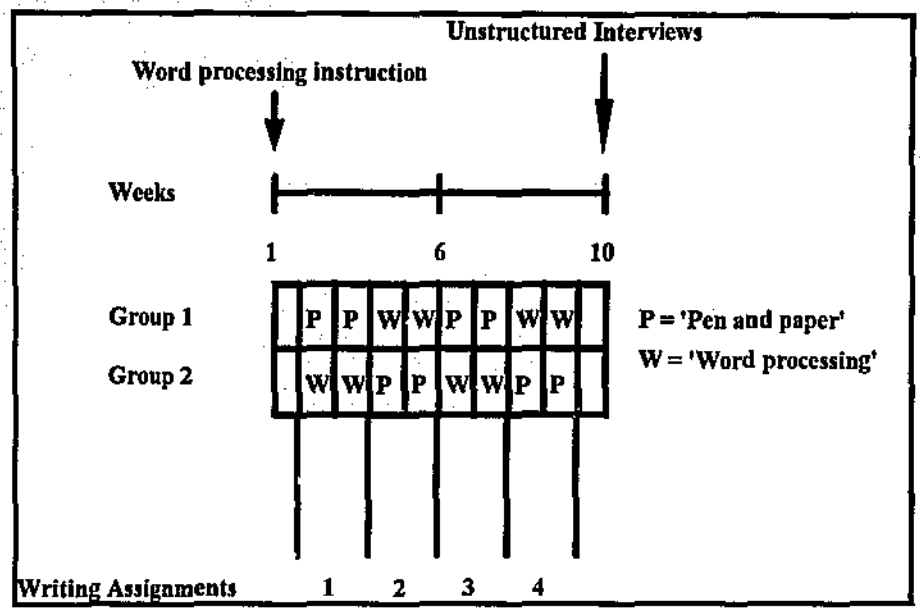


Figure 4.1: The Research Design

4.2 Sample Used

The 'intact' ESL class initially identified as suitable subjects for this study, consisted of 20 NNESB (non-native English speaking background) adults - enrolled in ESL 1004 - an ESL unit designed to prepare them for study at Edith Cowan University. This unit constitutes the "arts" component of a four-unit preparatory ESL course that qualifies students for entry into the university's graduate and undergraduate programs.

Of the original 20 subjects in this 'intact' group - only 15 were included in the final data analysis. This was partly due to attrition (three subjects withdrew from the course) and partly due to the provision of inadequate data (two subjects refused to submit the minimum number of texts required: two word processed, two handwritten). It is important to note that participation in the research was on an entirely voluntary basis - subjects were free to discontinue their involvement at any point in the data collection

process. It should also be noted that the researcher experienced some difficulty in obtaining 'pen and paper' drafts from some subjects. This issue will be examined in the limitations section (Section 6.6).

The sample of 15 subjects, came from a diverse range of linguistic and educational backgrounds - the majority having no previous word processing experience. The small sample size is an issue to be considered -when statistical methods constitute the main data analyses in the present study. However, this is another issue that should be addressed in the limitations section (Section 6.6). Relevant data on the subjects themselves are presented in the following table (Table 4.1).

Although gender was *not* a focus of this study, the majority of subjects were female. The sample consisted of 12 females and 3 males. This is apparently a typical male-to-female ratio for enrolment in these undergraduate preparatory ESL units.

Table 4.1

Background Data on the Research Subjects

Subject	Country of Origin	First Language	Sex	Educational Background	WP Experience
1	Argentina	Spanish	f	Diploma (Education)	None
2	China	Mandarin	m	BA (Chinese Literature)	None
3	El Salvador	Spanish	f	High School	None
4	Chile	Spanish	f	High School	None
5	Ecuador	Spanish	f	High School	None
6	Egypt	Arabic	f	BA (Archaeology)	None
7	Poland	Polish	f	BA (Horticulture) - Incomplete	Limited Experience
8	Germany	German	f	Technical College	25 years Mainframe Programming
9	Japan	Japanese	f	BA (Literature)	None
10	Chad	Sara	m	Diploma (Govt. Studies)	None
11	Thailand	Thai	f	B.Psych	Basic WP and Database
12	Afghanistan	Pushtun	m	High School	Basic WP
13	Croatia	Croat	f	BA (Linguistics) - Incomplete	Basic WP
14	Spain	Spanish	f	Diploma (Management Studies)	Has taken a WP course in the past
15	Chile	Spanish	f	BA (Drama) - Incomplete	None

4.3 Description of Instruments and Equipment Used

4.3.1 Instruments

The Canale et al. (1988) Holistic/Analytic Writing Quality Scale

The Canale et al. (1988) writing quality scale is the main instrument utilised in this study. It is presented in its entirety (with definitions) in section 1.5.1 and again in more summarised format in Table 3.1. This instrument was used to measure the quality of the written product. It has been proven (in previous studies) to be both reliable and valid. Using four raters, Canale et al. found that it achieved an overall inter-rater reliability coefficient of .92 (using the Hoyt Estimate of Reliability). Generally, the instrument will be utilised 'as is' - the exceptions being that item 7 (neatness) will be assumed to refer to both handwritten and word processed standards of document presentation - and that each of the 20 items will be measured on a scale of zero to five (rather than zero to four as in the original Canale et al. research). A six-point scale was considered more appropriate by the researcher due to the considerable variation in written language competencies he observed in initial informal analyses of subject texts.

Faigley and Witte's Taxonomy of Revision Changes

The instrument used to analyse the revision changes in the written and word processed texts collected, was Faigley and Witte's taxonomy of revision changes (see Appendix 3). This taxonomy distinguishes text changes as being either changes that do not affect the meaning of a text ('Surface Changes') or changes that do affect the meaning of a text ('Text-Base Changes') (Faigley & Skinner, 1982).

Faigley and Witte's taxonomy categorises six main types of revision operations: additions, deletions, substitutions, permutations, distributions and consolidations. These six operations can affect meaning at the 'Microstructure' or 'Macrostructure' level, or not affect meaning at all (see Section 1.5.2). 'Macrostructure' changes affect the **summary** of a text while 'microstructure' changes still affect meaning, but are 'localised'. For example, a microstructure change would affect the meaning of a phrase or sentence, but not the whole piece of discourse (Faigley, 1981).

Instances of 'editing' are what Faigley and Witte would term, 'formal changes' (Faigley, 1981). While it is possible that some formal changes could also be interpreted as text-base changes at the microstructure level, for the duration of the present study, formal changes will be recorded as such by the researcher only when they *do not affect meaning.*

Verbal (Think-Aloud) Protocol Analysis

The 'think-aloud' protocols of the two most proficient, and two least proficient writers, were audio-taped throughout the duration of the study and used to give a more complete picture of the revising behaviours observed. These were what Swarts et al. (1984) refer to as 'introspective protocols'. While writing or word processing, the subjects selected were asked to 'think aloud' into the tape recorders provided. They were not asked to further explain or comment on their composing processes.

'Most proficient' and 'least proficient' writers were identified on the basis of their word processing and 'pen and paper' transcription rates and total number of errors data. There is evidence that transcription rate is a reliable indicator of writing quality (Wetzel, 1985; Johnson, 1986; Duling, 1985; Dalton & Watson, 1986).

Unstructured Interview

An unstructured interview was conducted with each of the subjects, at the conclusion of the study. These interviews were intended to provide insights into the overall reactions of the subjects to the use of the word processor as a writing tool, and how the processes of composing on the computer and composing with pen and paper, differed for them. They were also asked to describe their attitudes and feelings towards both writing methods. This information was used to construct an 'attitude profile' on each subject.

Observation Schedule

The researcher was present at all writing sessions on campus. Interesting or unusual observations were recorded in a simple observation schedule (see Appendix 9). These were limited to those behaviours (specifically revising) that related to the subjects' composing processes.

4.3.2 Equipment

Hardware and Software

The computers used in this study were Total Peripherals IBM-compatible 486SX personal computers. The machines were all located in one university computer laboratory - and connected to the university computer network. They were suited to the present study because they were capable of running the type of software required: Microsoft Windows 3.1 (a GUI or 'graphical user interface' software package) and WordPerfect For Windows, version 5.2 (a word processing package). It would have been preferable had the subjects had access to 486DX 50 or 66 mhz machines however, as the SX machines used were the minimum requirement for the software to run at a suitable speed.

4.4 Data Collection Procedures

During the first week, records were made of transcription rates (keyboard and manual) and number of errors, for all subjects. Based on these transcription rates, a selection was made of two 'advanced' and two 'basic' writers. The subjects were asked to 'think-aloud' whilst composing. The intention being that the resulting verbal data would be used to assist in the analysis of subject revision and quality data.

In the final week, the researcher conducted brief, open-ended interviews with all subjects. These 'unstructured' interviews were intended to elicit the subjects' global impressions and specific comments on their experiences with manual and word processed transcription in academic writing tasks.

The writing assignments themselves were those set by the course coordinator for the ESL 1004 unit. They were all of the same expository academic genre and of a similar level of cognitive demand. Writing tasks generally fell within either the 'Explanatory A' or 'Explanatory B' categories of Martin and Peters' (1985) Schematic Structure of Exposition Types (see Appendix 10).

The Martin and Peters taxonomy was developed specifically as a framework for teachers and researchers of academic writing - and is particularly suited to academic ESL writers (Drury & Webb, 1991). The type of writing tasks comprehended by it have been used successfully in the past with ESL writers (Heuring, 1985; Raimes, 1985, 1987).

It was advantageous to the present research that all writing tasks were of a similar genre: That they required a, "similar expression of ideational, interpersonal and textual meanings in the formal items of [the] text" (Couture, 1985, p. 76). Whilst it might have otherwise been necessary to 'standardise' the writing tasks in this study - this would have detracted from the obvious authenticity of the work. This necessity would have arisen out of the fact that research has long since established that 'writing task' affects subjects' revising behaviours (Heuring, 1985).

Although time spent word processing was not 'controlled', all subjects were expected to keep a 'time-sheet' to indicate the amount of time spent working on their assignments - in both word processing and 'pen and paper' conditions.

For the ten-week duration of the data collection, all written and word processed work was collected and analysed. In the case of word processed work, the subjects' modifications to text were recorded by utilising WordPerfect for Windows' background macro-recording function. The software's macro-recorder function was used to record every keystroke made by a subject, for the duration of his/her word processing sessions.

In Previous research (Oliver, 1992), the writer had relied upon his subjects recording their own revisions - indicating them by formatting sections of their discourse differently. The word processor's 'strikeout' command was used for deletions (that is, ~~this~~) and an inverted triangle symbol was used on either side of any addition (that is, ∇this∇). Similar revision markings were used by the subjects in their pen and paper work.

The method just outlined seems to have a number of disadvantages - the most obvious being that the possibility exists that the methods of subject recording of revision changes outlined, would add an element of unnaturalness or artificiality to the word processing condition. Another concern is to what extent subjects can be relied upon to *always* remember to mark their revisions. These potential difficulties were overcome by the ability of the software to record and save to file, all keystrokes executed in a given word processing session.

4.5 Data Analysis Procedures

The data were analysed using descriptive statistics and graphical displays. Paired two-sample *t*-tests were used to determine if there were significant differences between the means (over the major categories of 'writing

quality' and revision) for the two groups - the word processing and 'pen and paper' groups. Since the time taken to write/word process assignments was not controlled for, t-tests were used to determine if a significant difference existed between the time spent on word processing assignments and the time spent using the traditional 'pen and paper' method. Had there been a significant difference, it would have been necessary to treat time as a covariate in the analyses.

For both the holistic/analytic writing quality instrument and taxonomy-based revision analyses, inter-rater reliability was established by the use of two other raters. Both volunteer raters were experienced ESL university - level lecturers with considerable experience in teaching and evaluating English composition. These coders used the Canale et al. and Faigley and Witte instruments to rate a randomly selected 10-percent sample of the collected written and word processed assignments.

CHAPTER FIVE

Results

This chapter is divided into four sections. The first three sections address Parts A, B, and C respectively, of the main research question. The final section addresses the subsidiary research question. Most of the data analysis procedures are quantitative: involving the use of descriptive and inferential statistics, and the graphical display of data.

The corpus of texts analysed in this study consisted of 181 drafts - some word processed, others handwritten. The research design called for subjects to produce only four assignments - two word processed and two handwritten. However, a total of 15 subjects completed the four tasks - requiring a mean of 3.01 drafts per assignment to do so. In total, this amounted to 181 drafts examined by the researcher. During the data collection period, subjects also completed other set assignments for their ESL unit - and other units. These were not included in the analyses.

In some cases, up to eight drafts were produced for one writing assignment. For the revision analyses, *all* drafts were analysed. For the purposes of the writing quality analyses - two *final* word processed and two *final* 'pen and paper' texts - from each of the fifteen subjects, were analysed - yielding a total of 60 *final* texts (15 subjects x 4 assignments).

For the descriptive statistics and *t*-tests, the following approach was implemented. For both the revision analysis and writing quality analysis, means (for either number of revisions or writing quality scores) were

reckoned between the two drafts in each condition (word processing and 'pen and paper') - and these data were then used as the basis of all subsequent analyses. This approach was used to increase the reliability of the analyses - by working with averaged figures for both word processing tasks and both 'pen and paper' tasks instead of working with four separate sets of datum (see Appendices 17 and 18).

The appropriateness of this methodology is supported by significant ($p < .05$, $df = 13$) correlations (between both drafts) in both word processing and 'pen and paper' conditions - for all of the 'revision' and all but one of the 'writing quality' items. This is also indicative of high test-retest reliability of the principal and secondary writing analysis instruments used. Appendices 15 and 16 provide the reliability correlation coefficients between drafts one and two, for all major sub-categories in the Faigley and Witte and Canale et al. instruments respectively.

5.1 The Effect of Word Processing Software on the adult academic ESL Writer's Composing Process

The choice was made to examine the composing *process* in terms of *revision*. Although the composing process is made up of many processes and sub-processes, most researchers agree that revision is the central process in writing.

5.1.1 Descriptive statistics for subjects' revision in the word processing and pen and paper conditions

Descriptive statistics were calculated for each of Faigley and Witte's four major categories of revision changes, for both word processing and pen and paper conditions. These are presented in Tables 5.1 to 5.4.

Tables 5.1 to 5.4 show the means and ranges for numbers of changes to text of the four main revision categories, made by the fifteen subjects in their word processing and pen and paper conditions. Formal and meaning-preserving changes both come under the category of 'surface changes' (non-meaningful revisions), while microstructure and macrostructure changes come under the category of 'text-base changes' (meaningful revisions).

For the taxonomy-based revision analysis from which these data were calculated, inter-rater reliability was established by comparing the researcher's classification of revisions with those of two independent coders. The Faigley and Witte taxonomy was shown to and demonstrated for the two coders, who then used it to code the changes to text in a randomly selected 10-percent sample of the collected written and word processed texts. Two inter-rater reliability correlation coefficients were calculated for; researcher/coder 1 (.85), and researcher/coder 2 (.91).

Table 5.1 shows a mean for formal changes in the pen and paper condition that is approximately half that of the figure for the word processing condition. The range for word processing almost completely overlaps the range for pen and paper. Both ranges are indicative of considerable variability in numbers of changes made. In the pen and paper condition, the subjects made a total of 357 formal changes to text, compared to 595 in the word processing condition. For both conditions, formal changes were predominantly changes to spelling or "tense, number and modality" (see Appendix 3).

Table 5.1

Descriptive Statistics for Formal Changes in Word Processing and Pen and Paper Conditions:

	Pen and Paper:	Word Processing:
Mean	23.77	39.63
Range	3.5 - 79	4 - 221
Sum	357	595

Table 5.2 shows a different pattern to that in Table 5.1. The mean for meaning-preserving changes is very close for the 'pen and paper' and word processing conditions. Once again, there is near-complete overlap of the 'pen and paper' range by the word processing range. The ranges in this table are also indicative of considerable variability in the two conditions. The total of meaning-preserving changes in the pen and paper condition was 283, compared to a total of 323 in the word processing condition.

Interestingly, the majority of meaning-preserving changes in the 'pen and paper' condition were restricted to additions or deletions (more complex operations such as substitutions and permutations were not attempted). Additions normally took the form of single words added within sentences: for example, "...and ∇that∇ the writers sense of humour". Deletions normally consisted of one or two words: For example, "...the story might not be very interesting ~~for the reader~~" (NB. In these examples, the '∇' symbol placed on either side of a word or phrase, denotes an addition to the text: The use of character 'strikethrough' represents deletion from the text).

Table 5.2

Descriptive Statistics for Meaning-Preserving Changes in Word Processing and Pen and Paper Conditions:

	Pen and Paper:	Word Processing:
Mean	18.87	21.50
Range	0.5 - 85.5	1 - 169.5
Sum	283	323

In the word processing condition, there tended to be a greater variety of meaning-preserving changes - including permutations, distributions and the occasional consolidation. For example, here is a typical meaning-preserving substitution made by Subject 4: "The writer showed he had a large vocabulary" - became, "The writer used a large range of vocabulary...".

In Table 5.3, there is a larger mean for word processing than there is for 'pen and paper' composition (for microstructure changes). As with the two previous tables, this difference is accompanied by an almost total overlap between the ranges for word processing and for pen and paper. Here also, the two ranges are indicative of considerable variability in both conditions. In the pen and paper condition, subjects performed a total of 213.5 microstructure changes, compared to 316 in the word processing condition.

At the microstructure level, the most frequent changes to text (in both conditions) were additions and deletions - although there were also a lot of substitutions. These normally consisted of words or phrases being replaced. However, in some cases, in the word processing condition, quite large pieces of discourse have been replaced (see Appendix 11, Subject 2, WP 5.2).

Table 5.3

Descriptive Statistics for Microstructure Changes in Word Processing and Pen and Paper Conditions:

	Pen and Paper:	Word Processing:
Mean	14.23	21.07
Range	0 - 110	3 - 154
Sum	213.5	316

Table 5.4 illustrates an important difference - the difference between macrostructure revising in the word processing and 'pen and paper' conditions. There is complete overlap of the 'pen and paper' range by the word processing range. These ranges however, are indicative of less variability at the macrostructure level. Whilst the difference between the two means is comparatively large, the full extent of the differences between macrostructure-level revision in the two conditions is much larger than is immediately apparent.

The total number of macrostructure changes made in both conditions, was small (in the word processing condition, subjects performed a total of 49 macrostructure changes to text in comparison to a total of 9 in the pen and paper condition). However, a single instance of macrostructure addition in the word processing condition could involve between 1 and 602 words being added to the text: whereas an instance of macrostructure addition in the pen and paper condition could involve between 1 and 223 words being added. Macrostructure changes to text in both conditions consisted predominantly of *additions* (see Appendix 11 for text samples and coding key).

Another interesting difference between word processing and 'pen and paper' at the macrostructure level of revision, is that there were far more instances of macrostructure substitution in the word processing condition (n=16) when compared to the 'pen and paper' condition (n=1). Examples of these will be found in Appendix 11.

Table 5.4

Descriptive Statistics for Macrostructure Changes in Word Processing and Pen and Paper Conditions:

	Pen and Paper:	Word Processing:
Mean	0.57	3.23
Range	0 - 4.5	0 - 13.5
Sum	9	49

5.1.2 Results of the paired two-sample t-tests for subjects' revision in the word processing and 'pen and paper' conditions

Paired two-sample t-tests were used to determine whether or not the differences in numbers of revisions made (for Faigley and Witte's four main categories) in the two conditions, were statistically significant.

Tables 5.5 to 5.8 (and Appendix 19) show the results of the paired two-sample t-test for four sets of data - the differences between the total word processing and total pen and paper changes made by all fifteen subjects for the four major categories of revision changes; formal, meaning-preserving, microstructure and macrostructure changes.

Table 5.5 shows that the difference between the number of formal changes made by subjects in the word processing and 'pen and paper' conditions, was not statistically significant ($p > .05$).

Table 5.5

Paired Two-Sample T-Test of the Difference between Formal Changes in the 'Pen and Paper' and Word Processing Conditions.

	Pen and Paper	Word Processing
Mean	23.77	39.63
No. of Subjects	15	15
Hypothesized Mean Difference	0	
df	14	
t	1.46	
P	0.17	

Similar to formal changes, Table 5.6 shows that the difference between the number of meaning-preserving changes made by subjects in the word processing and 'pen and paper' conditions, was not statistically significant ($p > .05$).

Table 5.6

Paired Two-Sample T-Test of the Difference between Meaning-Preserving Changes in the 'Pen and Paper' and Word Processing Conditions.

	Pen and Paper	Word Processing
Mean	18.87	21.50
No. of Subjects	15	15
Hypothesized Mean Difference	0	
df	14	
t	0.39	
P	0.67	

Table 5.7 shows that the difference between the number of microstructure changes made by subjects in the word processing and 'pen and paper' conditions was, as for formal and meaning-preserving changes, not statistically significant ($p > .05$).

Table 5.7

Paired Two-Sample T-Test of the Difference between Microstructure Changes in the 'Pen and Paper' and Word Processing Conditions.

	Pen and Paper	Word Processing
Mean	14.23	21.07
No. of Subjects	15	15
Hypothesized Mean Difference	0	
df	14	
t	1.95	
P	0.07	

Table 5.8 shows that there was a statistically significant ($p < .01$) difference between the number of macrostructure changes made by subjects in the word processing and 'pen and paper' conditions. This represents the one major difference between revising with 'pen and paper' and revising with computer, for the subjects in this study.

Table 5.8

Paired Two-Sample T-Test of the Difference between Macrostructure Changes in the 'Pen and Paper' and Word Processing Conditions.

	Pen and Paper	Word Processing
Mean	0.57	3.23
No. of Subjects	15	15
Hypothesized Mean Difference	0	
df	14	
t	3.47 *	
P	0.004	

* $p < .01$

To sum up, the differences in revising behaviours between the word processing and pen and paper conditions were statistically significant for only one of the four categories - macrostructure changes. While there were some differences at the formal, meaning-preserving and microstructure levels, these were not significant.

5.1.3 Macrostructure changes

Of particular significance is the difference observed in number and extent of macrostructure revisions made in the word processing and pen and paper conditions. As in previous research (Oliver, 1992), it is apparent that many more macrostructure changes were made in the word processing condition, when compared with the 'pen and paper' condition. These macrostructure changes also tended to be much larger in the word processing condition (a mean of 219.25 words per macrostructure change compared with a mean of 19.16 words in the 'pen and paper' condition).

It is worth noting that there was a large difference in the number of words and sentences per *draft* between the two writing conditions; a mean of 674.00 words and 60.04 sentences per draft in the word processing condition compared to a mean of 398.12 words and 17.00 sentences per draft in the pen and paper condition. In both word processing and 'pen and paper' conditions, macrostructure changes to text were predominantly additions. The number and type of macrostructure changes in both conditions can be seen in Table 5.9.

Table 5.9

Macrostructure Revisions in the Word Processing and Pen and Paper Conditions (Categories and Position in Text)

Macrostructure Revision Categories:	**Word Processing:**	**Position:** (initial, in-text/medial or final)	**Pen and Paper:**	**Position:** (initial, in-text/medial or final)
Additions:	30	5 initial 8 medial 17 final	6	2 initial 1 medial 3 final
Deletions:	3	2 medial 2 final	2	2 medial
Substitutions:	16	4 initial 9 medial 3 final	1	1 initial
Permutations:	0		0	
Distributions:	0		0	
Consolidations:	0		0	
Word Processing Total:	**49**		**'Pen and Paper' Total:**	**9**

Although the majority of macrostructure changes were additions, there were also some deletions and a number of substitutions. In previous research (Oliver, 1992), primary ESL writers tended to produce almost exclusively end-of-text additions, at the macrostructure level. This was true for both word processing and 'pen and paper' conditions. However, the pattern is decidedly different with the adult subjects studied. Notably, 16 macrostructure substitutions were made in the word processing condition - as compared with only 1 in the 'pen and paper' condition. In addition to

this, macrostructure changes were not confined to 'end-of-text' additions - they could also occur initially (i.e. revisions to the beginning of a text), medially (revisions to the 'body' of the text) and finally (revisions 'added on' at the end). Table 5.9 also presents these data.

For both conditions, the majority of macrostructure changes are still 'end-of-text' additions - but they are not limited to just this one category. While it could be argued that some of these macrostructure additions recorded constituted nothing more than the continuation of an ongoing writing process, the rebuttal to this argument is simple.

To assist him in answering the question of what constitutes a macrostructure addition - and what simply constitutes a 'continuation' of the writing process, the researcher was fortunate enough to have had recourse to the macro recorder files previously mentioned. These files provide a perfect record of all keystrokes made by a subject - and, if necessary, can be *replayed* on the computer screen in 'real-time'. In other words, the recording captures not only keystrokes, but also their *sequence* and relative times and pauses.

An instance of macrostructure revision is where the subject has made a *change* to the text, and where this change constitutes a *discrete operation* - and entails a change to the overall meaning of the discourse. It is not simply a 'continuation' within an uninterrupted 'flowing' writing process. In both 'pen and paper' and word processing conditions, where text has been added in this way, it is firstly classified as a macrostructure revision - then in terms of its position within the text. It is reiterated here that a macrostructure revision does *not* have to be large - it may consist of only a few words. It is the impact on overall meaning that is important.

5.1.4 Changes to text: patterns and comparisons

The total revision changes made by each subject, in the four major categories of revision, were plotted. These data are seen in Figures 5.1 to 5.4. Figure 5.1 shows that a large number of formal changes were made in both word processing and 'pen and paper' conditions.

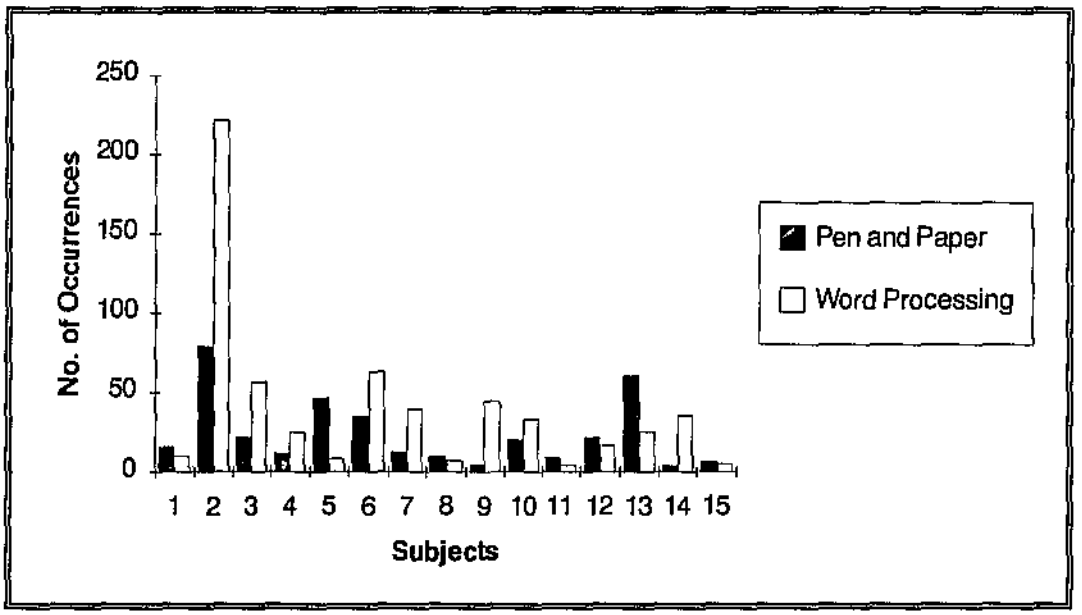


Figure 5.1: Formal Changes

Figure 5.2 shows a similar pattern to that in Figure 5.1. Also noticeable is the fact that Subject 2 has consistently produced more formal and meaning-preserving revisions than any other subject. The researcher is tempted to label Subject 2 a 'hyper-reviser'. He is an extensive 'pen and paper' reviser - but even more so on the computer. Subject 2 represents the one 'outlier' in these data. It is emphasised however, that the non-meaningful revisions made by this subject, were both intelligent and goal-directed.

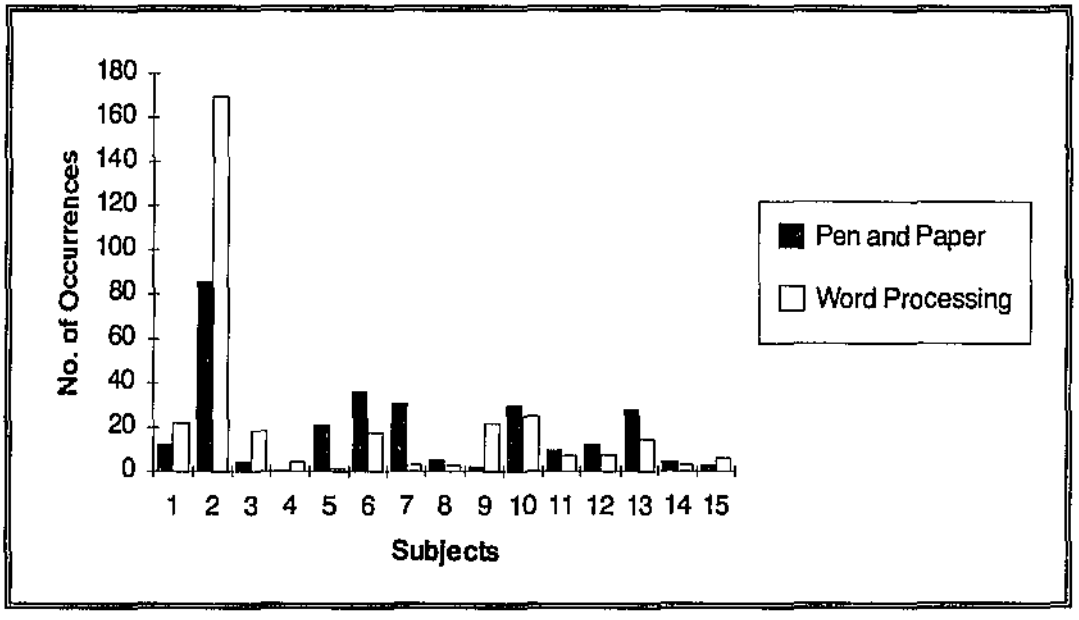


Figure 5.2: Meaning-Preserving Changes

A short comparison is made at this point - between the revising of primary ESL writers - and the present subjects. In his previous research (Oliver, 1992) found that primary ESL writers produced fewer formal and meaning-preserving changes, a similar number of microstructure changes - and a significantly larger number of macrostructure changes - in their word processing condition.

The present research indicates that a *different* pattern exists for *adult* ESL writers. There is no significant difference between word processing and 'pen and paper' conditions for the number of formal or meaning-preserving changes made. Having considered the two categories of *non-meaningful* revisions - an examination of the two *meaningful* categories of revision follows.

Figure 5.3 illustrates data that (like the formal and meaning-preserving changes), are not significantly different between the two conditions. It would seem that like primary ESL writers, *adult* academic ESL writers do not produce significantly more microstructure changes to text when they word process.

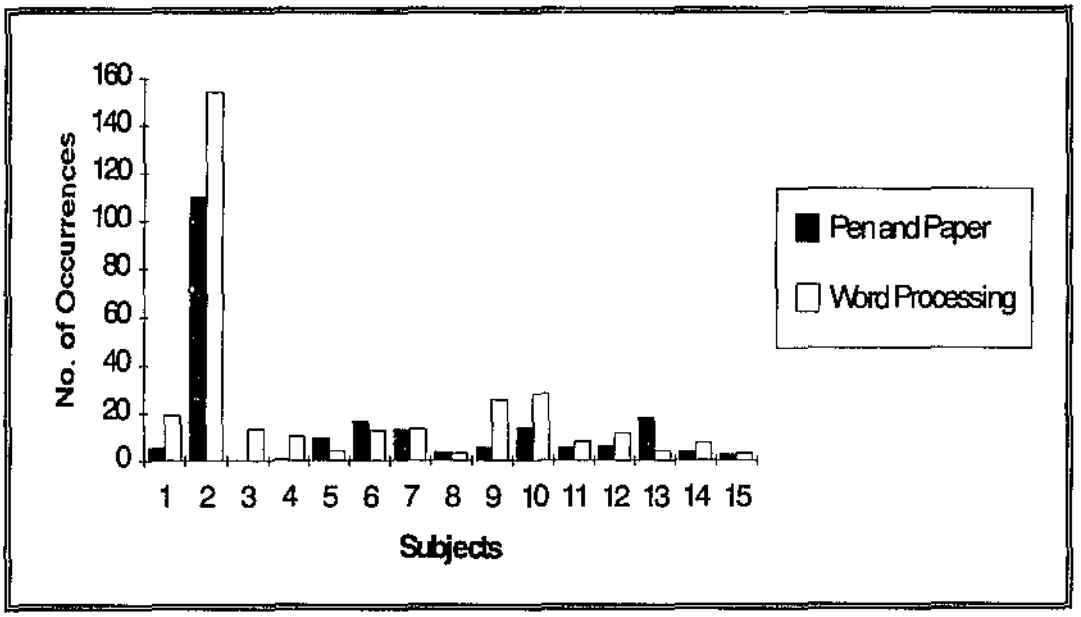


Figure 5.3: Microstructure Changes

Figure 5.4 shows a similar pattern to that previously observed by the researcher with primary ESL writers - the subjects in the present study also produce more macrostructure changes in the word processing condition - when compared with their 'pen and paper' condition.

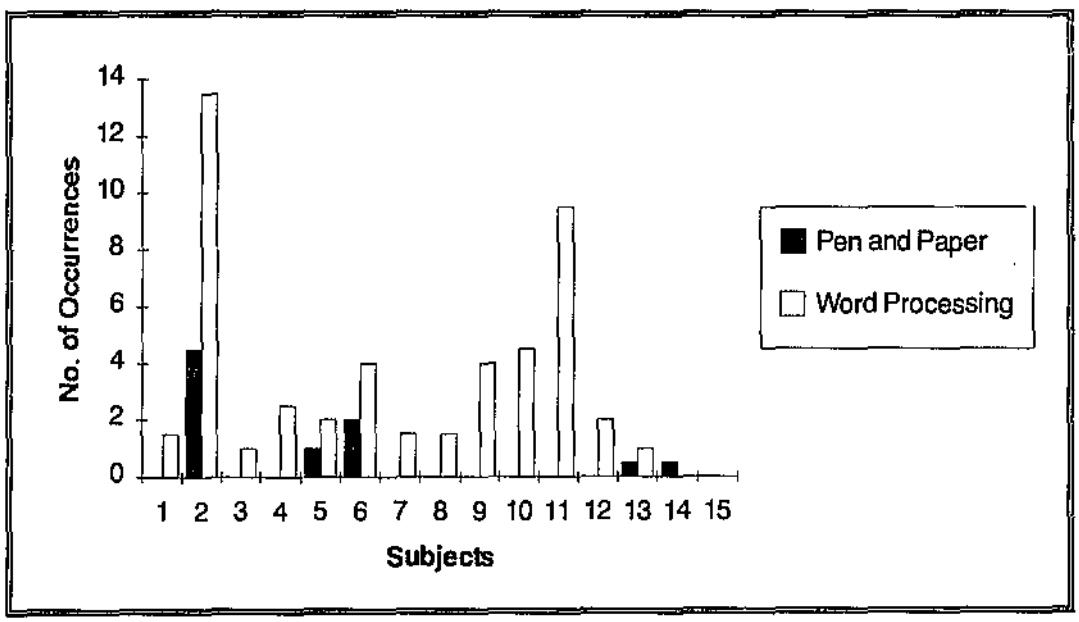


Figure 5.4: Macrostructure Changes

5.1.5 Emerging patterns

A significant focus of subject revision in the word processing condition was on macrostructure changes to text. More (and much more extensive) macrostructure changes were produced by almost all subjects in the word processing condition when compared with the pen and paper condition. The changes were a mixture of additions, deletions and substitutions. They were not restricted to 'end-of-text' additions - several of the macrostructure changes occurred initially and medially. The lack of audio-taped protocols prevents a detailed exploration of these macrostructure revisions, but, unlike the subjects in his previous research, the present subjects had difficulty in 'thinking aloud' for the purposes of the researcher's protocol analysis. This issue will be addressed in Section 6.6 (the limitations).

5.1.6 Protocol analyses

As previously mentioned, it was the researcher's intention to make use of verbal protocol data to assist him in his analyses of revising behaviour. As outlined in the methodology, a decision was made to select two 'advanced' and two 'less advanced' writers - and tape their utterances during each composing session. The four subjects were instructed simply to "think aloud" into the tape recorder - in keeping with previous studies. After listening to nearly 30 tapes - it was found that these subjects were unable, or unwilling, to 'think aloud'. At best, they read (verbatim) their written work into the microphone: At worst, there was no verbal activity at all. There are several possible explanations for the subjects being unable to 'think aloud' - these will be considered in Chapter 6.

5.2 The Effect of Word Processing Software on the adult academic ESL Writer's Composing Product

The revision data examined thus far illustrate certain differences in the writing *process* that are possibly related to the writing *mode* (i.e. word processing or 'pen and paper'). At this point, it is logical to take the comparison between 'pen and paper' and word processing one step further - and to ask if the *quality* of the *writing* produced - i.e. the quality of the *product* - is in any way different when it is word processed.

To determine if there were a difference, the researcher utilised a similar methodology to that implemented with the Faigley and Witte revision taxonomy. This time, however, only the *final* drafts of each subject's two word processed and two 'pen and paper' texts were analysed - and the Canale et al. writing quality instrument was applied. An inter-rater reliability check (utilising the same two volunteer raters) yielded reliability correlation coefficients (after rating of a random 10-percent sample of the corpus of *final* drafts) as follows; researcher/rater 1, .87, researcher/rater 2, .92.

5.2.1. Descriptive statistics for subjects' writing quality scores in the word processing and pen and paper conditions

Descriptive statistics were calculated for each of Canale et al's 's four major categories of writing quality - for both word processing and pen and paper conditions, and are presented in Tables 5.10 to 5.13. The tables provide a numerical comparison of the mean and range for scores achieved by each subject's word processed and 'pen and paper' texts - on each of the four major Canale et al. writing quality categories. Also provided are summed scores for a simple numerical comparison of totals.

Since the names of Canale et al's four categories are somewhat long - where they are referred to in-text, they will be abbreviated as follows:

A. "Writing as a reflection of community standards" will become "community standards",
B. "Writing as a reflection of individual personality" will become "individual personality"
C. "Writing as unity of form and ideas" will become "form and ideas"
D. "Writing as an effective act of communication" will become "communicative effectiveness".

Table 5.10 shows a mean score for 'community standards' in the word processing condition that is greater than that for the 'pen and paper' condition. There is overlap in the ranges for word processing and pen and paper. Word processed texts tended to gain higher scores on 'community standards' sub-items such as; neatness, punctuation, and paragraphing.

Table 5.10

Descriptive Statistics for Quality of Writing ("Writing as a reflection of community standards") Changes Across Word Processing and Pen and Paper Conditions:

	Pen and Paper:	Word Processing:
Mean	21.97	28.93
Range	16 - 31	25.5 - 33.5
Sum	329.5	434

Table 5.11 shows that word processed texts have generally received a higher score on 'individual personality' sub-items (such as 'originality' and 'maturity of expression') than have their handwritten counterparts. Considering the relatively small size of the 'pen and paper' and word processing ranges - there is considerable overlap.

Table 5.11

Descriptive Statistics for Quality of Writing ("Writing as a reflection of individual personality") Changes Across Word Processing and Pen and Paper Conditions:

	Pen and Paper:	Word Processing:
Mean	7.97	8.83
Range	7 - 9	8 - 10
Sum	120	133

Table 5.12 shows how word processed texts have also achieved higher ratings on 'form and ideas' sub-items - this category including; use of lexical cohesive devices, structural (grammatical) cohesive devices, and general coherence. In the sample of texts examined, word processed work has almost always achieved higher scores on 'form and ideas'. Once again, there is overlap between 'pen and paper' and word processing ranges.

Table 5.12

Descriptive Statistics for Quality of Writing ("Writing as unity of form and ideas") Changes Across Word Processing and Pen and Paper Conditions:

	Pen and Paper:	Word Processing:
Mean	21.17	23.43
Range	14 - 26	18 - 27
Sum	317.5	351.5

Table 5.13 shows that there is also a difference in score means between word processed and 'pen and paper' texts for 'communicative effectiveness'. The overlap of ranges is total. This table indicates that word processing does impact on the sub-items of the 'communicative effectiveness' category - these including; clarity of writer's purpose, sense of audience, and use of literary devices.

Table 5.13

Descriptive Statistics for Quality of Writing ("Writing as an effective act of communication") Changes Across Word Processing and Pen and Paper Conditions:

	Pen and Paper:	Word Processing:
Mean	16.7	19.2
Range	14 - 20	14 - 23
Sum	250.5	288

5.2.2 Results of the paired two-sample t-tests for subjects' writing quality scores in the word processing and 'pen and paper' conditions

As for the analysis of revision data - the paired two-sample *t*-test for means was considered more appropriate for the writing quality data. The paired two-sample t-tests were used to determine whether or not the differences in scores achieved on each of the four major Canale et al. categories of writing quality - between word processed and 'pen and paper' texts, were statistically significant.

Tables 5.14 to 5.17 (and Appendix 19) show the results of the paired two-sample t-tests for four sets of data - the differences between the total word processing and total pen and paper quality scores achieved by the *final* drafts of the two 'pen and paper' and two word processed writing tasks - for all 15 subjects - and for Canale et al's four categories of writing quality.

Table 5.14 shows that the difference between the quality scores for word processed and 'pen and paper' texts, in terms of the sub-items of 'community standards', was statistically significant ($p < .001$).

Table 5.14

Paired Two-Sample T-Test of the Difference between Quality of Writing ("Writing as a reflection of community standards") in the 'Pen and Paper' and Word Processing Conditions.

	Pen and Paper	Word Processing
Mean	21.97	28.93
No. of Subjects	15	15
Hypothesized Mean Difference	0	
df	14	
t	7.005 *	
p	.0000062	

* $p < .001$

Table 5.15 shows that there was also a significant difference ($p < .01$) between the quality scores achieved by word processed texts on the sub-items of 'individual personality'. As previously mentioned, this category refers to;

1. originality and interest of ideas presented, and
2. ease, confidence, and maturity of expression.

Table 5.15

Paired Two-Sample T-Test of the Difference between Quality of Writing ("Writing as a reflection of individual personality") in the 'Pen and Paper' and Word Processing Conditions.

	Pen and Paper	Word Processing
Mean	7.97	8.83
No. of Subjects	15	15
Hypothesized Mean Difference	0	
df	14	
t	3.75 *	
P	0.002	

* $p < .01$

Table 5.16 illustrates another difference between word processed and 'pen and paper' composition. It shows that the difference in quality scores received for word processed and 'pen and paper' drafts for 'form and ideas' is also significant ($p < .001$). 'Form and ideas' comprises two main elements - cohesion (lexical and structural) and coherence. That scoring on these two linguistic items should consistently favour word processed texts is of some importance to this thesis - and will be discussed in Chapter 6.

Table 5.16

Paired Two-Sample T-Test of the Difference between Quality of Writing ("Writing as unity of form and ideas") in the 'Pen and Paper' and Word Processing Conditions.

	Pen and Paper	Word Processing
Mean	21.17	23.43
No. of Subjects	15	15
Hypothesized Mean Difference	0	
df	14	
t	4.56 *	
P	0.0004	

* $p < .001$

The last of Canale et al's four writing quality categories is 'communicative effectiveness'. Table 5.17 shows that there was a significant difference in quality scores for 'communicative effectiveness' between the word processed and 'pen and paper' texts. Within this category, Canale et al. have placed such items as; clarity of purpose, sense of audience, and effectiveness of ideas.

Table 5.17

Paired Two-Sample T-Test of the Difference between Quality of Writing ("Writing as an effective act of communication") in the 'Pen and Paper' and Word Processing Conditions.

	Pen and Paper	Word Processing
Mean	16.7	19.2
No. of Subjects	15	15
Hypothesized Mean Difference	0	
df	14	
t	5.46 *	
P	.000083	

* $p < .001$

5.2.3 Writing quality patterns - similarities and differences

The total writing quality scores achieved by subjects' final word processed and 'pen and paper' drafts - for each of Canale et al's four categories are shown in Figures 5.5 to 5.8. Figure 5.5 shows a significant difference in quality scores ($p < .001$) achieved for 'community standards', between the two writing modes. Word processed texts almost always received higher quality scores on the 'community standards' sub-items - especially; 'neatness', 'punctuation' and 'paragraphing'.

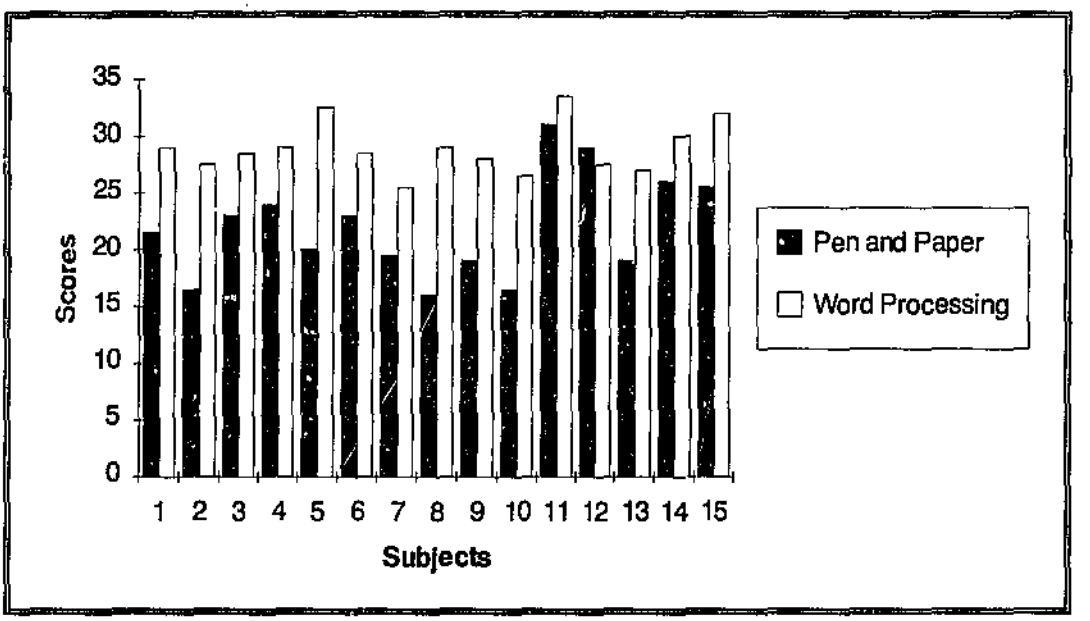


Figure 5.5: Writing Quality - "Writing as a reflection of community standards"

Figure 5.6 shows that in almost all cases, texts produced in the word processing mode achieved higher quality scores for 'individual personality' than did their handwritten counterparts. This difference is significant at the .01 level ($p < .01$).

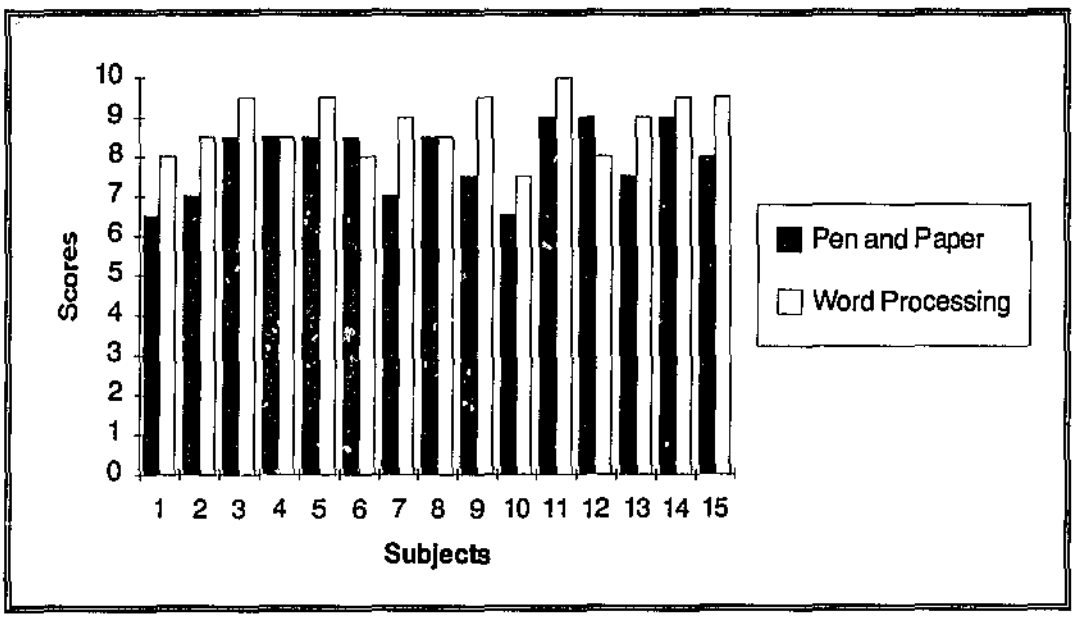


Figure 5.6: Writing Quality - "Writing as a reflection of individual personality"

Figure 5.7 illustrates a significant ($p < .001$) difference between the word processing and 'pen and paper' modes for the 'individual personality' category. There is a consistent tendency for word processed texts to achieve higher quality ratings for the implementation of lexical and structural (grammatical) cohesive devices - than those achieved by 'pen and paper' texts. This difference is possibly related to the revision data already discussed. The possible connection is between increased revision and increased discourse cohesiveness. This potential correlation will be examined statistically in Section 5.4.

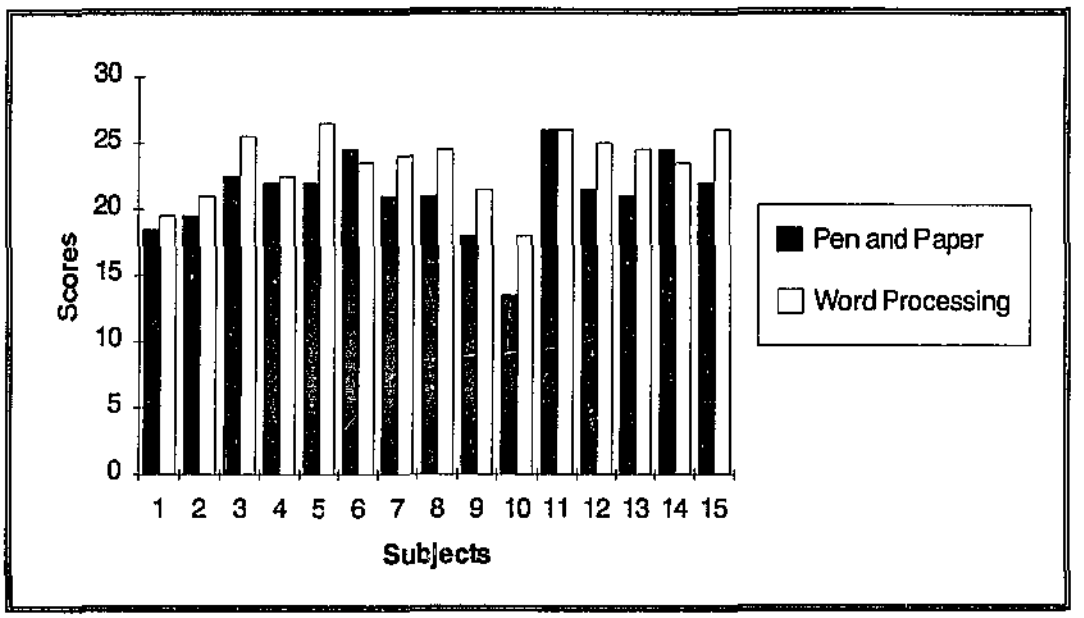


Figure 5.7: Writing Quality - "Writing as unity of form and ideas"

Figure 5.8 shows a significant difference ($p < .001$) between the 'communicative effectiveness' of word processed and 'pen and paper' texts. Word processed texts generally received higher quality ratings on the sub-items of 'purpose', 'sense of audience', and 'effectiveness of ideas'.

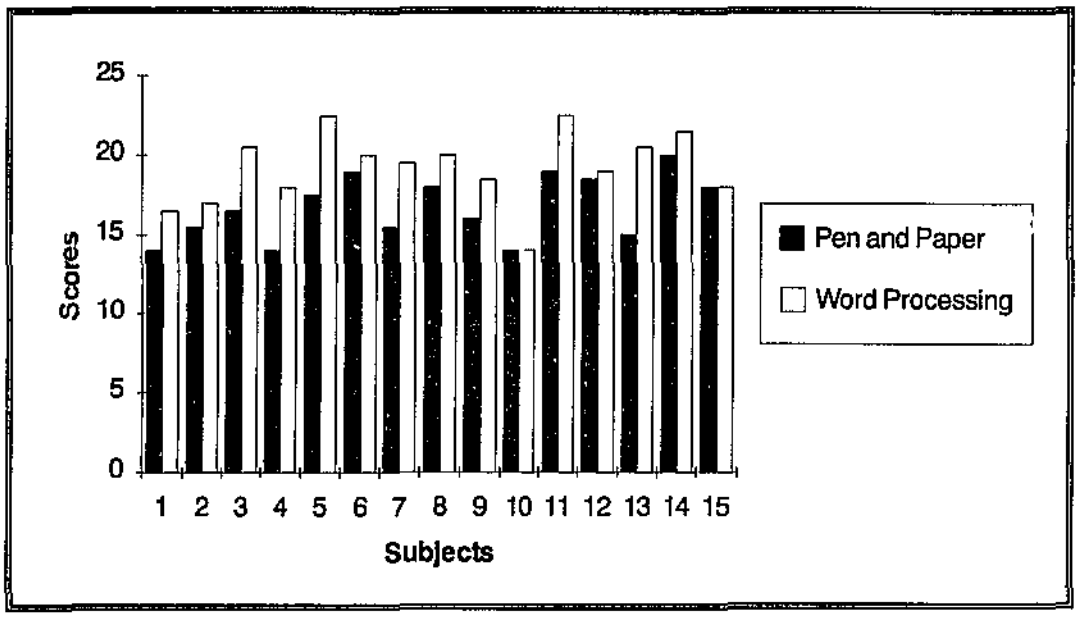


Figure 5.8: Writing Quality - "Writing as an effective act of communication"

5.2.4 Written/word processed samples

Due to the large number of written and word processed drafts produced, only a small sample have been included for comparison (see Appendix 11). These are a representative sample of the work produced in the subjects' word processing and pen and paper conditions. These texts will now be examined in terms of revision and writing quality. Included with Appendix 11 is a coding key for revision.

Subject 4: Word processed draft and associated macro file:

To understand the methodology used to collect revision data in the word processing condition - it is necessary to examine a sample word processed assignment and associated macro file (see Appendix 11, Subject 4, WP2.1 and M2.1 - for both). Referring to the document, the reader will observe several revision annotations made by the researcher - to indicate places where Subject 4 has made revisions. For example, the subject decided that she wanted to have a larger title very early in the writing session - so she changed to a 24-point size for her heading. The following lines (lines 11 to 13, page 1) from the macro file indicate this:

```
Name:"Times New Roman  (TT)";
Size:24.0p;
ForceInsert:Yes!
```

Lines 35 to 40 on page one of the macro file printout, illustrate the formal change made in paragraph three of the assignment. The writer originally intended to say, "...the atmosphere *seemed* to be...". However, she changed this to, "...the atmosphere *seems* to be...". This change has been marked on the assignment as 'Ft' - representing a formal change - within the subcategory of 'tense, number and modality'.

Lines 36 (page two) to 3 (page three) of the macro file show that the phrase from the second sentence in paragraph four, was originally, "...but later on the *writer*...". This became, "...but later on the *reader*...". This is obviously a meaningful revision - but it is not one that affects the summary of the text. That is, the meaning of the text has not been altered substantially at the discourse level. Because of this, the annotation above 'reader' in paragraph four is 'ms'. The lower case 'm' is indicative of a *microstructure* meaningful revision.

It should be pointed out here, that in the word processing condition, revision tends to operate at a number of different levels, almost simultaneously. The microstructure revision just mentioned, occurs within a three paragraph piece of discourse that constitutes a macrostructure addition.

Another point that needs to to be addressed here is the size of the actual macro file referred to. This is *not* the full macro file - which, in its original form, was over 65 pages long. If the researcher had chosen to include a macro file from one of his subject's larger pieces of written work, this would have created problems - many of these files were in the 150- to 250-page range. It is important to remember that *every* keystroke/movement on-screen was recorded.

For the sake of conciseness, the macro file presented here has been considerably 'compressed'. Where a large amount of irrelevant material has been deleted from this macro file, (or from any other) it has been marked thus: < x (no. of) pages deleted>. Many other irrelevant deletions were also made - to ensure that the macro file was of a manageable size.

The sample word processed assignment and associated macro file provided (see Appendix 11, Subject 4, WP2.1 & M2.1) are intended as an example of how the researcher has collected his revision data - and as a possible methodology for similar studies in the future.

Subject 2: Word processed and 'pen and paper' work:

A sample of subject compositions would not be representative if it did not include work from Subject 2, the 'hyper-reviser'. This subject is normally an extensive reviser in 'pen and paper' composing. However, once he discovered the revising features of WordPerfect, the amount of revising he did from that point on, became much more extensive. Due to the typically large size of this subject's drafts (usually 6 to 10 pages), one page extracts of his word processed and 'pen and paper' work have been included (see Appendix 11, Subject 2, drafts WP 5.2 and PP 5.1).

Looking at this subject's 'pen and paper' work first, it will be noted that revisions consist of a mixture of formal, meaning preserving and microstructure revisions. There are, in total, 22 revisions on this page - 9 of which are microstructure (meaningful) revisions. The pattern of many

different levels of revising happening 'almost simultaneously' is not in evidence. Instead, revisions appear to be discrete (and very 'localised') entitities.

His assignment, an essay on the history of Chinese characters (after reaching the 'final' draft stage) achieved an overall quality score of 57. As with most 'pen and paper' drafts, some marks were lost for 'community standards' items such as; neatness, punctuation, paragraphing and elements and layout. For the 'community standards' section, it received a score of 16 out of a possible 35. In addition, this assignment lost marks for the 'individual personality' section (7/10), the 'unity of form' section (19/30), and the 'communicative effectiveness' section (15/25).

By way of contrast, the same subject's word processed draft (see Appendix 11, Subject 2, PP5.1), a tutorial presentation he developed on the same topic of 'Chinese Characters', received a quality rating of 69. A definite pattern can be identified in this subject's word processing revisions. Examining his word processed draft, it can be seen that there is a large amount of 'imbedding' of lower-level revisions within larger, meaningful revisions.

The subject made a total of 87 revisions on this page, 34 of which were meaningful revisions. The rest were formal and meaning-preserving revisions, generally 'imbedded' within the microstructure revisions. The macro file for this draft indicates that many of these revisions, both meaningful and non-meaningful, were made *recursively*. 'Recursively' means that the subject went backwards in the text to revise work already done.

A comparison of quality scores between this draft and the 'pen and paper' draft show that the subject's word processed text achieved superior scores for all four quality categories. The specific items on which the word processed text was marked noticeably higher included; neatness, punctuation, paragraphing, interest of ideas, maturity of expression, lexical cohesion and structural cohesion.

Subject 6: Word processed and 'pen and paper' work:

Subject 6 is the most academically advanced individual within this sample. She is currently completing her masters degree in archaeology. Her 'pen and paper' draft was an essay on "Ancient Egyptian Funerary Arts". The first page only of this 'pen and paper' draft will be found in Appendix 11 (Subject 6, PP6.1). It is worth mentioning here that this is the *sixth* (and final) draft of this assignment in the 'pen and paper' condition. As far as this subject was concerned, this was a 'final draft'.

Examining her 'pen and paper' work reveals that, being a native Arabic speaker, the subject has some difficulty with mastery and control of left-to-right English flowing script. Despite this, the 'pen and paper' draft scored a mark of 72 for overall quality. Whilst this draft scored poorly on 'community standards' (22/35,) it scored well on 'individual personality' (8/10) and on 'form and ideas' (24/30). A lack of clear organization cost points in the 'community standards' category, which also cost points in the 'communicative effectiveness' category (18/25).

In contrast, the subject's word processed draft (an explanatory piece relating the impact of a 'significant other' in a past situation), achieved an overall

quality score of 77 (see Appendix 11, Subject 6, WP1.4). Whilst this is far from being the most significant difference in quality scores between the two conditions, it still serves to highlight some of the more typical differences between the two conditions for these subjects.

Firstly, there is one similarity to be considered. The majority of revisions in the word processing and 'pen and paper' drafts (for all subjects), were non-meaningful. For example, Subject 6 performed a total of 25 revisions in the word processing draft - only 2 of these are meaningful. This is similar to the 'pen and paper' condition where 26 revisions were made - and 4 meaningful (microstructure) revisions. The similarity in number (and proportion of types) of revisions made between both conditions, will be considered in Section 5.4.

In terms of differences (between word processing and 'pen and paper'), the subject's word processed work achieved a much higher quality score for the 'community standards' category. Here, superior scores for neatness, punctuation, paragraphing and elements and layout, all made a noticeable difference.

It is unusual that the subject's word processed work scored less on 'form and ideas' than did her 'pen and paper' work. Within the present subject sample there has been a tendency for higher scores for 'form and ideas' to be allocated in the word processing condition - and this difference is a significant one ($p < .001$). In terms of 'individual personality' and 'communicative effectiveness' - the scores for both conditions (for Subject 6) were identical.

Whilst the subject's work shows superior quality scores for word processed texts, it demonstrates less sophisticated revision behaviours than those of Subject 2. This is another issue to be considered in Section 5.4

Subject 15: Word processed and 'pen and paper' work - and a second look at cohesion and coherence:

Subject 15 has something in common with subject's 2 and 6 - she has no prior word processing experience. The most interesting thing about this subject is that within a very short period of time (10 weeks) she completely adapted to 'composing on-screen'. An examination of her 'pen and paper' draft (Appendix 11, Subject 15, PP2.2) will show that she revises very little in the 'pen and paper' condition. Similarly, she does not revise very much in the word processing condition.

Her word processed work (Appendix 11, Subject 15, WP1.2) achieves higher quality scores for all four quality categories. Those quality items in which her word processed text achieves higher scores include; neatness, punctuation, paragraphing, ('community standards'), originality of ideas, maturity of expression ('individual personality'), cohesion (lexical and structural) and overall coherence ('form and ideas').

In other comparisons made thus far, there was considerable revision activity to examine. In this case, in the 'pen and paper' condition, the subject produced a total of five revisions - one meaningful. The word processed text had five revisions also - one of them being meaningful. If anything - this subject has exhibited almost identical revision behaviours in both writing conditions (word processing and 'pen and paper') - but with very different outcomes in terms of *quality*.

A question that logically develops out of the *lack* of difference in revising between the two conditions, for this subject, is this: If revising doesn't differ for Subject 15 between 'pen and paper' and word processing - what does? The question has validity for all subjects if we consider that out of four categories of revision changes, only one proved to be significantly different - the number and variety of macrostructure revisions made.

Figure 5.7 shows that for 12 subjects out of 15, word processing enabled them to produce texts that achieved higher scores on the 'form and ideas' category of Canale et al's writing quality instrument. The answer possibly lies in an examination of the two items that make up the 'form and ideas' category - namely, cohesion and coherence. A simple comparison between the two texts - in terms of cohesion and coherence - may well hold the answer. Let us examine Subject 15's word processed and 'pen and paper' work in terms of cohesion and coherence. Her quality ratings show that like the majority of subjects, her word processed work has received higher quality scores for these items.

In terms of lexical cohesion, Subject 15's word processed text is superior to her 'pen and paper' effort. The word processed text demonstrates the

competent and integrated use of synonymy, hyperonymic/hyponymic relation, part/whole relationships and collocability. Specific examples include;

- synonymy - paragraph 1 - 'author' & 'writer',
- hyperonymy/hyponymy - paragraph 3 - 'language' & 'description, narration ans [sic] dialogue',
- part/whole relationships - paragraph 4 - 'plot' & 'scene',
- collocability - paragraph 1 - 'aborigine' & 'social *injustice*' * (* in 1993 there is a reasonable expectation that these terms will co-occur quite frequently).

By way of comparison, in her 'pen and paper' draft, Subject 15 makes little use of lexical cohesion - with the exception of an over-reliance on collocability. One example of collocability was;

- paragraph 1 - "healthy diet" & "...proteins, vitamins and calories".

If Subject 15's word processed text is now examined in terms of structural (or 'grammatical') cohesion, a similarly pleasing range of grammatical devices are evident. For example;

- anaphoric relation - paragraph 1 - "The author *exposes these issues* in a very intelligent way" & "*This skill* is clearly shown...",
- reference by pronoun - paragraph 1 - "the author" & "he",
- conjunctions - several used - including; and, therefore, etc.,
- parallelism (partial) - paragraph 1 - "...which exposes the social injustice which Aborigine people..." & "The author exposes these issues...".

A comparison with the word processing text in terms of grammatical cohesion, also shows a more limited range of devices implemented. Conjunctions are used - and there are some instances of parallelism (full and partial). For example;

- paragraph 1 - "...what a healthy diet means..." & "Basically, a healthy diet means...".

Just as a greater range and number of cohesive elements are effectively implemented in the word processed text - so too, do they appear to contribute to a better overall coherence. The four coherence criteria of the Canale et al. instrument can be easily applied to analyzing the coherence of Subject 15's word processed text. For example - her word processed text exhibits;

- logical development,
- continuity (of facts, opinion, and writer perspective),
- balance (relative emphasis of concepts), and
- completeness (all elements of the text work together as integrated discourse).

Her word processed work achieved higher quality scores on three of the four items in the 'coherence' sub-category of 'form and ideas' (see Table 3.1). These items were; continuity, balance, and completeness. The fourth item ('development') received a score equal to that received in the 'pen and paper condition'.

While Subject 15's 'pen and paper' text is not being labelled as 'inferior' - it should be noted that her word processed text achieved an overall quality rating of 88 - compared with 75 for the 'pen and paper' text. This rating was based on an instrument that has (in previous studies and the present one) been proven extremely reliable.

It should be noted here that these analyses of Subject 15's word processed text were *not* intended to be in-depth - they are nothing more than a rudimentary analysis of cohesion and coherence. Other writing quality considerations such as grammar, spelling and syntax, have not been considered here.

There are strong similarities between the patterns described for the word processed and 'pen and paper' compositions of Subject 15 - and those of Subjects 1, 3, 4 and 5. This is both significant and understandable, as these five subjects are all native Spanish speakers - and constitute one third of the final sample used for this study.

Subject 8: Word processed and 'pen and paper' work:

Subject 8 represents a unique subject within the sample used. Unlike the subjects referred to so far in this section, Subject 8 has a vast amount of computer experience. She has been a mainframe programmer for approximately 25 years - and is extremely *uncomfortable* with the idea of composing with 'pen and paper'. The other texts examined so far have been produced by individuals who had no prior computer or word processing expertise, prior to their involvement with this research.

This subject required considerable coaxing to produce any work with 'pen and paper' - and needed to be convinced that any work produced this way would not have a negative effect on her unit assessment. When she was made fully aware of the research design and purpose - she was happy to cooperate with the researcher - but on the understanding that once she had produced a 'pen and paper' draft for him - she could *then* go ahead and word process it anyway. The nature of these 'pen and paper' drafts are explained here. The example included in Appendix 11 (Subject 8, PP1.2) is really a word processed draft - to which the subject has appended a 'manually' composed second draft. Whilst collection of this sort of 'pen and paper' data was highly irregular, the researcher considered this subject to be of particular interest and importance to the study. Therefore, this situation was considered preferable to one of non-participation.

Not surprisingly, the overall quality score achieved by the subject's word processed work was much higher than that for her 'pen and paper' work. The difficulty experienced by the researcher in *attempting* to read this subject's work is indicative of a lack of 'conventional writing' in the subject's daily life. Interestingly, whilst there were revisions in her 'pen and paper' assignment (Appendix 11, Subject 8, PP1.2), there were none in her word processed assignment (Appendix 11, Subject 8, WP1.1).

It would be inappropriate to make a 'like-to-like' comparison between this subject's 'pen and paper' and word processed work without taking into account her unique circumstances. For her, 'pen and paper' composition is as unusual as word processing was for the majority of subjects, prior to the commencement of this study.

This subject demonstrates in her 'pen and paper' draft, that her 'pen and paper' composing is little more than 'outlining' and the writing of 'notes'. It is obvious that this subject has little need for revision in the word processing mode. Having watched her at length, the researcher would be inclined to typify her word processing composition style as 'stream-of-consciousness' - direct translation of 'in-head' knowledge to the computer screen. If this subject ever used any hand-written notes to assist her with her assignments, this researcher was not aware of it.

The subject revised less than most in the word processing condition. However, there is no doubt that the quality of the work she produced in the word processing condition was of a higher quality (when compared to 'pen and paper'). Like the majority of subjects, her word processed work scored higher quality ratings for 'form and ideas' (cohesion and coherence). The one revision behaviour that Subject 8 had in common with *all* other subjects is that she performed more macrostructure revisions overall in her word processed work.

This text analysis section would be incomplete without a specific examination of some examples of macrostructure revisions made by the subjects in this study, which follows.

All subjects: Macrostructure revisions in both word processing and 'pen and paper' conditions:

Subject 5:

The first macrostructure revision examined is one executed by Subject 5 (see Appendix 11, Subject 5, PP2.2). She is a native Spanish speaker. The 'pen and paper' draft this macrostructure revision occurred in was an assignment on the history of Australian film. Here we can see that within the large parenthesis a macrostructure substitution (the only one in the 'pen and paper' data analysed) and a macrostructure deletion have occurred.

Firstly, the Macrostructure substitution consisted of everything from, "...to this prefer presentations of evangelical religion such as Soldiers of the Cross 1900" to "...tend to classified in seven different parts" at the bottom of the page, being replaced with, "With Joseph Perry and Sons..." to, "...the culmination of the series presented...".

This was a *macrostructure* substitution since it did substantially alter the summary of the text - by altering the part of the text dealing with the introduction to, and earliest history of, Australian film. Several important new details were added with this substitution. The deletion was of the sentence, "By the 1890 the Australian film were add new dimensions...". Since this sentence was replaced with, "...inter-related films, slides, music and the spoken word", it could be argued that the 'Ms' annotation covers the revision instant quite adequately. However, the topic of the essay is on the history of Australian film. The previous sentence put these new

innovations into historical perspective - and into a specific period. Considering the nature of the assignment, although more material has been added (in the substitution), important information has also been lost (deleted).

It is repeated here, that in keeping with his systemic-functional conceptual framework, the researcher has implemented an entirely *semantic* definition of macrostructure revision - not a grammatical one.

Subject 10:

Subject 10 is a native speaker of Sara, one of over one hundred dialects of *Chad* spoken in the four countries bordering Lake Chad in north eastern Africa. This subject produced macrostructure changes in the word processing condition only. The one examined here is from the second page of an essay on traditional African arts (see Appendix 11, Subject 10, WP6.1). It commences six lines from the bottom of page one - and continues until half-way down page two.

The macrostructure addition takes the form of an example, or illustration. It affects the summary of the text, by modifying the central theme (and thus the *summary*) of the text. This revision has been taken (in part) from a reference work, and has been added to the text (medially) after completion of the first draft.

Subject 11:

There seems to be a pattern in the execution of macrostructure additions that are medial (added to the 'body' of the text). In the case of Subject 11, a native Thai speaker, she also produced macrostructure additions that consist of quotations from a reference book (see Appendix 11, Subject 11, WP3.2). Unlike *final* and *initial* macrostructure additions, it would seem that the majority of *medial* macrostructure revisions examined, consist of 'added in' examples and quotations - these generally seem to consist of material authored originally by someone other than the subject.

All three examples of macrostructure revision examined here, are examples of *recursive* revising at the macrostructure level. They are indicative of the subjects' *non-linear* writing process. this issue will be considered in Section 6.5 (Theoretical Models).

5.3 The Effect of Word Processing Software on the adult academic ESL Writer's Attitudes Towards the Writing Process and him/herself as a writer

At the conclusion of the research, all 15 subjects in the final sample were interviewed by the researcher. The unstructured interviews proved to be an invaluable source of informal data. The average interview was of approximately 15 minutes duration. Interviews were taped with the full knowledge and consent of the participants. At all times subjects were encouraged to discuss those issues that they considered the most significant or interesting. As much as was possible, the interviewer avoided 'leading' the subjects - or attempting to control or structure the interview too much.

The subjects in this study expressed a wide range of opinions and feelings towards word processing, and its place in the composing process. When transcribed, the interview data proved to be quite extensive. For this reason, only pertinent extracts have been examined here. Specific extracts from a representative sample of five subjects were examined - then an 'attitudinal profile' was constructed for all subjects - and presented in tabular form (see Appendix 12). The intention of the researcher, since these interviews are the major source of naturalistic data, was to provide a 'thick' description of subject response to word processing and 'pen and paper' composition.

Subject 8 - interview:

This subject expressed the following view regarding word processing, "...I couldn't go without it". This perhaps, sums up best, her view towards word processing in the composing process. Interestingly, she indicated to the researcher that although she had some previous experience of WordPerfect, and had gained considerable benefit from the word processing component of the ten-week data collection period, she still felt that she had, "...only mastered about 30 % of WordPerfect".

When asked during the interview why word processing was so important to her, she replied thus, "...to help me in my ongoing studies to get my Bachelor of Science degree. I am very sure I will be using word processing with all of my assignments".

To satisfy his own curiosity, the researcher asked the subject what differences she noticed between the WordPerfect for Windows he had taught her, and the WordPerfect for Dos she was accustomed to. She indicated that she preferred the, "...WordPerfect without the Windows because in Windows you are always lagging behind".

The last quote indicates that the subject is accustomed to composing at some *speed* on a computer. If the hardware or software was not adequate, she would obviously experience a considerable amount of frustration. It is probable that this subject, and others like her, would be more comfortable working in Windows if it was installed on a fast 486DX-based personal computer.

When the researcher asked the subject how the ten weeks of word processing had influenced her attitudes towards writing - she replied:

> I have never been very good in writing with 'pen and paper' - (it) is not really an alternative for me any more. I definitely prefer to use the computer. I like to write a sentence with the computer and make changes where necessary - If I'm doing this with 'pen and paper' it is very messy. I prefer to do editing and revising on screen. With 'pen and paper' I find it more difficult to get the first sentence down but much easier on the computer...

It is interesting that for this subject, 'pen and paper' was not considered a viable alternative to word processing. Her quote indicates that her writing style is now so adapted to the word processor that she finds difficulty in "getting the first sentence down" if she tries to use 'pen and paper'.

This subject tended to be quite outspoken in her views. When asked if she felt that word processing influenced the way she thinks when writing, she had the following to say:

> Yes...I start much earlier to type things, I find it much faster and easier to use the computer. It is a much faster way to get things down - It is much easier to revise and edit...

When asked what else she would like to say about word processing, Subject 8 mentioned that she felt that she revised more when she word processed and that:

> I am very sure that using the computer for word processing has improved the quality of my work. Its also fun and easy to do. I also like the appearance of the work - it is neater and tidier. I like it because you can move a sentence around and read it in its new setting and get a feel for it - whether it is right where it is.

Subject 8 was asked if her attitude towards herself as a writer had changed:

> I was scared of writing before - I mean, writing in English was very difficult for me - the word processor has made a big difference for me - I feel much more confident now. I know I still make mistakes but now much less than before - I know that now I am able to deliver something that is quite ok.

As a final question, the subject was asked to comment on anything else she wanted to. Her reply was interesting:

> WordPerfect has two facilities - one of them the spell checker and the other the thesaurus. They are really good to use, but if I am in an exam in a class I can't use them - this is a problem.

The subject went on to say that if she was to be taught composition on the computer - she should be *assessed* on the computer. She was indicating that mode of instruction should match mode of examination. Her concern was that she might find herself being instructed in computer-based composition at some point in the future - but then have to be examined in *'pen and paper'* composition. For this subject, the two are very different phenomena.

Subject 3 - interview:

Subject 3 was asked a very broad question at the beginning of her interview - she was asked to comment on anything related to the ten weeks she spent doing word processed and 'pen and paper' compositions. This was her response:

> The most interesting thing for me was learning how to use the computer. I didn't know how to use one when I started with the group. It has helped me to improve my English even though I didn't come very often to the tutorials, because of my work...

The subject stated that the only previous experience she had of word processing was a two to three hour tutorial organised by the university last semester.

When asked how she felt about word processing, this subject said that:

> ...I find it easier to write as I think when I am word processing and I fix mistakes easy and quick. I like also using the thesaurus which is quick. When I write with pen and paper I have to use a dictionary often and it takes much time.

An interesting problem this subject identified in the word processing she did was one of limited space:

> ...I have to fill myself with a lot of knowledge before I start (word processing) - I have to do all my research first and have my books of reference all around me. Sometimes this is awkward when there is a shortage of space...

This subject identified working in the computer lab as being *uncomfortable*. She found it hard to concentrate surrounded by lots of other people working on the computers. She also found it difficult doing her 'pen and paper' composition in the lab due to the limited space available - and because she was unable to have her reference books spread out around her.

When asked if she felt the computer had affected the way she writes - she responded:

> Yes, because of the facilities the computer gaves [sic] you - its much better than 'pen and paper' - because with 'pen and paper' you get tired very quick repeating the draft a lot of times, where the computer allows you to do it quick and easy many times.

The subject added that she was initially anxious and frustrated about learning how to use the computer. She indicated to the researcher that it was only after completing her first assignment on the word processor, that she began to see the difference.

In response to a question on how word processing had influenced the subject's attitudes towards writing. Her reply was:

> I feel more positive about my writing now - so much so, I am going to buy a computer for myself...

This was not an unusual response - Subject 4 said the same thing within the first few weeks of the research. By the conclusion of the study, she had purchased an expensive IBM-compatible computer system and a copy of WordPerfect for Windows. Like several other subjects, Subject 4 is a refugee with limited funds. The importance she placed (within such a short period of time) on having access to word processing facilities, and the expending of her limited funds, are indicative of the genuineness of her responses.

A final comment from Subject 3 summed up her overall feelings about the word processing component of her ESL unit:

> ...I was very unhappy in the language lab but I am very happy I learned to use the computer. I can now do my assignment directly into the computer instead of writing rough notes...

Subject 4 - interview:

This subject echoed the responses of Subject 3. She too, decided after the first few weeks of the research, to purchase a computer and word processing software. By the conclusion of the research, more than half of the subjects expressed an intention to buy their own computers.

Subject 6 - interview:

Subject 6 had never used a computer before becoming involved in the present study. All of her assignments and coursework in her previous degree were completed by hand. Referring to this subject's 'pen and paper' draft may lead the reader to believe that this is highly unlikely - it can be seen that she has great difficulty in producing controlled flowing script in English (see Appendix 11, Subject 6, PP6.1). However, the researcher was able to see samples of her work in Arabic. In these, she exhibited none of the difficulties with 'manual' transcription that are evident in her 'pen and paper' work in English.

The first question the researcher addressed to this subject was regarding her overall impressions of her ten weeks of word processing and 'pen and paper' composition:

> At first it was very hard for me because I had very slow speed typing. I practised a lot and slowly became better at typing which made me feel good....Now I am happy when I find it easy to put in to my assignment things I have forgotten...to put in and to rearrange my work on the page without any trouble. When I use 'pen and paper' it is difficult to rearrange work without much trouble...

Subject 6 went on to say that:

> Now I find it takes me only one third of the time on computer to complete work that takes much more time in 'pen and paper'...

The subject (without further prompting) continued to describe her experiences with word processing and 'pen and paper' composition:

> When I started typing on the keyboard I only use one finger and have to look for every key - now I work much faster and finish assignments and home work quicker - and neater - with good spelling. Now I know where the letters are without looking at the keys. I type much quicker.

The following quote best explains why this subject likes word processing so much:

> I find it so much easier using the word processor to add information - to correct spelling - it is not easy for me to write in English language - but with the word processor it is much better....The computer saves my time, I get much more done and correct things as I go using the thesaurus and speller all the time. When I want to add something I can add it immediately - also taking out is quick and easy.

This subject cited several other advantages for word processing (over 'pen and paper' composition) - these included; ease of locating and replacing text, ease of organising work 'on-screen', ability to compose *directly* to the screen without, "pages and pages of writing notes". This last point was very significant for this subject. She was most impressed by the fact that she learnt, using the computer, to compose directly to the screen.

Subject 6's final comment was:

> ...I am going to buy a computer now to use at home. I want to have a CDROM encyclopaedia and Arabic word processor - then I will find getting information much easier.

Subject 9 - interview:

Subject 9 is a native Japanese speaker. At the time of commencing the study, she had only recently bought an IBM-compatible computer for her home. When asked to make a general comment she had the following to say:

> During the past ten weeks I have used the computer for academic writing for the first time and I am very pleased I had a chance to learn so much so quickly - and at the right time....I don't like hand writing - I am not very good at it so...I prefer to do most of the work including finishing it off - on the computer. If I can - I type straight into the computer - although if I am getting information from several books - then I make notes on 'pen and paper'...

When the researcher asked Subject 9 about whether her revising behaviours were different in the word processing condition - she said this:

> ...In the computer I do more editing and revising than I do with 'pen and paper'. It is so much easier to do corrections on the word processed work and not at all messy. Correcting 'pen and paper' work is much more difficult and messy....I am not still competent with English grammar so I rely very much on my programs to help me - this is one big advantage of having a word processor...

When this subject was asked if she had any final comments to make in regards to word processing - either negative or positive - she said the following:

> Using the computer makes me feel more confident in myself as a writer because I know that the finished work will be checked for me by computer - and it will be mistake-free. This is good....I cannot think of anything negative about computing and using the word processor - it is a big improvement on 'pen and paper'.

Subject interviews - a summary:

In the representative sample of subject interviews examined (five out of a total of fifteen) - there would appear to be no negative reactions to the word processing software itself. Referring to Appendix 12, an overall 'attitudinal profile' has been constructed for the subject sample - in relation to their perceptions of word processing and 'pen and paper' composition.

All fifteen subjects preferred word processing to 'pen and paper' for academic writing purposes. The reasons given for this included; ease and speed of revision, improved writing quality, access to electronic spell checking and thesaurus facilities, speed of transcription, and a few subjects felt that word processing more closely approximated their natural writing style than did 'pen and paper' composition.

Only three subjects identified disadvantages for word processing - these were related to an initially low typing rate on their part - or the need for further instruction in the use of the software.

All subjects interviewed identified ease of revision as one of the major advantages of word processing. A number of them also considered that the quality of their writing had increased as a direct result of their word processing. Even more significantly, two subjects (Subjects 8 and 15) indicated that word processing suited the way they wrote better than 'pen and paper' composition.

The comments of these two subjects are significant. They are *not* surprising when they come from Subject 8 - who has a vast amount of prior experience with computers. However, Subject 15 had *no* prior experience of word processing - and it was only during the ten week period of data collection that this subject developed the ability to compose directly 'on-screen'.

In comments made to the researcher, Subject 15 indicated that during data collection, she made a complete change in the way she writes. She changed from being a 'pen and paper' writer to an 'on-screen composer'. This is significant because it indicates that the advantages one would normally expect Subject 8 to have (due to her twenty or more years in the computer industry) are not essential for an individual to derive considerable benefit (and *quickly*) from the use of word processing software.

Subject 15 has demonstrated that it can be nothing more than a matter of a few *weeks* before a subject begins to adapt to the new technology - and for the technology to then start to impact on revising behaviours and the quality of the writer's work.

The responses of these subjects indicate that word processing has had a major impact on their attitudes towards writing. Word processing is viewed by all subjects, as a desirable (and preferable) alternative to conventional 'pen and paper' composition. However, the researcher would warn against interpreting these subjects' responses as evidence that word processing can *totally* substitute for traditional composition methods. The rationale here is not dissimilar to that behind the use of calculators in the mathematics classroom. The student *needs* to know how to perform mathematical functions *before* being given a machine to do it for him/her.

5.3.1 Other Anecdotal Data

As previously discussed, the taping of verbal protocol analysis was not a useful source of data. Unlike previous research (Oliver, 1992), the present subjects did not 'think aloud'. The protocols however, were never intended to be the only source of naturalistic data - the researcher also anticipated the need for subject interviews and the use of anecdotal records. The researcher was present at all writing sessions on campus - during these sessions he made notes of significant behaviours or situations he observed. Sample extracts from the researcher's anecdotal records have been included in Appendix 13. These have been useful in adding to the researcher's overall knowledge of individual subject's writing processes, problems, and practices.

In the few samples provided in Appendix 13, it is interesting to note that two requests occur from subjects who would rather word process their assignments - instead of using 'pen and paper'. This was *not* an unusual occurrence. Throughout the research, one or two subjects became quite aggressive when it was 'changeover time'. Subject 8, when it was time for her to change from word processing to 'pen and paper' mode - came to see the researcher afterwards and told him that she simply had, "...no time to waste on 'pen and paper' writing - I have a lot of work to do - and I need to word process it...".

The researcher had a similar experience with Subject 14 also (undocumented). She was generally quite unhappy about having to do 'pen and paper' work - and on one occasion - both she and Subject 8 came to see the researcher - to ask to do word processing rather than 'pen and paper' work.

One characteristic that all subjects in this study share, is a positive attitude towards writing with the computer. Some of these subjects came into the study with such an opinion - the rest developed such opinions over the course of the 10-week intervention period.

5.4 The Relationship Between Revising and Writing Quality in 'Pen and Paper' composition and Word Processing

The data so far have shown significant differences exist between texts produced by word processing and those produced by 'pen and paper'. These differences are in terms of one (of four) of the revision categories and in terms of four (of four) of the writing quality categories. These findings have been supported by the use of multiple raters, inter-rater reliability checks on instruments used, keystroke recording of subjects' word processing sessions, researcher observation and subject interviews.

From the researcher's perspective, these results are interesting and provocative - because of the nature and extent of the differences observed. However, an important question remains unanswered. For the subjects in this study, word processing has influenced their revising behaviour, and has

enabled them to produce texts that receive significantly higher quality scores for all four categories of writing quality. What has not been established is whether or not there has been a (significant) relationship between revision and writing quality scores for these subjects. If these two items - revision and writing quality, are significantly correlated - it would be interesting to know in which condition (word processing or 'pen and paper') this relationship is *most significant*.

The revision and writing quality data in question have been presented here in two correlation matrices - one for the 'pen and paper' condition and the other for word processing (see Tables 5.18 and 5.19). These will show if there is any statistically significant (positive or negative) correlation between revising and writing quality - in either word processing or 'pen and paper' conditions.

Table 5.18 shows that there is no significant correlation between the four main categories of revision and four main categories of writing quality - in the 'pen and paper' condition ($p > .05$, $df = 13$).

Table 5.18

Correlational Matrix for Revising and Writing Quality in the 'Pen and Paper' Condition

	Revising - Formal Changes	Revising - Meaning-Preserving Changes	Revising - Microstructure Changes	Revising - Macrostructure Changes
Quality - 'community standards'	-0.40	-0.45	-0.39	-0.30
Quality - 'individual personality'	-0.24	-0.45	-0.37	-0.16
Quality - 'form and ideas'	-0.10	-0.22	-0.19	0.03
Quality - 'communicative effectiveness'	-0.22	-0.21	-0.19	0.02

Table 5.19 shows that there is no significant correlation between the four main categories of revision and four main categories of writing quality - in the word processing condition ($p > .05$, $df = 13$).

Table 5.19

Correlational Matrix for Revising and Writing Quality in the Word Processing Condition

	Revising - Formal Changes	Revising - Meaning-Preserving Changes	Revising - Microstructure Changes	Revising - Macrostructure Changes
Quality - 'community standards'	-0.35	-0.25	-0.27	0.04
Quality - 'individual personality'	-0.15	-0.19	-0.20	-0.04
Quality - 'form and ideas'	-0.32	-0.39	-0.42	-0.26
Quality - 'communicative effectiveness'	-0.26	-0.36	-0.39	-0.15

These correlation matrices support the hypothesis that for the subjects in this study, there was no significant relationship between revision and writing quality. This issue will be considered in more depth in Chapter Six.

5.5 Transcription Rates, Number of Errors and Time

There are a number of final issues that need to be addressed before moving on to the discussion chapter. The first of these is the question of whether the overall difference in transcription rates between word processing and 'pen and paper' conditions was significant. Transcription rate has previously been identified as a significant factor in word processing research (Dunn and Reay, 1989).

The answer to this first question is that there *is* a significant difference between the transcription rates in the word processing and 'pen and paper' conditions ($p < .001$). Subjects achieved significantly lower transcription rates in the word processing condition when compared with 'pen and paper'.

It is important to remember that the transcription rates referred to here were those recorded by subjects in their timed one-minute transcription 'tests'. These were conducted at the beginning, at each 'changeover', and at the conclusion of the research.

Despite significantly faster transcription rates in the 'pen and paper' condition, subjects still managed to produce longer word processed texts, and more extensive macrostructure revisions within these. Table 5.20 (and Appendix 19) shows that subjects had a significantly slower mean transcription rate ($p < .001$) in the word processing condition.

Table 5.20

Paired Two-Sample T-Test for the Difference between Transcription Rate in the 'Pen and Paper' and Word Processing Conditions.

	Pen and Paper	Word Processing
Mean (cpm *)	128.5	89.6
No. of Subjects	15	15
Hypothesized Mean Difference	0	
df	14	
t	4.73 *	
P	0.00032	

* characters per minute

** $p < .001$

Another difference between word processing and 'pen and paper' composition was in the number of errors made. Once again, the error rate referred to here is the number of errors made in a one-minute

transcription 'test'. Subjects had a significantly lower transcription rate *and* error rate in the word processing condition, when compared with the 'pen and paper' condition.

Table 5.21 (and Appendix 19) shows that the difference in means between errors in the word processing and 'pen and paper' conditions was statistically significant ($p < .05$).

Table 5.21

Paired Two-Sample T-Test for the Difference between Error Rate in the 'Pen and Paper' and Word Processing Conditions.

	Pen and Paper	Word Processing
Mean (errors per minute)	0.47	1.87
No. of Subjects	15	15
Hypothesized Mean Difference	0	
df	14	
t	2.78 *	
P	0.014	

* $p < .05$

The two preceding tables add interesting insights to what is already known. In the word processing condition, subjects' texts were longer, macrostructure revisions were more extensive, and the texts received higher quality ratings (for all four quality categories). In addition to this, word processing was a significantly slower means of transcription for these subjects - and one in which they made significantly fewer errors.

A final factor to be considered here is time. If subjects were slower at word processing, the question of how they produced longer texts (and of a higher quality) needs to be addressed.

For the purposes of this study (to avoid detracting from the practical and authentic nature of the research), the amount of time spent on word processing and 'pen and paper' composition was *not* controlled for. Instead, subjects were simply requested to keep a record of the time they spent writing (in 'pen and paper' and word processing conditions). The subjects used time sheets such as the one in Appendix 14.

Table 5.22 presents data that is not consistent with the other findings in this study. Subjects' word processed texts were longer and the macrostructure revisions made within them were longer also - when compared to the work done in the 'pen and paper' condition. However, the transcription rates of subjects in the word processing condition were significantly lower. Given these facts, it would be logical to assume that the subjects in this study spent considerably more time word processing than they did on 'pen and paper' composition. Table 5.22 however (and Appendix 19), shows *no* significant difference in terms of time spent on composing in either condition.

The researcher would be inclined to attribute this conflicting data (at least in part) to a lack of accurate reporting on the part of subjects. Datum on time spent composing was the only datum that was solely the responsibility of subjects to record. The collection and supervision of all other work was undertaken by the researcher himself. This issue will be discussed in Section 6.6 (the Limitations).

Table 5.22

Paired Two-Sample T-Test for the Difference between Time Spent Composing in the 'Pen and Paper' and Word Processing Conditions.

	Pen and Paper	Word Processing
Mean (minutes)	158.67	160.67
No. of Subjects	15	15
Hypothesized Mean Difference	0	
df	14	
t	0.11	
P	0.91	

CHAPTER SIX

Discussion

This discussion chapter is divided into six main sections. The first four sections address the three sub-sections of the main research question and the subsidiary research question. The fifth section examines the theoretical models in relationship to the research findings - and the final section addresses the limitations of the study.

6.1 The Effect of Word Processing Software on the adult academic ESL Writer's Composing *Process*

The present study has examined the effect(s) of word processing on revising behaviours, quality of writing, and attitudes of writers towards the writing process. A number of interesting findings have emerged. These have shown that the revising of adult academic ESL writers differs when using word processing instead of the more conventional pen and paper method. It is clear that whilst there is no *overall* significant difference in revision between word processing and 'pen and paper' conditions, there is a significant difference in revisions made at the macrostructure level. Significantly more macrostructure revisions were performed in the word processing condition - and their positions (in text) and type were more varied (in comparison to the 'pen and paper' condition). In addition, these macrostructure revisions tended to be much larger in the word processing condition.

As in previous research (Oliver, 1992), the majority of macrostructure revisions were additions. In his previous study, the author hypothesised that macrostructure revising was the most cognitively demanding form of revision - and that a focus on 'conventional' revising at the macrostructure level would not allow a similar amount of simultaneous concentration at other 'levels' of cognitive demand. The literature reviewed by the researcher has not considered this possibility. The data, however, do appear to at least partially support such an interpretation.

While macrostructure revising has significantly increased in the word processing condition, microstructure and non-meaningful revisions have not. Considering the comparatively large amount of text involved in macrostructure revising in the word processing condition, the researcher would conclude that the word processing software has facilitated more extensive and complex revising than was normally possible for these writers with pen and paper. This has meant however, that there were no similar increases in other revision categories as the subjects moved from 'pen and paper' to word processing conditions.

The findings of the present study do show that word processing facilitates macrostructure-level revision - whilst not significantly influencing non-meaningful or 'lower-level' meaningful (microstructure) revising.

For both conditions (word processing and pen and paper), the claim of Faigley and Witte (1984) and Heuring (1985) that revision is a *recursive process*, was supported by the data. Whilst his attempted collection and

analysis of verbal protocols did not assist the researcher in establishing the recursive nature of revision, the macrorecorder files he collected did. The combination of macrorecorder files, handwritten revision markings, and interview data, all provided a 'picture' of macrostructure revising in the word processing and 'pen and paper' conditions.

As in previous studies (Sudol, 1985; Daiute, 1986; Oliver, 1992), the present research has demonstrated that word processing involves a type of revision very different to that done with pen and paper. While this difference is not immediately apparent in terms of *overall* revision, it is very marked at what is arguably the 'highest' level of revision - *macrostructure* revising.

Sudol (1985) referred to this with his 'principle of addition'. Sudol found that his L1 adult college students revised very differently on the computer. Unlike their pen and paper counterparts, his word processing subjects tended to 'add first, delete last'. They would normally not start deleting or changing anything until they had gone through the process of making long and extensive additions (to the end of the text). Once they had added everything they wanted, a recursive process of rereading and searching for possible deletions and modifications began.

This process is similar to the one executed by the adult L2 subjects in the present study. Since all movement backwards and forwards in text was 'logged' in the macrorecorder files collected, the researcher had the advantage of very precise information about revising with a word processor.

For example, ALL macrostructure revisions in the word processing condition have been accompanied by the writer 'recursing'. The writer would either move backwards in the text to reread a portion of text, then modify it - or move backwards in the text, reread a portion of text, then move *forward* to continue writing.

Where a macrostructure revision has involved bidirectional 'recursing' - (going backwards in the text to reread, then returning to the original position and revising or adding text), it is likely that it has involved an instance of the cognitive process Heuring (1985) would call Crystallizing (see Figure 3.2). Where there has simply been a unidirectional 'recursing' (going backwards in the text to reread and revising at that point), it would involve an instance of the cognitive process of Evaluating (see Figure 3.2). Crystallizing and Evaluating are the two cognitive processes involved in the 'Reviewing' sub-process of L2 composing. The relevant theoretical models will be considered in Section 6.5.

The researcher found it somewhat more difficult to analyse his subjects' handwritten work in the way just described. To start with, there were fewer macrostructure revisions in the 'pen and paper' condition. In addition, the only clues the researcher had to work with were the revision markings made by the subjects themselves (words crossed out or inserted). These gave no indication of 'within-text' movement or of the conventional equivalent of 'scrolling' (moving through an on-screen document to read it).

Despite the difficulties, there was enough evidence to suggest that *both* unidirectional and bidirectional recursing have occurred in the 'pen and paper' condition also - but in different proportions. The difference between

both conditions is this: In 'pen and paper' composition, there is proportionally more bidirectional recursing and revising. In the word processing condition - there has been more unidirectional recursing and revising. The most logical explanation for this is the ease of text insertion that word processing affords - as opposed to the difficulty of attempting to insert any large-scale revision in a handwritten text.

The researcher would go further in describing the differences between 'pen and paper' revision and word processor revision. Word processor revision can be seen as much more *immediate* - or 'point of error'. The nature of the word processing medium is such that a writer can return to the chunk of discourse that needs revision, and insert his changes *at that point* in the text. The options (for macrostructure revisions) for 'pen and paper' revision will usually be to insert or correct further on in the text (deleting the material that is inadequate) - or to simply delete.

It is now possible to hypothesise that the dominant *cognitive* process in revision varies - depending on whether the subject is word processing or using 'pen and paper'. In the word processing condition, the writer is more likely to be involved in *evaluating* (see Figure 3.2) and in the 'pen and paper' condition, the writer is more likely to be involved in *crystallizing*.

The previous paragraphs describe the main differences in revising with 'pen and paper' and revising with the word processor. Sudol (1985) was right when he said that revising with a word processor was different. It is different - and not just in terms of a 'principle of addition'.

This 'principle of addition' may be one explanation for the subjects in the present study producing much more extensive and comprehensive macrostructure revisions (and also larger drafts) in the word processing condition, but there are other considerations also. This researcher would have to expand on Sudol's (1985) 'principle of addition' to take into account the present word processing subjects. A further characteristic would need to be added. In the word processing condition - this 'principle of addition' would become a 'principle of addition and *substitution*' (see Table 5.9).

While macrostructure additions were the most common type of macrostructure revisions made in the word processing condition - the second most frequent type of macrostructure revisions were *substitutions* (Table 5.9). Unlike Sudol's (1985) model, subjects 'added first, then substituted'. These substitutions could also frequently incorporate *additions*. It has often occurred in the word processing condition, that one type of revision is 'embedded' within another. This is *not* so frequently observed in the 'pen and paper' condition (see Appendix 11). Overall, macrostructure deletions were comparatively few: There was a total of three in the word processing condition and two in the 'pen and paper' condition.

This phenomenon of simultaneous execution of revision at different 'levels' of cognitive engagement, seems to be common to revision in the word processing condition. The work of Subject 2 (see Appendix 11, Subject 2, WP2.1) is a good example of this. In her work, formal and meaning-preserving changes are embedded within a microstructure revision which is, in turn, embedded within a macrostructure revision. An important example

of this can be seen in the work of Subject 2 (Appendix 11, Subject 2, WP5.2). In view of subjects' overall comments, it is arguable that this is one effect flowing from the ease with which unidirectional 'recursing' and revision can be accomplished using a word processor.

The findings of the present study do not necessarily conflict with those of Hawisher (1987) who found that word processing produced fewer (and less comprehensive) revisions. A possible explanation for this may lie in the fact that Hawisher gives no indication of the method she used to record revisions made by her subjects on the word processor. Unless some sort of keystroke recording software was implemented, it is likely that a large proportion of her subject's revisions went unrecorded. The software of 1987 cannot be favourably compared with that of 1993.

The considerable variability in individual response to revision in the word processing condition is also worth mentioning here. As the descriptive statistics for revision show (Tables 5.1 - 5.4), there was far more variability in the word processing condition, for each of the four categories. This indicates that while there *is* a significant common effect (for the macrostructure category) of word processing on these subjects - as individuals, they experienced this effect to varying degrees.

Of some interest is the fact that previous experience with word processing had no significant effect on the number of revisions made by subjects in the word processing condition.

To sum up, the use of word processing software influenced the revision strategies of the subjects in this study, in the following ways;

1. encouraging the writers to focus much more on 'text-base' (meaningful) changes at the macrostructure level (when compared to pen and paper writing),

2. causing an increase in macrostructure revising that occurs without any increase in non-meaningful or microstructure revision,

3. facilitating more extensive and complex macrostructure revising than was normally possible for the subjects with 'pen and paper',

4. complementing the recursive nature of revision,

5. possibly causing a shift in focus of the dominant cognitive process in L2 revising,

6. facilitating a 'principle of addition and *substitution*' at the macrostructure revision level,

7. enabling a form of 'revision multitasking' - where a writer focuses on more than one revision 'level' (or category) at once,

8. showing that a lack of previous word processing experience had no significant influence on revising behaviour in that condition.

Another benefit of the word processing software is that since it enabled all keystrokes to be recorded and saved (in macrorecorder files) - the risk of excessive emphasis being placed on "please the teacher" responses - or of researcher bias, is lessened.

6.2 The Effect of Word Processing Software on the adult academic ESL Writer's Composing *Product*

While the writing *process* was examined in terms of revision in this study - writing *product* has been measured in terms of 'quality'. The instrument chosen to measure 'writing quality' proved itself to be both reliable and valid. It also enabled the researcher to obtain both analytic (specific) and holistic (general) measures of quality for the final sample of 60 texts selected for the quality analysis. This is an important issue since some previous studies (Reed, 1990; Robinson-Stavely & Cooper, 1990) have claimed improved quality due to the use of word processing software, but have not examined the *effect* that the type of *instrument* itself may have. Others (Hawisher, 1987) have claimed *no* improvement in writing quality.

When the researcher was considering what type of writing quality instrument was most suitable to this study - two main types were examined; the holistic instrument and the analytic instrument. Each of these has a weakness - the holistic gives an overall measure of 'quality' - but provides no information on the components of 'quality' that influenced the rater's evaluation. The analytic instrument gives a break-down of linguistic items and/or considerations, but unless high internal consistency is established,

few are willing to accept its validity as an *overall* measure of 'quality'. The Canale et al. (1988) instrument (see Table 3.1) is an holistic/analytic instrument. It has been established to have high internal consistency and generally yields high inter-rater reliabilities. It is a reliable measure of what English language educators perceive to be 'good quality' English.

There was an *overall* significant ($p < .001$) difference between writing quality scores in the word processing and 'pen and paper' conditions. Texts received significantly higher *overall* quality ratings - and significantly higher quality ratings for all four quality categories - in the word processing condition. Levels of significance were as follows; 'community standards' ($p < .001$), 'individual personality' ($p < .01$), 'form and ideas' ($p < .001$) and 'communicative effectiveness' ($p < .001$).

The intervention period for this study was ten weeks - and the majority of subjects had no prior word processing experience. This being the case, the fact that overall quality scores (and all four specific quality category scores) were significantly higher in the word processing condition, is worthy of comment. Whilst the subjects in this study have had years of practice at 'pen and paper' writing, for the most part, they had *ten weeks* of practice with the computer.

The items on which word processed texts consistently achieved higher quality scores were;

'Writing as a reflection of community standards'

1. neatness,
2. punctuation,
3. paragraphing,

'Writing as a reflection of individual personality'

8. originality and interest of ideas,
9. ease, confidence, and maturity of expression,

'Writing as unity of form and ideas'

10. lexical cohesive devices,
11. structural cohesive devices,
12. development: the sense of direction and order of presentation of ideas,
13. continuity: the consistency of facts, opinion and writer perspective, as well as the reference to previously mentioned ideas and the relevance of newly introduced ideas,
14. balance: the relative emphasis accorded each idea,
15. completeness: the degree to which all ideas in a piece of writing work together as an integrated, thorough discourse,

16. clarity of writer's purpose and desired response from his or her audience,
17. sense of audience,
18. effectiveness of ideas.

The 'community standards' items are quite straightforward. Generally, the word processed texts produced by subjects in this study tended to be neater, better punctuated, and more appropriately paragraphed - than their handwritten texts.

The ease with which a writer can modify aspects of formatting (such as paragraphing and 'justification') and the way that word processing facilitates the easy addition or removal of any character - these are possible explanations for why the word processed texts examined in the present study consistently achieved better quality scores on the three 'community standards' items listed above. The subjects were able to 'experiment' with these features of text with an ease hitherto unknown by them - to experiment, and to try several alternatives, until they were completely satisfied with the result.

The 'individual personality' items could be considered quite subjective. In terms of the present study, this was a *strength* rather than a weakness. The intention was to represent writer's *voice*. While 'voice' is not an easy concept to define, items 8 and 9 on the Canale et al. instrument are a beginning.

The volunteer raters both reached particularly high (.94 and .91) inter-rater agreement in marking texts on these two items. The researcher reached similarly high agreement with both volunteer raters on these items also (.93 and .89). The researcher recommended both raters use Diederich's (1974) explanation of his 'ideas' component (see Section 1.5.1) to assist in their scoring.

In terms of 'individual personality', word processed texts consistently out-performed handwritten ones. Word processed texts were identified by three raters as being superior in terms of the originality and interest of ideas, and in terms of the ease, confidence, and maturity of expression.

In terms of cohesion and coherence, the researcher relied totally on the work and definitions of Halliday and Hasan (1976, 1985) and Canale et al. (1988). The reason that word processed texts scored consistently higher in terms of both lexical and structural cohesion is that for both types, there was a more consistent and varied use of cohesive devices. This use also contributed to an improvement in the overall coherence of the texts (defined in terms of items 12 to 15 in the Canale et al. instrument). The texts of Subject 15 (see Appendix 11, Subject 15, WP1.2 and PP2.2) make an interesting contrast in terms of both cohesion and coherence. These are representative of the sorts of differences that exist between the word processed and 'pen and paper' texts - they are by no means unusual examples.

It is important that *coherence* be related to the systemic-functional framework utilised by the researcher. The coherence items in the Canale et al. instrument (see Table 3.1) need to be understood within a 'situation of context'. What Halliday would term 'sociosemantic' considerations come

into play. By coherence, the researcher is not simply referring to the Canale et al. criteria being satisfied. These criteria must be satisfied within a specific Task Environment (see Figure 3.1), where the text operates at two levels - the levels of *register* and *genre* (see Appendix 2).

The following table (Table 5.23) presents one with a simplified version of the 'task environment' diagram in Appendix 2. It may serve to demonstrate how the 'context of situation' impacts (through field, tenor and mode) on the 'text' (in terms of the expression of *experiential, interpersonal* and *textual* meanings. It is taken from Halliday and Hasan and has been modified slightly by the researcher (1985, pp. 26).

Table 5.23

Relation of the Text to the Context of Situation

SITUATION: Feature of the context	(realised by)	**TEXT:** Functional component of semantic system
Field of discourse (what is going on)	⟷	Experiential meanings (transivity, naming, etc.)
Tenor of discourse (who is taking part)	⟷	Interpersonal meanings (mood, modality, person, etc.)
Mode of discourse (role assigned to language)	⟷	Textual meanings (theme, information, cohesive relations)

The preceding table is important in terms of three of the four categories of writing quality (all four having been scored significantly higher in the word processing condition) - namely 'individual personality', 'form and ideas',

and 'communicative effectiveness'. Referring to the table, the textual meanings item can be seen to include cohesion, just as the interpersonal meanings item can be seen to comprehend 'individual personality' and 'communicative effectiveness'. The Canale et al. (1988) definition of coherence (based on the related instrument items) can be seen to fit quite neatly into the 'textual meanings' category as well. We now have a 'working model' - one that enables the teacher or researcher to see the act of academic writing in terms of 'cause and effect'.

With this model in mind, it was easy for the researcher to rate his subjects' texts in terms of; cohesion, coherence, 'ideas', 'sense of audience' and voice. The task environment was known - as was its field, tenor and mode. The appropriate expression of this through the text, in terms of experiental (or 'ideational'), interpersonal and textual meanings, would guarantee the subject a high score on the 'individual personality', 'form and ideas', and 'communicative effectiveness' items mentioned. A failure to successfully negotiate one of these items would result in a reduced quality score on the Canale et al. instrument.

In the majority of cases, word processed texts received *significantly* higher quality scores on these items, in the word processing condition. By way of explanation, the researcher would draw the reader's attention to Appendix 12 - subjects 8 and 15 both indicated that they felt word processing was a far more 'natural' way for them to write. The possibility exists, that for *some* ESL writers, computer-based composition is more compatible with their composition 'style'.

Subject 8 went so far as to say that she found considerable difficulty in 'getting her ideas down' when attempting 'pen and paper' composition, but found this easy at the computer screen. If using a direct 'head-to-screen' composition method has somehow facilitated the 'flow of ideas' for this subject - we have here a possible explanation for why subjects *consistently* received higher quality scores on the sub-items of 'communicative effectiveness' (especially 'clarity of writer's purpose...', 'sense of audience', and 'effectiveness of ideas') in the word processing condition. This hypothesis is supported by the claim of several subjects that word processing was a more 'natural' way for them to write.

Within the specific task environment of this research (the university computer lab, the teachers, the computers and software, etc.) it is possible there was something in the human/computer interaction that the instrumentation in this study was not able to 'pick up' - a unique characteristic of the word processing medium that makes it, in the words of Hyland, "...a new creative environment which demands a radically *different* approach to writing..." (my italics) (1990, p. 335).

Whilst the researcher had expected that the most likely category of writing quality for word processed drafts to achieve higher quality scores in would have been 'community standards' (sub-items such as; neatness, punctuation, and paragraphing), he had not anticipated that word processing would have facilitated a significant improvement in items such as 'sense of audience' or 'effectiveness of ideas'.

It would seem that whilst the composing process (just like revision), is not normally amenable to 'multitasking' (a writer will normally perform one task only at any given time - although this can happen in any order, and any task can, and often does, interrupt any other), it may be that the word processing mode of composition *is* conducive to a type of 'composition multitasking' - enabling the writer to both focus on, and improve, his/her performance with *more* than one rhetorical or linguistic item at a time.

If this is the case, the data seem to indicate that the effect of word processing is qualitatively similar for revision and writing quality considerations. That is, word processing seems to *encourage* what the researcher will refer to as 'revision multitasking' - and at the same time facilitates a larger/broader phenomenon - that of 'composition multitasking'.

In contrast to this, 'pen and paper' composition does not seem to allow more than a few instances of this revision 'multitasking' - and does not facilitate a comparable increase in cohesion, coherence or other items of Canale et al's four quality categories.

To sum up, the use of word processing software influenced writing quality in the following ways;

1. by enabling writers to produce texts that scored higher quality ratings *holistically* and that were better (at a statistically significant level) in all four specific (analytic) writing quality categories - these being; 'community standards' ($p < .001$), 'individual personality' ($p < .01$), 'form and ideas' ($p < .001$), and 'communicative effectiveness' ($p < .001$),

2. by facilitating a more consistent, varied and appropriate use of lexical and structural cohesive devices,

3. enabling word processed texts to demonstrate greater mastery of the 'individual personality', 'form and ideas' and 'communictative effectiveness' aspects of two of the three of Halliday's 'functional components of the semantic system' - these being 'interpersonal meaning' and 'textual meaning',

4. in terms of coherence - word processed texts achieving consistently higher quality ratings on all four componenents of this 'form and ideas' item from the Canale et al. taxonomy,

5. allowing texts to be produced by a composition method much more compatible with at least some of the present subjects' 'composition styles',

6. by facilitating quite dramatic increases in quality scores for items in the 'community standards' category of the Canale et al. instrument - this category consisting of things such as; neatness, paragraphing and punctuation,

7. in causing a *significant* ($p < .001$) increase in 'communicative effectiveness',

8. by providing the writer with a 'new creative environment' - one that, "...demands a radically different approach to writing...to make effective use of the medium" (Hyland, 1990, p. 335).

Item 7 (communicative effectiveness) would seem to be a function of writing *mode*. Whilst the data *do* show a significant *increase* in 'communicative effectiveness' in the word processing condition however, more research is needed to conclusively establish such a causal relationship.

The claim made in the final item (item 8) *is* supported. The research data strongly suggest that word processing does entail a different approach to writing.

It is this researcher's opinion that Hyland's (1990) claim that, "...word processing is a new creative environment which demands a radically different approach to writing...to make effective use of the medium" (1990, p. 335), *has* been partially answered. However, it is likely that only over a much longer period of time that writers will learn to fully adapt to this new technology - and to take *full* advantage of the word processing medium. It is also likely that over such a period of time, the differences observed between word processing and pen and paper writing modes would be even more significant. This will be discussed in Section 6.6.

6.3 The Effect of Word Processing Software on the adult academic ESL Writer's *Attitudes* Towards the Writing Process and him/herself as a writer

Final interviews with the subjects (see Section 5.3) indicate that in a comparatively short period of time (10 weeks), many of them described an

improvement in how they felt about themselves as writers. Subject 8 (see Section 5.3) said:

> I was scared of writing before - I mean, writing in English was very difficult for me - the word processor has made a big difference for me - I feel much more confident now. I know I still make mistakes but now much less than before - I know that now I am able to deliver something that is quite ok.

The majority of subjects said that they felt the *quality* of their writing had improved because of word processing (see Appendix 12). When questioned further on this point however, they were unable to give reasons for this perceived improvement in writing quality.

One subject (Subject 6) was *most impressed* by the fact that she learnt how to 'compose directly' onto the computer screen. She started her ten weeks of writing with the researcher, lacking in confidence and not sure that she would be able to use the computer. By the end of the ten week period - she felt comfortable in doing *all* her writing on the computer.

One point that is made by the subjects themselves, is how much they enjoyed using the word processor - how much *fun* it was. This may be at least partially indicative of the 'novelty value' phenomenon. As to whether the subjects will still consider word processing to be fun in 6 or 12 months - this is an entirely different proposition. Judging from the reactions of Subject 8 however, word processing *will* continue to be a 'fun' experience for these subjects. After more than twenty years working on the computer, Subject 8 found that the word processing she did as part of this research was still a very satisfying and enjoyable experience. For her too, it was *fun*.

An area in which it would be reasonable to assume considerable variation in attitudes towards word processing, would be between subjects with previous word processing experience, and those without. The previous example shows that this was *not* the case in the present study. Reference to Appendix 12 will show that Subject 15 referred to word processing as being a far more 'natural' writing medium for her than 'pen and paper'. Her attitudes are similar to those of Subject 8. However, Subject 15 had no prior word processing experience - whereas Subject 8 had over twenty years experience as a mainframe programmer. Within the ten-week data collection period, Subject 15's attitudes towards the writing process changed *drastically*. She now sees word processing as her preferred method of composition.

An identical reaction came from Subject 3 (see Section 5.3). She told the researcher that word processing enabled her to, "...write as I think". It seems likely that given more *time*, the majority of subjects would adapt to word processing as their preferred composition method - and that this would be accompanied by a similar change in attitudes.

The subjects in this study all reacted positively to the use of word processing/computers in their writing. They found word processing motivational, a quicker and easier way to write, interesting to learn, a superior way to make revisions, and a personally satisfying experience. They all expressed an interest in learning more about the use of the computer for word processing - and many expressed the desire to learn about the other functions and applications of computers that could be of benefit to them. Most of all however, the majority expressed the belief that word processing improved the quality of their writing.

In summary then, the major differences perceived by the subjects themselves in using the computer were:

1. making changes (revising) was quicker and easier,

2. the work looked much neater and was easier to read,

3. mistakes were easier to detect and locate (most subjects commented on how much they liked using the built-in dictionary and thesaurus in WordPerfect),

4. word processing enabled them to be more creative. Several subjects said that they felt the computer suited the way they write much better. As Subject 3 puts it, "I can write as I think",

5. the majority of subjects felt that word processing enabled them to produce better work - and in less time (there was at least one subject however, who felt that learning to use the word processor was difficult for her initially - this was Subject 6).

Overall, the differences perceived by the subjects between word processing and pen and paper writing, show that *all* subjects preferred word processing to pen and paper. If there was one subject attitude towards word processing that concerned the researcher, it was a comment made by Subject 9. She said that she felt her English grammar was inadequate, and that she relied very heavily on her grammar- and style-checking software that was built into the word processing software she had started to use at home (Amipro 3). From the author's experience, grammar checking software is a 'two-edged sword' - without sufficient knowledge, the writer who relies on the

software too heavily is likely to make some quite obvious grammatical errors - while the writer *with* sufficient knowledge may not use the software in the first place - or to a degree sufficient to gain any benefit.

This sort of software relies on *rules* - it does not 'know' about a lot of the exceptions - nor is it designed to factor considerations such as 'context' into its linguistic analyses. Whilst the researcher sees the use of an electronic thesaurus or dictionary (in conjunction with a word processor) to be an extremely positive thing - he would recommend caution in introducing students such as those in the present study, to grammar-checking software in the short term.

6.4 The Relationship Between Revising and Writing Quality in 'Pen and Paper' and Word Processing Conditions

From the researcher's point of view, one of the most significant findings in the present study is a *lack* of a significant correlation between the four main revision categories and four main writing quality categories. No signficant relationships were established (see Tables 5.18 and 5.19).

It would seem logical that an increase in size and number of macrostructure changes would have some effect on writing quality. In the present study, however, this was not the case. In the word processing condition, as number, variety and size of macrostructure revisions increases, so do quality scores achieved by the texts produced - for all four quality categories. This does not, however, represent a significant correlation.

Interviews with subjects demonstrate that they were aware word processing improved the quality of aspects of their writing - but none of them knew *why*. The present study has shown that word processing increases number, size and type of macrostructure revision - and the overall size of drafts. It has also shown that writing quality improves for all four writing quality categories. The question that arises is *how* does the word processing software achieve this? This will be raised in Section 6.6 also (limitations).

6.5 The Theoretical Models

The data collected support the composing process models of Flower and Hayes (see Appendix 1) and Heuring (see Figure 3.1). The anecdotal records, interviews, macrorecorder files, and writing samples of the subjects indicate that the revising of these subjects has been part of what Heuring (1985) calls the 'reviewing component' of the composing process (see Figure 3.2 and Appendix 2).

This process consists of the two sub-processes of *crystallising* and *evaluating*. The cognitive process of crystallising (which involves re-examining the text to stimulate further ideas) seems to be linked to the end-of-text macrostructure additions made in both the word processing and pen and paper conditions - although more of these changes (and more extensive ones) were made in the word processing condition.

The sub-process of evaluating (which involves a writer examining what has been written in order to determine what changes or improvements are necessary), seems to be linked to the execution of initial and medial macrostructure changes made by the subjects in both conditions. Once again, more of these were made in the word processing condition.

As mentioned previously, *crystallizing* (see Figure 3.2) involves what this researcher has termed *bidirectional recursing* (going backwards in the text to reread, then returning to the original position and revising or adding text). On the other hand, *evaluating* involves what the researcher terms *unidirectional recursing* (going backwards in the text to reread and revising at *that point*).

Word processed texts showed evidence of unidirectional and bidirectional recursing (evidenced in the related macrorecorder files) in the execution of macrostructure substitutions. These were distributed between initial, medial and final - the largest number being medial (see Table 5.9).

For the subjects in this study, revising on the computer was both *quantitatively* and *qualitatively* different at the macrostructure level. The quantitative differences have already been addressed. The *qualitative difference* relates to the cognitive sub-process of reviewing that is operating when the writer is revising.

Although there is evidence of both crystallising and evaluating in both conditions with the subjects, it would appear that the sub-process of evaluating is facilitated more in the word processing condition. It can be concluded therefore, that the use of the word processing software as a revising 'tool', facilitates large-scale meaningful revision for these subjects (more so than the use of pen and paper), and that it does so by facilitating the cognitive process of 'evaluating' in some way.

Flower et al's Cognitive Processes in Revision Model

The 'paradigm of revision' used in this study was that of Flower et al. (1986) and can been seen in Appendix 8. It is important to realise that this model was originally intended to represent the cognitive processes involved in the revising of L1 writers. Despite this, the model does seem to be an accurate reflection of the revising process of the subjects in this study. The one significant difference between this model and the revising of subjects in the present study, is the absence (in the model) of a 'translating' stage.

While the lack of protocol data did not enable the researcher to successfully identify *all* revision components in the model - his analyses still successfully identifed the following important sub-processes;

- evaluation,
- strategy selection,
- redraft or paraphrase,
- modify text and/or plan (see Appendix 8).

The Flower et al. (1986) model of revision is both complex and powerful - it gives an indication of the complexity of revision. However, for the purposes of the present study, the Heuring model was quite adequate (see Figure 3.2).

The Translating Process

Referring to Figure 3.2, 'translating' can be seen to be a sub-process of 'transcribing' (which is the process of encoding thought into writing). It is understandable that second language speakers should have an additional

process here: that of 'translating' from L1 to L2 before 'translating' the thought into the written word. Although the researcher was not successful in obtaining audio-taped protocols from his subjects, some macrorecorder data and 'pen and paper' annotations provide evidence of Heuring's (1985) translating process in action. In some of the word processed work of Subject 3 for example, she has occasionally inserted a word or phrase in Spanish - the most appropriate semantic 'place holder' she could use. At some later point, this word or phrase has then been translated into English.

While such physical evidence of translation was comparatively rare in this study, it was there. However, the majority of such translation will *not* involve any physical evidence - this is where the researcher requires a tool such as verbal protocol analysis. As mentioned already, the subjects in this study were either unable or unwilling to 'think-aloud' - this issue will be addressed in Section 6.6.

There is no doubt that the use of word processing software has affected the revising strategies of the subjects in this study, both qualitatively and quantitatively. It can be inferred from this, that there has been a corresponding effect on the cognitive processes associated with these strategies. The findings of the present study support the claim that in some respects, the computer is a more powerful writing and revising tool (than the more conventional writing methods) for the adult academic ESL writer.

The Holistic/Analytic Scale of Writing Quality (Canale et al., 1988)

In terms of writing quality, the Canale et al. (1988) instrument was also this study's theoretical model of 'quality'. Referring to Table 3.1, all four categories of writing quality are of interest. These improved quite

dramatically due to the influence of word processing software in the composition process. While there is no obvious explanation for why scores on all four categories of writing quality should improve significantly in the word processing condition, there are a number of possibilities.

The most plausible explanation would seem to be that there is some feature or characteristic of the word processing process that somehow 'enlarges' the range of rhetorical and linguistic concerns the writer can simultaneously (and successfully) negotiate - at the *same time* facilitating improved performance on these same items. It is unlikely that this question will be 'definitively' answered until a number of larger, future longitudinal studies have addressed it. The instrument itself has (as in previous studies), yielded high inter-rater reliability coefficients - and has demonstrated impressive construct validity.

6.6 Limitations of the Study

Due to the small sample size and selection of subjects from the same class, the researcher acknowledges the need to exercise caution in generalising results to the wider adult student population.

The analysis of think-aloud protocols needs to be mentioned here. The concern has been raised that the use of verbal protocols will either affect the, "...naturalness of a writing situation..." (Heuring, 1985, p. 8) or actually cause more revision to occur (Raimes, 1987). Although opinion is divided in some respects, the majority of research reviewed seems to consider that the benefits of utilising protocols far outweigh the disadvantages of any

potential confounding influences (Raimes, 1985, 1987; Heuring, 1985; Swarts, et al., 1984; Selfe, 1985).

In the present study however, the researcher was not successful in the elicitation of verbal protocol data. It is possible that the subjects selected required more time to become accustomed to the idea of 'thinking aloud'. Another possibility is that since it was impossible to separate subjects selected for protocol analysis, from the rest of the group, self-consciousness or a fear of peer ridicule may well explain the problem. It is also possible that placing an additional cognitive burden on these subjects, was the cause of the problem. This seems unlikely however, given the fact that the primary ESL subjects used by the researcher in a previous study (Oliver, 1992) had no difficulty in 'thinking aloud' - and their English language proficiency was far less than that of the present subjects.

The writing task is also an important consideration. Hillocks (cited by Raimes, 1987) puts it this way, "...even extensive variations in the framing of topics - particularly in the specification of rhetorical situations result in significant differences in writing..." (p. 445). The writing tasks were not standardised in the present study. Although such control does have advantages, it also adds an element of artificiality to the writing situation. This could influence the generalisability of findings. As it turned out, the writing assignments set for the subjects all conformed to the 'Explanatory A' and 'Explanatory B' categories of Martin and Peters' (1985) Schematic Structure of Exposition Types (see Appendix 10).

The findings of the present study will allow for some generalisation to other ESL writers performing similar academic writing tasks on the computer. It is possible however, that the effects of word processing on the elements of writing quality or revising may vary considerably for different writing tasks. Because of this, caution should be exercised in attempting to generalise the findings of the present study to ESL writers performing 'any type of writing' on the computer. It is likely that some writing tasks will facilitate revision or higher analytic/holistic quality ratings - while others will not.

The *software* itself should not be overlooked either. Several subjects commented on the functionality of WordPerfect - and specifically referred to the editing and revision functions, 'spell checking', and thesaurus functions. It is a reasonable assumption that the better the software, the more likely it is to enable writers to produce better work.

Considering the statistical methodology utilised in this study, the criticism *could* be made that a sample of 15 subjects is too small to provide an adequate empirical 'base'. Considering the *massive* amount of data collected and analysed by the researcher, this is *not* a valid criticism. The revision analyses entailed the analysis of 181 word processed and 'pen and paper' drafts. The quality analyses entailed the analyses of 60 *final* word processed and 'pen and paper' drafts. In both cases, two additional raters were used to ensure inter-rater reliabilities.

In summary, a number of variables (in addition to the writing 'mode') had the potential to influence the composing processes of the subjects in this study. Where necessary, these were controlled as much as was possible - where not, their influence (if any) was analysed and acknowledged.

CHAPTER SEVEN

Conclusions

This study addresses a number of issues. First and foremost, it has established that for the subjects selected, the revision process (and thus the composing process) was significantly different (at the macrostructure level) when using a computer. A number of findings from this study are of relevance to the educator of adult ESL students who is contemplating the use of computers in his/her writing classes.

The study is of particular relevance to the teachers of adult academic ESL students at the university level. It indicates that they (the students) will derive a number of specific benefits from being taught to write with the computer. Word processing will enable them to:

- write more,
- perform more extensive and complex revisions,
- focus more on *meaning* than surface features of the text,
- be more motivated and feel more positive about the writing process and themselves as writers,
- locate and edit errors more easily ,
- read and revise their own work more easily,
- improve the quality of their writing in terms of;
    - neatness,
    - punctuation,
    - paragraphing,
    - lexical cohesion,
    - structural cohesion,

- discourse coherence,
- expression of ideas,
- effectiveness of ideas,
- sense of audience,
- clarity of purpose,

- enjoy a degree of confidence in their written English instead of a fear of linguistic inadequacy,
- experience *fun* in the composing process,
- work with a 'silent partner' - a writing tool capable of so much more than a ballpoint pen - a tool capable of;
  - checking spelling,
  - providing selections of suitable synonyms and antonyms for word choices, and
  - a myriad of formatting (aesthetic) options for presentation of 'written' work.

These are some of the advantages of word processing that were experienced by the subjects in this study. This is not to say that the quality of students' writing will instantly improve if they are all simply given access to computers and word processing software. Obviously, the advantages of word processing are only advantages *if they are used.* Subjects need to be taught, and encouraged in the use of, the features of the word processing software.

While 'writing quality' is, to most, an abstract concept, the Canale et al. instrument used in this study has given the researcher some insight into the complexity and depth of the construct.

This study merely 'scratches the surface' of what is an extremely complex and largely unseen process: the writing process. It has focussed on one aspect of writing process (revision) and one aspect of writing product (quality) - and on the effects of manipulating one feature of the writing environment (the writing 'mode').

It is not possible to say that the revising performed on the computer (by the subjects in this study) was better *overall* - but it *is* possible to say that the *quality* of the texts produced using the computer *was better overall.* This study has established that for these subjects, their revising (and thus composing) processes were *different* in the word processing condition, when compared with conventional pen and paper writing. While not significantly correlated, the difference in revision was accompanied by a significant increase in scores achieved on all of the four writing *quality* categories.

There is no doubt that the computer enabled these subjects to revise more extensively and to write more text. It would also seem that the computer offers certain advantages that the more conventional writing methods do not. There is no suggestion that orthodox methods of composition instruction should be totally supplanted by computers. Rather, word processing should be allocated its appropriate role as a supplemental composition 'tool'. After all, the best 'tool' is of no use to the tradesman who doesn't know his craft.

The question of whether word processing enables the adult academic ESL writer (or adult academic writers in general) to produce superior writing must be answered at *two levels.* In terms of overall quality - there was a

significant difference ($p < .001$) between the two conditions in this study. In terms of specific categories of writing quality - word processing *did* produce better quality writing for all four categories considered. Once again, the researcher would make the point that the amount of *time* involved is an important issue.

For the subjects in this study, the computer was, in some ways, a more powerful and versatile composing and revising 'tool' than its more traditional alternative. However, this writer for one, is already asking how similar research conducted over much longer periods of time, would differ from the present study, in terms of results.

The findings have answered the research questions: but in turn pose additional questions. There is a need for further research into the effects of word processing and computers on the composing processes of ESL writers. Inferences have been made in this study about the cognitive processes behind the observable writing behaviours - and these have been based on the analyses of a large amount of data. They are still *inferences*, however.

Perhaps the most important issue here, is that any research that attempts to analyse the effects of word processing on an individual's writing, is really trying to analyse how the computer affects the way he or she is *thinking* (inferred from what he or she *does*). The writing process is much like an iceberg: the larger portion of it is always hidden from view, and it is on the basis of what we can *see*, that we attempt to draw conclusions. In light of this, there is a need for more research, utilising diverse methodologies and involving large samples, large amounts of data (from a variety of sources) and longer periods of time.

The researcher began this thesis with a quote from Anderson (1991) - a quote he would like to finish on:

> ...computer-based technologies are changing our notions of literacy and changing how students learn...the tools we use change us - and so as new educational uses are developed for computers, the very concepts of text that we have held until now are changing, and will continue to change (p. 50).

The data collected in this study tend to support this view. We, as educators, *are* dealing with a 'new literacy' - and new understandings of 'text'. There is much to learn - for teacher and pupil alike. So much the better if they can enjoy the learning experience together - benefiting from both the old, and the new.

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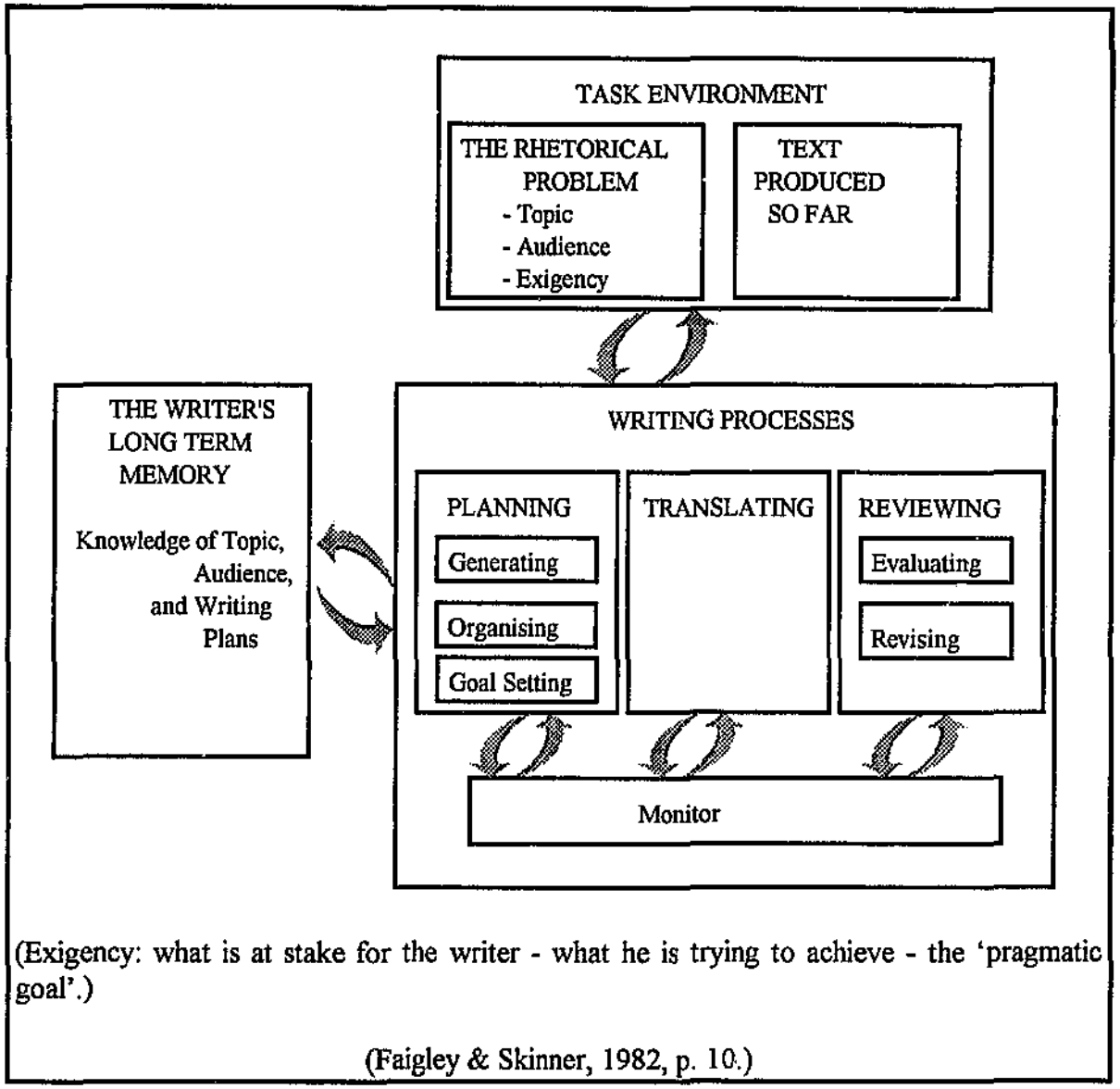
Appendix 1:

Hayes and Flower's Model of Composing



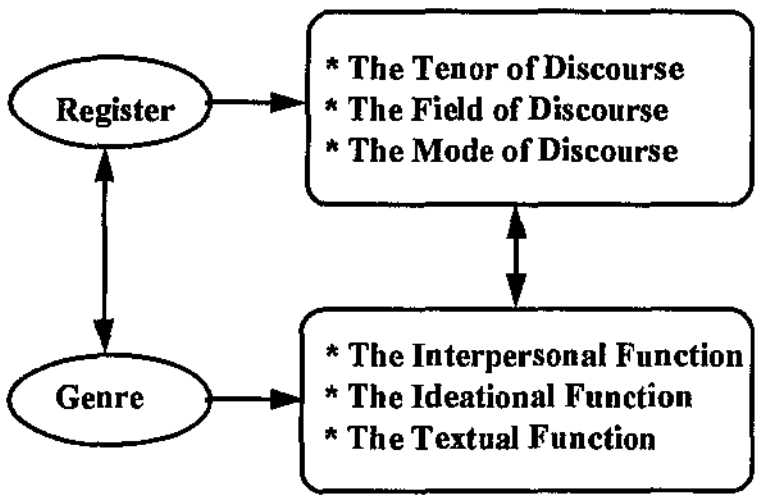
(Exigency: what is at stake for the writer - what he is trying to achieve - the 'pragmatic goal'.)

(Faigley & Skinner, 1982, p. 10.)

Appendix 2:

Text-Related Components of Task Environment

Text-related components of Heuring's (1985) Task Environment
(Adapted from Halliday, 1978)

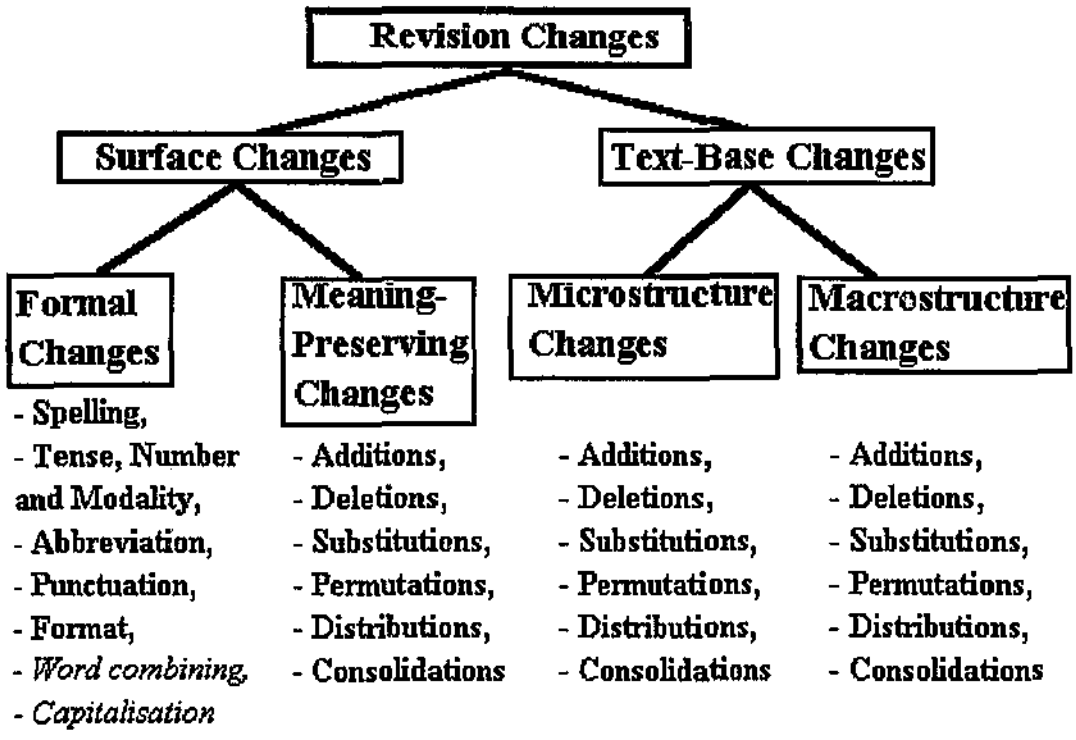


...a text is to be understood as functioning in a context, where context is said to operate at two levels: at the level of register, where field (social activity), tenor (the interpersonal relationships among people using the language), and mode (the part played by language in building communication) all have consequences for the choices made in the linguistic system; and at the level of genre, where the social purpose in using language also has consequences for the linguistic choices made. For any given instance of language use, a genre is selected (be that a report, narrative, a trade encounter, etc.), and particular choices are made with respect to field, tenor, and mode, all of which are in turn realized in language choices (Christie, 1992, pp. 142-143).

(The two levels of contextual considerations referred to in the preceding quote are the product of the systemic functional model of language production - this model being the synthesis of Halliday's (1985a) functional grammar, and Martin's (1985a, 1985b) work on the relationship of text to context - with its particular focus upon genre or text type.)

Appendix 3:

Faigley and Witte's Taxonomy of Revision Changes



Note: Both 'word combining' and 'capitalisation' have been added to the formal changes revision types to take into account two categories that were evident in the written work of ESL subjects in a previous study by the researcher (Oliver, 1992). 'Word combining' is discrete from 'abbreviation' (or contraction): the latter referring to cases of abbreviation accepted by convention, the former to the incorrect combination of words into single units: for example, 'little bit' combined to form 'littlebit'.

(Faigley & Skinner, 1982, p. 29.)

Appendix 4:

Faigley and Witte's Six Revising Operations

Additions: "...raise to the surface what can be inferred (*you pay two dollars => you pay a two dollar entrance fee*)".

Deletions: "...do the opposite so that a reader is forced to infer what had been explicit (*several rustic looking restaurants => several rustic restaurants*)".

Substitutions: "...trade words or longer units that represent the same concept (*out-of-the-way spots => out-of-the-way places*)".

Permutations: "...involve rearrangements or rearrangements with substitutions (*springtime means to most people => springtime, to most people, means*)".

Distributions: "...occur when material in one text segment is passed into more than one segment. A change where a writer revises what has been compressed into a single unit so that it falls into more than one unit is a distributional change (*I figured after walking so far the least it could do would be to provide a relaxing dinner since I was hungry. => I figured the least it owed me was a good meal. All that walking made me hungry*)".

Consolidations: "...do the opposite. Elements in two or more units are consolidated into one unit (*And there you find Hamilton's Pool. It has cool green water surrounded by 50-foot cliffs and lush vegetation. => And there you find Hamilton's Pool: cool green water surrounded by 50-foot cliffs and lush vegetation*). As the last example suggests, consolidations are the primary revision operation in sentence-combining exercises"

(Faigley & Witte, 1981, p. 403).

N.B. It is important to realise that these definitions of Faigley and Witte's six revision operations are only suitable for defining these operations when they are *meaning-preserving changes*. None of the previous research reviewed by this writer has made the distinction between these six operations as surface changes *or* text-base changes, explicit. Essentially, these definitions will remain the same for text-base changes, but with one important difference. There will (and must) be a change in the ***meaning*** of the text, at either the microstructure or macrostructure levels, for an addition, deletion, substitution, permutation, distribution, or consolidation, to be a *text-base change*.

Appendix 5:

Benefits Reported for Word Processing

Previous research indicates word processing benefits the student writer in three main areas:

(1) Development of Ideas through Written Language
- more time spent on writing
- longer compositions
- increased experimentation with language

(2) Revision behaviour
- facilitation of the revision process
- increased number and types of revisions
- more discourse-level revision
- fewer surface errors

(3) Affective/Social
- reduced writing apprehension and improved attitudes to writing improved attitudes about English
- greater objectivity about own writing
- increased sense of competence and self-esteem
- more collaboration among student writers

(Pennington, 1990, p. 84)

Appendix 6:

Negative Causal Factors Attested in Some Word Processing Research as Contributing to Lack of Positive Effects

- Premature completion of work
- Interactive effects that discourage the development of ideas
- Local rather than global revision
- Attention directed primarily to surface features
- Focus on structure at expense of content
- Premature publishing or overpublishing of work
- Preoccupation with physical appearance of paper
- Inhibited experimentation and planning
- Focus on quantity at the expense of quality
- Superficial synthesis rather than depth of analysis
- Ineffective writing process
- Isolation of student writers

(Pennington, 1990, p. 85)

Pennington (1985) notes that the negative factors listed above result from unfavorable psychological reactions to the properties of the medium (word processing) and/or unproductive use of its capabilities. Under certain conditions, the properties of the computer described in Appendix 5 as benefits for writers can have negative effects on students' writing.

Appendix 7:

Situational and Methodological Variables in Word Processing Research

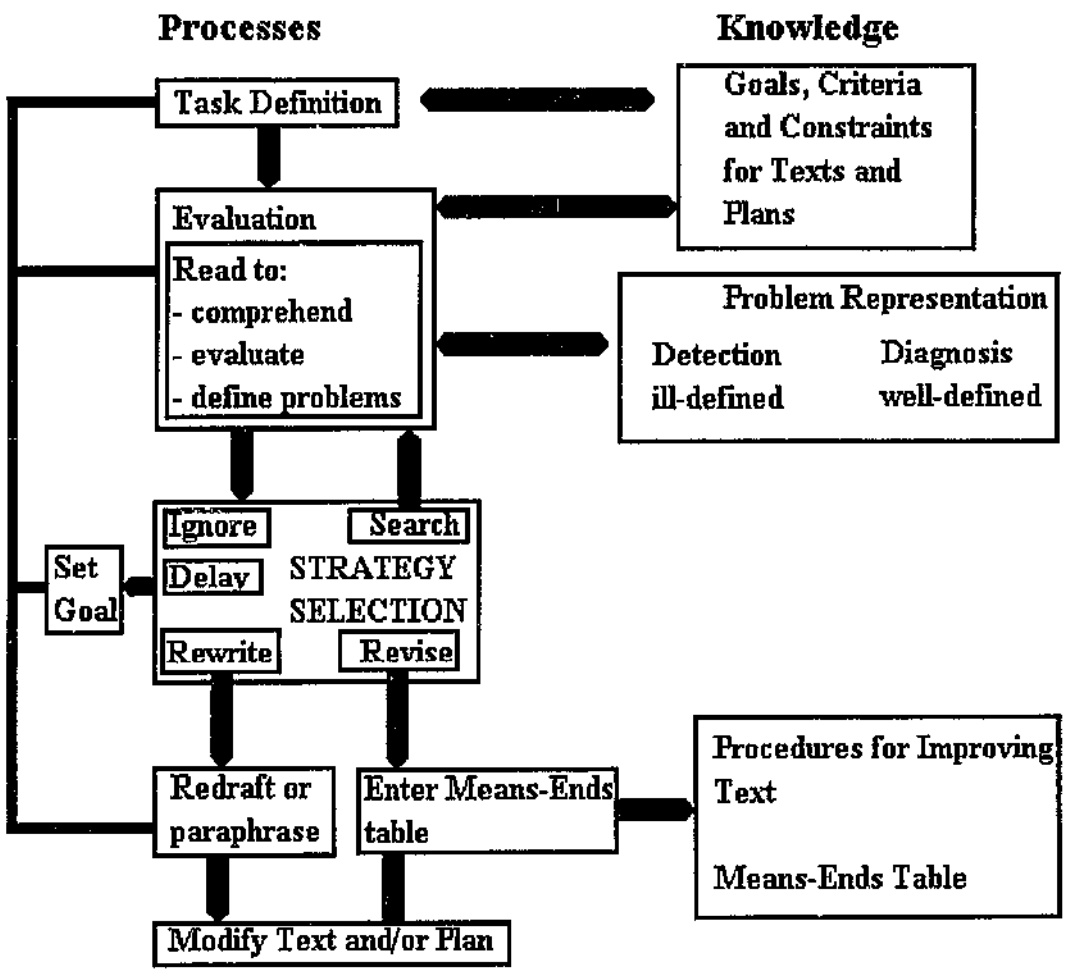
(a)	Subjects	(Individual differences)
(b)	Teachers	(Attitudes)
(c)	Setting	(Computer lab or classroom?)
(d)	Time-Span	(Short/long period?)
(e)	Training	(Amount, type, quality)
(f)	Instructional Format	(Word processing with process writing approach? Genre Interventionist Approach? Use of text analysing software?)
(g)	Software	('User-friendly'?)
(h)	Effectiveness Measures	(The type of measure applied to assess the effectiveness of word processing needs to be appropriate to the treatment)

(Pennington, 1990, p. 89)

Pennington (1985) lists these variables as potential causes of the conflicting findings in word processing research with L1 and L2 writers. Each of these factors, if not properly identifed (and where appropriate, controlled) has the potential to bias the findings of any such research.

Appendix 8:

Cognitive Processes in Revision



In the revision process, writing is guided by the *diagnosis* and any revision strategies the writer may have attached to that diagnosis. This set of strategies and goals is the writer's Means-Ends Table. This repertory of Ends (recognized problems) and Means (possible actions for dealing with those problems) spans the entire range of actions we normally associate with revising, from rule-governed procedures for 'fixing' a text to wholesale plans for 're-seeing' it.

The ability to revise is affected by the reviser's ability to represent text in the head and to represent his/her intentions to him/herself.

(Flower et.al., 1986, pp. 24-26)

Appendix 9:

Observation Schedule

Date:		**Observation:**
Time:		
Subject:		
Group:		

Appendix 10

Martin and Peters' Schematic Structure of Exposition Types

	Introduction	Body	Conclusion
EXPLANATORY A (explain what)	Indicate subject and classes	Present classes in an order	Review
EXPLANATORY B (explain how/why)	Indicate phenomenon to be accounted for	Analyse contingent relationships in data	Restate
INTERPRETATIVE	Propose theme to be discussed	Apply thematic key to data	Affirm viability of view
EVALUATIVE	Indicate judgment to be sought and criteria used	Test data against criteria	Affirm validity of evaluation
ARGUMENTATIVE	Propose thesis to be defended	Argue grounds	Formulate logical conclusion

(Martin & Peters, 1985, p. 87)

Appendix 11:

Samples of Written/Word Processed Work

Coding Key

Note: All revision changes have been coded according to the following coding key (refer also to Appendices 3 and 4). In the following samples these abbreviations are inserted in brackets immediately above the revision itself (where practicable). Where this has not been possible, the coding has been inserted immediately underneath - or at the beginning or end of that line. The boundaries of microstructure and macrostructure changes have been marked with parentheses.

Revision Changes

Surface Changes

Formal Changes:	**- Spelling**	**(Fs),**
	- Tense, number and modality	**(Ft),**
	- Abbreviation	**(Fa),**
	- Punctuation	**(Fp),**
	- Format	**(Ff),**
	- Word combining	**(Fw),**
	- Capitalisation	**(Fc).**
Meaning-Preserving Changes:	**- Additions**	**(Pa),**
	- Deletions	**(Pd),**
	- Substitutions	**(Ps),**
	- Permutations	**(Pp),**
	- Distributions	**(Pdi),**
	- Consolidations	**(Pc).**

Text-Base Changes

Microstructure Changes:	**- Additions**	**(ma),**
	- Deletions	**(md),**
	- Substitutions	**(ms),**
	- Permutations	**(mp),**
	- Distributions	**(mdi),**
	- Consolidations	**(mc).**
Macrostructure Changes:	**- Additions**	**(Ma),**
	- Deletions	**(Md),**
	- Substitutions	**(Ms),**
	- Permutations	**(Mp),**
	- Distributions	**(Mdi)**
	- Consolidations	**(Mc).**

APPENDIX 11,
SUBJECT 4,
WP 2·1.

SHORT STORY ANALYSIS.

HUMAN NATURE

Human nature relates a story about one individual who is travelling and arrives in a very particular Island, where every habitant has just one leg. This place is called "One leg Island"

.The aims of the writer is to entertain . the work is not significant in its content, but the writer seems to be able to take the person to follow the story.

The place is very clear and the atmosphere seems to be on some occasions very relaxed, but during the time in the Island there is a different atmosphere for the individual who relates the story .

The writer used a large range of vocabulary , which could be very useful for the reader. The opening of the story might not be very interesting, but later on the reader becomes involved with the story, until the end that leaves the reader with sense of fulfilment.

We could say that the story is very satirical, and that the writers sense of humour is very crude and cruel - but it depends in the point of view of the reader. It seems that the characters feelings are involved when he arrives at the Island ,and when he lives the Island everything becomes normal again.

The way in which the writer writes his story is very interesting. It is about an Island which could represent any culture, in any part of the world, and leaves the reader to decide if it applies to them.

Appendix 11, Subject 4, M2.1

Sample Extracts From Macro Recorder File

```
Application (WP;WPWP;Default;"WPWPOZ.WCD")
PosLineDown()
SelectCharNext()
)
Font
(
  Name:"Times New Roman (TT)";
  Size:24.0p;
  ForceInsert:Yes!
)
PosCharNext()
PosCharNext()
DeleteCharPrevious()
Type
(
  Text:"lace is called ""One leg Island"""
)
HardReturn()
Type
(
  Text:"The place s"
)
DeleteCharPrevious()
Type
(
  Text:"is very clear and the  "
)
DeleteCharPrevious()
Type
(
  Text:"atmosphere seemd"
)
DeleteCharPrevious()
Type
(
  Text:"s to be in some oac"
)
DeleteCharPrevious()
DeleteCharPrevious()
Type
(
  Text:"casiond"
)
```

```
1   DeleteCharPrevious()
2   Type
3   (
4     Text:"svery relaxed"
5   )
6   DeleteCharPrevious()
7   DeleteCharPrevious()
8   Type
9   (
10    Text:", but during the time in the Island there is a di"
11  )
12  Type
13  (
14    Text:"fferet tamosphere"
15  )
16  PosCharPrevious()
17  DeleteCharPrevious()
18  Type
19  (
20    Text:"ta"
21  )
22  DeleteCharPrevious()
23  DeleteCharPrevious()
24  Type
25  (
26    Text:"at"
27  )
28  PosCharNext()
29  PosCharNext()
30  Type
31  (
32    Text:"for "
33  )
34  Type
35  (
36    Text:", but later on the writer "
37  )
38  DeleteCharPrevious()
39  DeleteCharPrevious()
40  DeleteCharPrevious()
41  DeleteCharPrevious()
42  DeleteCharPrevious()
43  DeleteCharPrevious()
44  DeleteCharPrevious()
45  DeleteCharPrevious()
46  DeleteCharPrevious()
```

```
1   Type
2   (
3     Text:" reader become involved with the sy"
4   )
5   DeleteCharPrevious()
6   Type
7   (
8     Text:"tory, until the edn of the story "
9   )
10  DeleteCharPrevious()
11  DeleteCharPrevious()
12  DeleteCharPrevious()
13  DeleteCharPrevious()
14  DeleteCharPrevious()
15  Type
16  (
17    Text:"end , that leaves the reader withh a very pleaset f"
18  )
19  Type
20  (
21    Text:"eling"
22  )
23  PosCharNext()
24  PosCharNext()
25  PosCharNext()
26  DeleteCharPrevious()
27  Type
28  (
29    Text:"nt"
30  )
31  HardReturn()
32  HardReturn()
33  Type
34  (
35    Text:"We could say that the story is very satirical, and "
36  )
37  Type
38  (
39    Text:" the writer "
40  )
41  DeleteCharPrevious()
42  DeleteCharPrevious()
```

```
Type
(
  Text:"s imagination is very cride and cruel , but it dep"
)
Type
(
  Text:"ens in the o"
)
DeleteCharPrevious()
DeleteCharPrevious()
Type
(
  Text:" point of view of the reader."
)

<deleted - 15 pages>

Type
(
  Text:"It is very interesting to see how the writer  "
)
DeleteCharPrevious()
DeleteCharPrevious()

<deleted - 2 pages>
(
  Text:"how the writer produce a story like tj"
)
DeleteCharPrevious()
DeleteCharPrevious()

<several pages deleted>

SelectCharNext()
DeleteCharNext()
Type
(
  Text:"We could say  that through  this"
)
```

```
1       DeleteCharPrevious()
2       DeleteCharPrevious()
3       SelectCharPrevious()
4
5       <material deleted>
6
7       SelectCharPrevious()
8       DeleteCharNext()
9       Type
10      (
11        Text:"There is a very interesting wai "
12      )
13      DeleteCharPrevious()
14      DeleteCharPrevious()
15      DeleteCharPrevious()
16      Type
17      (
18        Text:"y in which  the  writer exprees"
19      )
20      DeleteCharPrevious()
21      DeleteCharPrevious()
22      DeleteCharPrevious()
23      Type
24      (
25        Text:"ess  the idea"
26      )
27      PosCharPrevious()
28      Type
29      (
30        Text:"It is very interesting the "
31      )
32      PosCharNext()
33      PosCharNext()
34      Type
35      (
36        Text:" writes a stoty "
37      )
38      DeleteCharPrevious()
39      DeleteCharPrevious()
```

```
1       Type
2       (
3         Text:"ry  abaut an Island  which cu"
4       )
5       DeleteCharPrevious()
6       Type
7       (
8         Text:"ould be "
9       )
10      DeleteCharPrevious()
11      DeleteCharPrevious()
12      DeleteCharPrevious()
13      DeleteCharPrevious()
14      Type
15      (
16        Text:"represent  any culture  in any part of the world and"
17      )
18      Type
19      (
20        Text:" leaves the reader to decided"
21      )
22      PosLineUp()
23      PosLineUp()
24      PosLineUp()
25      Type
26      (
27        Text:"."
28      )
29      HardReturn()
30      HardReturn()
31      HardReturn()
32      HardReturn()
33      Type
34      (
35        Text:"                                        "
36      )
37      Type
38      (
39      PosLineDown()
40      FileSave()
```

SUBJECT 2
PP 5·1

A a basic ~~developing~~ md history of Chinese Characters

like other civilization old ma ~~the~~ country China has its ~~characters~~ more than 3 thousand year; now that ~~but~~ fs other country don't use ~~any~~ fs more md their old characters, China still use it till today. We may say chinese characters is ~~only~~ One of the ms oldest ms character fs in the world. chinese Character forusing hasn't lost its using value, because its change fs happed in its slow and its ma ~~characterisitic~~ Sysmical ms, hadn't any big change.(since it's form is)

Long ... the legend says that Chinese Scrip was invented any pa by Cang Jie, a minister of the Emperor Huang Di, wrote down the bones ~~on~~ or tortoise she... He observed the footprints of birds and beats whose lines and shapes, inspired by the sight of this. he then drew the pictures of the objects in accordance with their shapes and form. These picture Characters is early chinese character, It was called (Xiang xing (in chinese), fs or pictography, for pa ~~Example~~ the characters ri "sun" ⊙ ☉ 日; yuè 'moon' ☽ ☽ 月, the closer the resemblance fs between the Characters and the fs objects. Shān ("mountain") ⛰ 山 it is a clear. faithful Picture of a String of hills.

For render fs abstract ideas, ~~peoples~~ md some characters were invented and adapted. It was called ideographs, For instence, by adding a stroke to the top of the pictograph '木' tree (— +

SUBJECT 2
WP 5.2

Following social and life changed, things became complicated and diverse,the pictographs and ideographs were not enough to adapted new things, so a kind of phonetic script was used. This method was the combination between a determinative indicating and a phonetic indicating, such as determinative mu ( ) 'tree' ,'wood' and phonetic qi become a compound character, Its pronunciation is qi and its meaning is 'chinese chess'.

This method was quite simple and ingenuity.Also it was convenient to writer down and remember a new thing that people have discovered.Until this stage, the evolution of chinese script could be regarded as complete because it include ninety per cent of existing chinese characters.In the square of a script, There have two sides: its left indicate the meaning and its right indicate the sound. That is one why chinese character was called determinative-phonetic.

Another change of chinese script is that its style was changed from complete to simple and from single to divers. Simply, There had two stages. One is 'the ancient writing';Another is 'the official script', called 'li shu 'in chinese.

At first stage there had four styles: A, Inscriptions on bone or tortoise shells of the Sang Dynasty (16th--11th century B.C.) B, Inscriptions on ancient bronze objects of Wester Zhou Dynasty (11th--771B.C.);C, An ancient style of calligraphy, current in Eastern Zhou Dynasty (770--256 B.C.); D, Qin Dynasty for the purpose of standardising the script (221--207);During those periods, most of styles look like a picture .(Showing :1 2 3 4 5 6)

Second stage also have four styles : A, Official script (Easter Han 25--220AD);B,Characters executed swiftly and with strokes flowing together (220 A.D.); C, Regular script (220A.D.); D,Ruing hand.At that time,Their common styles are that chinese character was from pictography into symbol, its line or stroke became a radical system, for example , (mu) always means some plant, it is a symbol of plant.Also it had regular form of writing. (showing :7 8 9)

Many people know that Chinese character is a shape of 'square.'.This shape seem to intend for the eye rather than the ear ,such as ( )'land', ( )'back',look like a picture .Drawing a picture,it need to use a line or stroke, thinking about its collocation, writing chinese in a square, it also need to consider script's collocation and its stroke, so there are some similar between cere character and a picture of art. A square also is a space, like a picture scroll, one can free drawing it according its collocation.

For its beautiful and practical, a kind of hand writing art together with some medium of pen paper ink and ink-slab, called calligrapher, was invented and used . Writing a character was thought to present the personality of people. In old china, a entailing man

Painting and decorative art

APPENDIX 11
SUBJECT 6
PP 6·1

The painting art was taken place from the Middle Kyngdom. However a few example of princes's tomb from the Old Kyng contained a magnificant master pieces of art. Egyptian Artists used to paint on the walls of tomb. on the outer casing of the sarcophagus and on the papyrus paper. They decorated with the scene from the daily life and the after-life. They used colours which were easy to find such as the blues and greens from the ground-up minerals like azurite and malachite, the Reds and yellows from the desert's ochres, the whites from limestone and black from soot. Brightly coloured scenes of wildlife in the marshes still astound us today with their detail and freshness.

The two ways of thinking at that time were matching with each other. The former was to focus on the religions structures which the painting was representing it. The later the art of painting came to dominate the decoration of private tombs.

The example of the master pieces on the painting art contained many aspect of life and believes. The artists created tableaux of life on the River Nile. Officials are shown inspecting the exotic tribute brought to Egypt from all parts of the Known world.

procession to the tomb to the final prayers for the spirits. As a matter of fact one of the standard elements was a representation of the deceased hunting and fishing in the papyrus marshes, pastimes he would have wanted to enjoy throughout eternity.

APPENDIX II
SUBJECT 6
W P 1.4

If there is the will there is the way .

Father Keyroloss , that is the best friend I ever kwown in my life. He is the priest of our Coptic church in Cairo .I knew him many years ago . A long time ago I faced a great problemin my life It seems to lead for lossing my possition . At that time I was very sad and angry ,so Itried many ways to overcome this problem .

Traying to help me, many relatives and friends did their best ;however, their efforts were in vain .day after day ,the trouble had been increased , I went to my doctor who gave me some medecine to enable me to sleep .

Later on , Father Keyroloss was informed about my case by my husband . He came to visit me in my huose ,first of all ,when he visited me he asked if Iwent to the real doctor or not ?. As a matter of fact , I couldn't understand what he meant by a real doctor ??.Finally ,I got an anwer from him ,"GOD is the real dotor my daughter" .Father Keyroloss said .

Traying to blaze atrail to a real faith , I pray every day ,moreover ,he was my coach . He tought me a lot ,explaning to me how to manage my spiritual life in proper way . After a few months the result were unbeleivable !!.Many problem in my life have been solved gradually, furthermore,my classical enemies became friends suddenly .

In the begining I was intentive to the real reasons of all those changes in my life ,considering every thing logical and normal , because at that time the will of God was working,supporting me and did all thoses changes in my life .

According to my experience , spiritual life like any sport needs a certain outfit and working under the rules of use and disuse ,furthermore ,it needs a true will,true faith and skillful coach like Father Keyroloss.It was a true story from my real life can't ever been forgotten.

APPENDIX 11
SUBJECT 15
W.P 1·2

REVIEW ON "PAY BACK" (a short story)

" Pay · Back " is a short story which exposes the social injustice which Aborigine people have suffered since white people arrived in Australia.
The author exposes these issues in a very intelligent way. This skill is clearly shown in the way he conveys the time and place - made obvious - even though the writer does not say specifically where and when the situation happens. Also the reader can feel his/her senses involved in the situation.

In terms of the characters , they are multi-dimentional, as well as they have individual perspectives. One of the good things about this characters is that they exist beyond the author and therefore they determine what happens.

The language that the writer uses explores a large range of vocabulary. Furthermore, the author uses literary devices- such as metaphor - to create imagery which is both vivid and evocative.
Also, the characters have been developed by the use of a suitable speech which provides a suitable balance among description, narration ans dialogue.

The construction of the plot is very interesting. Since the opening scene the reader's interest is grab.
The ending satisfactory, it gives the impression that some justice has be done. Finally, can be said that the attitude of the writer towards the material is natural as well as realistic and sentimental.

Also, can be added that the reader gets some knowledge what have happened to the Aborigines during all these 200 years.

PAY BACK,
Davis, J.(Ed)(1990)Paperback: A Collection of Black Australian Writings Queensland University Press 370 pgs .

APPENDIX II
SUBJECT 15
PP 2.2

Healthy diet

Currently the number of people who have started to realize the importance of a healthy diet has grown. However, the lack of information about what a healthy diet means is still a major source of concern. Basically, a healthy diet means a balanced diet, which contains sufficient amounts of proteins, vitamins and calories.

One of the most important vitamin is vitamin A, which is stored in the liver. This vitamin is important for new cell growth and healthy tissues. We can find considerable amounts of vitamin A in milk, butter and fresh vegetables. The lack of this vitamin could produce eye disease.

Vitamin C is found in fresh fruit and green vegetables. This vitamin helps to prevent infections and aids in tooth and bone formation. If there is a deficiency of this vitamin, it can lead to scurvy. Furthermore, vitamin D is very important,

APPENDIX II
SUBJECT 8
PP 1.2

The Blue Rider

In the late years of the 19th and in the 20th century the world of arts (?) was changi dramatically. The modern time had begun. For centuries the arts was a matter Koenigshause Kings or powefull families. They supported artists and took over th patronages. This had a great influence on the artists. Through various circumstanc (French revolution, new knowledge of physics as the atom and chemistry) this c system was changed. in the 19th century. There were no patrons anymore and t artists had to look after themselves. However that made them independed from t influence of their patrons to really be creative in their style. The Modern Art of t 20th century had begun. I France the impressionists created their wonderful paintin at the end of the 19th century. Then the artists began to remove even further from t conservative style of painting the more or less exact images of their objects. Fauvis an Cubism found their followers in other European countries and even North Americ At the same time Germany attracted many artists from European countries. Dresden a ??? developed into arts centres ~~of groups~~, which were mostly founded to ????gate a comm direction in style. Other groups as Neue Künstler vereini...
The probably most important part in the development of an independent modern a played Munich. It drew artists from all over the world. There was one group of artis that had a different concept , ~~that was~~ the group "The Blue Rider ".

The Blue Rider was the name of a group of artists in Munich. It was founded by t artists Wassily Kandinsky and Franz Marc in 1911. . exhibition + almanach.
~~The name came from~~ internationally well known.

1. name 2. purpose/of the/group.
"pap"
probably the most famous member of the group. 1866
Wassily Kandinsky was born in Russia. His ... was from Siberia, his mother from Moscow. His grand mother was a Baltic and she spoke German, his first language was German. He studied l... social studies and painting was only hobby.

was changing
...s a matter of
...ook over their
...circumstances
...stry) this old
...nore and the
...nded from the
...ern Art of the
...erful paintings
...ther from the
...ects. Fauvism
...orth America.
... Dresden and D'dorf
...ate a common
Der Versammlung + Die Brücke
...nt modern art in Germany
...oup of artists

...nded by the

Why did he turn to art. !
In 1892 he went to Munich to study art at the ... Academy of Art"!.
When did he meet Marc?
Friends?
He was a very active person, interested in theoretical aspect of art as well.
He founded a union of painters and in 1909 together with Franz Marc the NKVM. Why?
They organised an exhibition in 1909 and a second one in 1911 with works of Picasso and Rouault and Vlaminck. However there were complications during the preparations and the group split. K. missed the spiritual experience Zitat!!! Kandinsky and Marc left and formed the "Blue Rider".
Lived together with Gabriele Münter in Murnau until 1914. Travelled in Europe and North Africa from 1904 to 1908.
Überschrift: Development of the artist.
~~First paintings~~

Kandinsky provided the group with its spirit and he was the main theorist. His articles in the Almanach are considered as the most important works in prewar Germany (Zitat)

I think he did some painting too

His father...
... His ...
... law and ...
...y.

His early works were mostly landscapes - freely distorted but still representations of reality in opulent colours in the Fauve manner. From 1910 onwards he began to change his style to more liberated and abstract improvisations which lead to the first free-form, largely non-objective (Spiritual) art of the new century.

Disciple ?

Franz Marc was a good friend of Kandinsky

APPENDIX II
SUBJECT 8
WP 1.1

{Gloria 30.07.93 First Sample:}

My name is Gloria Karnahl, I am born in small town in Germany with the name Wolfenbuettel. I went to primary school and then to a type of high school which we call a Gymnasium in Germany. I finished with the 'Abitur ' which is the german entry to University. I went to university to study economics but i didn't finish - a sore point..
In 1968 I came across data-processing which was a quite new thing at that time. I found it very interesting and was immediately drawn to it. I looked around and found that one of germany's leading industry companies - Siemens AG - took people for training . I applied and a few days later I was employed by Siemens.
I was trained for mainframe computing and worked for a long time in that area ,mostly with IBM-computer. After almost 25 years I got a bit tyred with computer and my life and I decided to move to Australia - for a change. I found immediately a job with a computer consultant company. Unfortunately I got retrenched in late 1990 and was not able to find another job in mainframe computing in Perth. After almost two years of unemployment and various casual jobs, I decided that it is time to give my life a new direction. I did a lot of thinking and found at the end of that process that it must be wonderful to learn about our environment and at a later stage to help to preserve it. After lots of inquiries I found two university courses to my liking: One is "Environment Management" at Edith Cowan University and the other is "Environment Science" at Murdoch University. I have not decided for which course I am going to apply but I think it will be the more 'hands-on' course of Environment management at Edith Cowan University.

The film FS PP 2.2

The definition of "feature" film varies from periods to periods –

In different Australian cities films were made as early as 1896, providing ~~an income as early~~ MS ~~income~~ pd or income for early Australia film makers. by 1899 MS films were add more dimensions FS ~~to the picture presentation of evangelical religion such as soldiers of the Cross 1900~~ (With Joseph Perry and Sons [illegible] and Joseph, was the first feature [illegible] ~~milestones of the Australia film Industry~~ The first full length ~~film~~, first religious, and ~~full text~~ to classified in seven different propaganda films and first spectacle parts. all of which depend entirely on definition, was rather complex display of

~~By the 1890 the [illegible] Australian film~~ were inter-related films slides, music and add ~~new dimension to the presentation~~ the Spoken word, been the first film of evangelical religion such as soldier [illegible] point of [illegible], and [illegible] clear fact, the of the cross until 1900

The culmination of the [illegible] presented by [illegible]

~~narrators~~ of film industries tend to [illegible] [illegible] magic power of light... H+ classified in [illegible] different parts.

(1) 1900 – 1913 [illegible]

(2) 1914 – 1918

(3) 1919 1929

1940 – 1945 (5)

1946 – 1960 (6)

for the Salvation of ~~[illegible]~~ mankind
and tens of people and [illegible] around
the world. (1)

2 For the purpose to produce [illegible] 7.5 ~~[illegible]~~ films
~~[illegible] the [illegible]~~ [illegible] the [illegible] of [illegible]
[illegible] the first [illegible]
to [illegible] for the [illegible] welfare
[illegible] of the [illegible] ~~[illegible]~~ [illegible] the
[illegible] ~~[illegible]~~ [illegible]
Soldiers of the Cross. [illegible] ~~[illegible]~~

Introduction of The film Industries
can be classified in [illegible] different periods.

1- 1900 - 1913

The story of Kelly Gang, the longest
narrative film seen in Australia,
and quite possible in the world, opened
on December 1906 in Melbourne showing
films to a large crowds
The Kelly Gang. the film [illegible] by Millar
Johnson and William Gibson by their
knowledge of chemistry they becoming
~~pro~~ experts in handling technical as-
pects of photography and processing

APPENDIX II
SUBJECT 10
WP 6-1

The African subsahara has a great potentiality in arts which are expended and attributed to the people according to their geographical areas because those people are the only ones who can understand their own versions.

The characteristics of arts are expressed in the following interpretations:

!- Afrians, before the colonisation of the muslims and Europeans, liveled peacefully in unity and harmony. They were always unified. Their way of living depended on the environmental ethnography. As they lived in collectivities, they sahared foods and other valubles materials together without obligation. An example of their of of living was sculpted by a local sculptor from Gahana shown in the class.

2- In order to defend themselves, Africans symbolise arts as arms to protect and secure their lands against their neighboring enemies and wild animals. For example, in Kenya and Ugunda, the worriors put on their masks, shields and armed with spears. This illustration draws them back to their ancestors. (French Equatorial Africa and Cameroons (1942). Another similar example is about the nomadic worriors, the Vidri Bazinger. These people, their ancestors used to oppose and resist to the muslim invaders in the Norh of Africa during the late sixteenth century. (African Arts, (1975) Volume 9 page75).

3- To show the importance of traditional values, they paint or sculpt their people well known. A typical example is " the appealing figure of Houphouet Boigney, President of Cote- D' ivoire, seen against a background of birds and fish, is an interesting blend of traditional figurative painting and realistic portraire." (Africa Arts, (1982), volume16 page 85.

4- The Spitritualism in subsharan Africa is the most praticable religion in that part of the world. In the early centuries, before Christ, Africans did not have any specific religion as it is today. Their believes have been based on their own ritual performances and depended on the geographical situations. They did it according to their ethnographic environment and its nature. They also incluеded physical health and healing activities.
For example, inthe North of Chad and Cameroun, when someone is sick at the the point of death, the people of these rgions will take that patient to a sacred place and there they will apply different methods of healing to cure him or her. If the patient recovers from his/ her illness, they will thank their ancestors. If not, they will simply say that, their ancestors love him/ her than anyone else. Then, they will return home with agony and disclose to the rest of the family that the fellow refused to come back home and every body will know that he

or she was died. In the evening, they will gathered at the defunt's house or parents to mourne and to sing the following song as an example:

" Those who are dead are gone;
They are in brightening Shadow
And in the thickening Gloom.
The Dead are not beneath the Earth;
They are in the quivering Tree.
They are in the goaning Wood.
they are in the flowing Water,
And in the still Water,
They are in the Hut, they are in the Crowd,
The Dead are not dead."

(African music, (1978) p127).

The reason of this song is that, these two countries have similarities in ritual ceremonies.

The other picture bellow are the vases made of stone and clay for traditional medecine purposes in Cross River, Nigeria. (Exhibited in L. Kahan Gallery New York City. (African Arts (November1982) p 84).

African Arts

Africa, in the form of a mango fruit, abandoned on its own in the ocean of sand known as Subsaharan Africa. It is the second largest continent after Asian continent. Its superficy is about 8,800,000 square kilometres. This continent is situated between the two big oceans, (Atlantic in the west and Indian in the east).

Its greatest length from north to south is about heigt thousands kilometres and from east to west is also seven thousands four hundreds and fourty kilometres. The coast routes including islands are about twenty thousand six hundred kilometres and its superficy is also about twenty nine million sqare kilometres. The New Illustrated Everyman's Encyclopedia @, (1985), p 20.

3- During the prehistoric time, Africa has already developed its own arts and was the Home of Proconsul, the first primate. Ten thousands years later, it was divided into four races which were: The Nigroid, Bush, pigmy and Proto- Hamite. The history of its arts has not been classified by the historians. It was said that there was no evidence to justify it because, firstly, nothing has been written down as it happens in western world Contrary

APPENDIX II
SUBJECT II
WP 3.2.
VI FF

a final and spectacular cultural show. The Governor's residence is beside the Naowarat Bridge which has been jumpacked all day, many of the revellers and even some mobile merchant having opted for the total abandon of standing in the river and splashing away. The scene i reminiscent of a mass baptism, a not altogether unfitting simile.

The mountain air and spring sunshine, together with the famed gentility of the Northern Thais afford a unique chance for visitors to share in the celebration of life and visitors to share in th celebration of life and culture in the heart of the ancient capital. Oliver Hargreave (1993: 52 53), the tourist who spent Songkran week in Chiang Mai last year, wrote his opion abou Songkran festival in ***Sawasdee***, Thai Airways International magazine. Examples of this are

> Getting wet at Songkran seems to throw a switch inside one. It's so hot__and soaking everyone is so much fun__ that you can't see any reason why anyone would want to stay dry.__ __
> Eventually, we got home__ cold, saturated and tired. But the fun had warmed our spirits for the start of the Thai New Year.

[md]

At Phra Pradaeng, just down the Chao Phya River from Bangkok, the ethnic Mons keep thei traditions alive year round with their own festivals which is like no other in Thailand. Thei celebration of Songkran is probably the largest and most colourful outside of Chiang Mai.

Appendix 12

Composing Attitudes Profile for All Subjects

Subject	Preferred Writing Method	Advantages Cited	Disadvantages Cited	Effect of Preferred Writing Method on Writer	Other Issues Raised
1	WP	1. ease of revision, 2. better quality writing,	none	more confidence	This subject believed that WP made her a better writer
2	WP	1. ease of revision, 2. better quality writing	none	more satisfied with quality and look of finished product	This subject still felt the need for initial 'pen and paper' drafting
3	WP	1.better written English 2. revising easier and quicker, 3. thesaurus and spell-checker	none	felt more positive about her writing	decided to buy her own computer,
4	WP	1. better written English 2. revising easier 3. thesaurus and spell-checker	none	felt more positive about her writing ability	decided to buy her own computer,
5	WP	1. revising easier, 2. spell-checker	initial difficulty with learning commands - loss of some work (due to not saving correctly)	more satisfied with appearance and accuracy (e.g. spelling) of work	she felt a need for considerable assistance with the software in the first few weeks - until she had mastered the basic
6	WP	1. revising easier, 2. WP much quicker	initial problems with learning WP - subject found frustrating because of low typing rate	felt more confident - able to hand in work knowing it is spelt correctly, well presented, etc...	so impressed with word processing - she also decided to buy her own computer

7	WP	1. revising easier, 2. work neater, 3. better quality writing, 4. spellchecker	an initial low typing rate was also a discouragement to this subject for the first few weeks	considerable improvement in confidence as a writer - confidence in ability to produce good quality finished text	This subject (like several others) found that she 'changed' from being a 'pen and paper' writer to a 'direct, head-to-screen' writer - within weeks
8	WP	1. revising easier and better 'on-screen', 2. quality of writing improved, 3. easier to 'get that first sentence down', 4. faster,	none	1. reduction of anxiety over writing in English - subject indicated she was sometimes 'scared' of writing in English - word processing helped overcome this 2. this subject found that word processing accomodated her normal writing style much more naturally than did 'pen and paper' methods	* 'pen and paper' was NOT an alternative for this subject - she is extremely uncomfortable about 'pen and paper' composition
9	WP	1. software can correct spelling mistakes, 2. ease/speed of revising	none	more confidence - able to feel confident in finished work	This subject mentioned that she relies heavily on her word processing software at home to assist her with English grammar - as well as spelling and the thesaurus
10	WP	1. ease of revision, 2. better quality writing	none	more confident in presentation of finished work	subject raised the issue of training - he believed he required more training in the use of the word processing software

11	WP	1. ease of revision, 2. better presentation	none	This subject found revising easier when word processing - but she did not believe that she produced better quality writing in the 'pen and paper' condition	subject mentioned that the WordPerfect software was much more advanced than the software she had used previously in her own country
12	WP	1. ease of revision, 2. ability to save/retrieve work, 3. different formatting /presentation options available	none	Subject felt his finished work was much more 'professional' when word processed.	subject mentioned an interest in learning more about word processing - and other applications of use to his studies
13	WP	1. ease of revision, 2. neater, 3. permanent record of work	none	Subject felt more confident about handing in word processed assignments	the subject mentioned that her initially slow typing speed was a disadvantage she had to overcome - to get the real advantages of word processing
14	WP	1. ease of revision, 2. quality of writing, 3. appearance	none	Subject said she felt that 'pen and paper' writing of assignments was a 'waste of time' - she felt her word processed texts were of a much better quality	This subject also expressed an interest in learning about other applications that may help her in her studies - specifically language translation software
15	WP	1. ease of revision, 2. quality of writing, 3. NATURALNESS of writing process, 4. superior creative writing environment	none	Subject expressed considerable satisfaction at the 'fluidity' of text on the screen - and the neatness of the 'final copy'. Most of all - the subject saw her word processed work as superior in quality.	This subject's characterisation of word processing as being a far more 'natural' composing medium for her - is interesting. She felt that composing 'direct to screen' suited her cognitive style much better

Appendix 13

Sample Extracts of Anecdotal Records

Date:	08.08.93	**Observation:**
Time:	12:50	Subject using handwritten notes to add material
Subject:	2	to his word processed work - extensive revisions
Group:	WP	being made...

Date:	08.08.93	**Observation:**
Time:	12:58	Subject lost his work - only a few lines at this
Subject:	12	stage - he (and a few others) still need to be
Group:	WP	reminded to SAVE their work to floppy disk...

Date:	08.08.93	**Observation:**
Time:	13:10	Subject starts experimenting with spellchecking
Subject:	6	function of software - very excited - talks to
Group:	WP	researcher about this...

Date:	08.08.93	**Observation:**
Time:	13:18	Subject asks for more advanced/global
Subject:	4	formatting commands - wants to change ALL
Group:	WP	text, point sizes, font, etc... - wants to work at above the paragraph level...

Date:	08.08.93	**Observation:**
Time:	13:30	This subject 'crashes' her computer - she
Subject:	5	somehow manages to reboot the machine
Group:	WP	without saving her work - researcher talks her through the commands for saving, transferring to floppy disk, etc...

Date:	08.08.93	**Observation:**
Time:	13:35	- Subject asks for advice on revision of her first
Subject:	11	assignment - also requests to use the word processor's spellchecker - to check the spelling of
Group:	PP	words in her written work... The subject had forgotten to bring her dictionary with her...
		- Subject asks if she can word process her work instead...

Date:	08.08.93	**Observation:**
Time:	13:41	- Subject's pen and paper work very messy and disorganized - at this point, she decides to scrap several pages - and start again - very little achieved for the rest of this session...
Subject:	1	
Group:	PP	- This subject also requests to be allowed to word process her work instead - "...my writing is very bad..."

Date:	08.08.93	**Observation:**
Time:	13:55	Subject appears to be the only 'pen and paper' writer to have completed a reasonable amount of writing - 2 to 2 1/2 pages of handwritten work - in this session - closer inspection reveals a large amount of 'loosely referenced' material has simply been copied from reference books...
Subject:	10	
Group:	PP	

Appendix 14

Sample Time Sheet

Name:_____.

Assignment Time Sheet:

Whenever you work on one of your written assignments - PLEASE remember to fill out this assignment time sheet. Your cooperation with this will help the researcher to collect accurate data. Please note: under the column called 'Writing Mode' - WP means 'word processing' and PP means 'pen and paper'.

Date:	**Writing Mode:** (WP or PP)	**Location:**	**Time Started:**	**Time Finished:**	**No. of Minutes:**

Appendix 15

Correlation coefficients of drafts one and two (word processing and 'pen and paper') for the four major categories of revision changes

Revision - PP1 - Formal Changes	Revision - PP2 - Formal changes	.66 *
Revision - WP1 - Formal Changes	Revision - WP2 - Formal Changes	.65 *
Revision - PP1 - Meaning-Preserving Changes	Revision - PP2 - Meaning-Preserving Changes	.84 *
Revision - WP1 - Meaning-Preserving Changes	Revision - WP2 - Meaning-Preserving Changes	.93 *
Revision - PP1 - Microstructure Changes	Revision - PP2 - Microstructure Changes	.96 *
Revision - WP1 - Microstructure Changes	Revision - WP2 - Microstructure Changes	.92 *
Revision - PP1 - Macrostructure Changes	Revision - PP2 - Macrostructure Changes	.61 *
Revision - WP1 - Macrostructure Changes	Revision - WP2 - Macrostructure Changes	.62 *

* $p < .05$, $df = 13$. (Overall reliability coefficient for revision of .77)

Appendix 16

Correlation coefficients of drafts one and two (word processing and 'pen and paper') for the four major categories of writing quality

Quality - Community Standards - PP1	Quality - Community Standards - PP2	.85 *
Quality - Community Standards - WP1	Quality - Community Standards - WP2	.67 *
Quality - Individual Personality - PP1	Quality - Individual Personality - PP2	.33
Quality - Individual Personality - WP1	Quality - Individual Personality - WP2	.50
Quality - Unity of Forms and Ideas - PP1	Quality - Unity of Forms and Ideas - PP2	.73 *
Quality - Unity of Forms and Ideas - WP1	Quality - Unity of Forms and Ideas - WP2	.70 *
Quality - Communicative Effectiveness - PP1	Quality - Communicative Effectiveness - PP2	.51 *
Quality - Communicative Effectiveness - WP1	Quality - Communicative Effectiveness - WP2	.60 *

* $p < .05$, $df = 13$. (Overall reliability coefficient for writing quality of .61)

Appendix 17

Number of revisions made by all subjects in Text 1 and Text 2 (and resulting means), for the word processing and 'pen and paper' conditions

Subject	Revision Category	PP[1] Text 1	PP Text 2	PP Mean		WP[2] Text 1	WP Text 2	WP Mean
1	Formal Changes	23	8	15.5		11	9	10
	Meaning-Preserving Changes	18	6	12		25	19	22
	Microstructure Changes	8	3	5.5		15	23	19
	Macrostructure Changes	0	0	0		1	2	1.5
	Total Revisions	**49**	**17**	**33**		**52**	**53**	**52.5**
2	Formal Changes	86	72	79		315	127	221
	Meaning-Preserving Changes	90	81	85.5		207	132	169.5
	Microstructure Changes	127	93	110		145	163	154
	Macrostructure Changes	5	4	4.5		11	16	13.5
	Total Revisions	**308**	**250**	**279**		**678**	**438**	**558**
3	Formal Changes	24	20	22		50	63	56.5
	Meaning-Preserving Changes	3	6	4.5		15	22	18.5
	Microstructure Changes	0	0	0		11	15	13
	Macrostructure Changes	0	0	0		1	1	1
	Total Revisions	**27**	**26**	**26.5**		**77**	**101**	**89**

[1]PP = 'pen and paper'
[2]WP = 'word processed'

4	Formal Changes	10	13	11.5	14	36	25
	Meaning-Preserving Changes	0	1	0.5	1	7	4
	Microstructure Changes	1	0	0.5	12	8	10
	Macrostructure Changes	0	0	0	2	3	2.5
	Total Revisions	**11**	**14**	**12.5**	**29**	**54**	**41.5**
5	Formal Changes	36	57	46.5	8	8	8
	Meaning-Preserving Changes	28	14	21	2	0	1
	Microstructure Changes	8	11	9.5	1	7	4
	Macrostructure Changes	0	2	1	1	3	2
	Total Revisions	**72**	**84**	**78**	**12**	**18**	**15**
6	Formal Changes	51	19	35	106	20	63
	Meaning-Preserving Changes	50	22	36	31	4	17.5
	Microstructure Changes	22	11	16.5	23	2	12.5
	Macrostructure Changes	4	0	2	8	0	4
	Total Revisions	**127**	**52**	**89.5**	**168**	**26**	**97**
7	Formal Changes	0	25	12.5	18	61	39.5
	Meaning-Preserving Changes	21	40	30.5	1	5	3
	Microstructure Changes	9	17	13	1	25	13
	Macrostructure Changes	0	0	0	1	2	1.5
	Total Revisions	**30**	**82**	**56**	**21**	**93**	**57**
8	Formal Changes	7	12	9.5	14	0	7
	Meaning-Preserving Changes	6	4	5	4	1	2.5
	Microstructure Changes	4	3	3.5	5	1	3
	Macrostructure Changes	0	0	0	0	3	1.5
	Total Revisions	**17**	**19**	**18**	**23**	**5**	**14**

9	Formal Changes	8	1	4.5	88	1	44.5
	Meaning-Preserving Changes	2	2	2	39	4	21.5
	Microstructure Changes	11	0	5.5	44	7	25.5
	Macrostructure Changes	0	0	0	8	0	4
	Total Revisions	**21**	**3**	**12**	**179**	**12**	**95.5**
10	Formal Changes	27	13	20	48	19	33.5
	Meaning-Preserving Changes	26	33	29.5	13	37	25
	Microstructure Changes	17	11	14	18	38	28
	Macrostructure Changes	0	0	0	4	5	4.5
	Total Revisions	**70**	**57**	**63.5**	**83**	**99**	**91**
11	Formal Changes	10	7	8.5	6	2	4
	Meaning-Preserving Changes	19	0	9.5	9	5	7
	Microstructure Changes	11	0	5.5	4	12	8
	Macrostructure Changes	0	0	0	8	11	9.5
	Total Revisions	**40**	**7**	**23.5**	**27**	**30**	**28.5**
12	Formal Changes	9	35	22	5	28	16.5
	Meaning-Preserving Changes	4	20	12	4	11	7.5
	Microstructure Changes	4	8	6	4	19	11.5
	Macrostructure Changes	0	0	0	1	3	2
	Total Revisions	**17**	**63**	**40**	**14**	**61**	**37.5**

13	Formal Changes	36	85	60.5	12	39	25.5
	Meaning-Preserving Changes	21	35	28	3	26	14.5
	Microstructure Changes	10	26	18	5	3	4
	Macrostructure Changes	0	1	0.5	0	2	1
	Total Revisions	**67**	**147**	**107**	**20**	**70**	**45**
14	Formal Changes	2	5	3.5	1	70	35.5
	Meaning-Preserving Changes	8	1	4.5	0	6	3
	Microstructure Changes	6	1	3.5	1	14	7.5
	Macrostructure Changes	1	0	0.5	0	0	0
	Total Revisions	**17**	**7**	**12**	**2**	**90**	**46**
15	Formal Changes	2	10	6	1	9	5
	Meaning-Preserving Changes	1	4	2.5	3	9	6
	Microstructure Changes	2	3	2.5	1	5	3
	Macrostructure Changes	0	0	0	0	0	0
	Total Revisions	**5**	**17**	**11**	**5**	**23**	**14**

Appendix 18

Writing quality scores achieved by all subjects in Text 1 and Text 2 (and resulting means), for the word processing and 'pen and paper' conditions

Subject	Writing Quality Components	[1]PP Text 1	PP text 2	PP Mean		[2]WP Text 1	WP text 2	WP Mean
1	"Community Standards" Score (out of 35)	20	23	21.5		27	31	29
	"Individual Personality" Score (out of 10)	7	6	6.5		9	7	8
	"Form and Ideas" Score (out of 30)	20	17	18.5		18	21	19.5
	"Communicative Effectiveness" Score (out of 25)	15	13	14		16	17	16.5
	Total Score (out of 100)	**62**	**59**	**60.5**		**70**	**76**	**73**
2	"Community Standards" Score (out of 35)	16	17	16.5		25	30	27.5
	"Individual Personality" Score (out of 10)	7	7	7		8	9	8.5
	"Form and Ideas" Score (out of 30)	19	20	19.5		20	22	21
	"Communicative Effectiveness" Score (out of 25)	15	16	15.5		16	18	17
	Total Score (out of 100)	**57**	**60**	**58.5**		**69**	**79**	**74**

[1]PP = 'pen and paper'
[2]WP = 'word processed'

3	"Community Standards" Score (out of 35)	21	25	23	28	29	28.5
	"Individual Personality" Score (out of 10)	9	8	8.5	9	10	9.5
	"Form and Ideas" Score (out of 30)	23	22	22.5	24	27	25.5
	"Communicative Effectiveness" Score (out of 25)	16	17	16.5	19	22	20.5
	Total Score (out of 100)	**69**	**72**	**70.5**	**80**	**88**	**84**
4	"Community Standards" Score (out of 35)	22	26	24	27	31	29
	"Individual Personality" Score (out of 10)	8	9	8.5	8	9	8.5
	"Form and Ideas" Score (out of 30)	21	23	22	23	22	22.5
	"Communicative Effectiveness" Score (out of 25)	14	14	14	18	18	18
	Total Score (out of 100)	**65**	**72**	**68.5**	**76**	**80**	**78**
5	"Community Standards" Score (out of 35)	20	20	20	31	34	32.5
	"Individual Personality" Score (out of 10)	8	9	8.5	9	10	9.5
	"Form and Ideas" Score (out of 30)	22	22	22	26	27	26.5
	"Communicative Effectiveness" Score (out of 25)	20	15	17.5	21	24	22.5
	Total Score (out of 100)	**70**	**66**	**68**	**87**	**95**	**91**
6	"Community Standards" Score (out of 35)	24	22	23	29	28	28.5
	"Individual Personality" Score (out of 10)	9	8	8.5	8	8	8
	"Form and Ideas" Score (out of 30)	25	24	24.5	22	25	23.5
	"Communicative Effectiveness" Score (out of 25)	20	18	19	18	22	20
	Total Score (out of 100)	**78**	**72**	**75**	**77**	**83**	**80**

7	"Community Standards" Score (out of 35)	20	19	19.5	25	26	25.5
	"Individual Personality" Score (out of 10)	7	7	7	9	9	9
	"Form and Ideas" Score (out of 30)	22	20	21	24	24	24
	"Communicative Effectiveness" Score (out of 25)	16	15	15.5	22	17	19.5
	Total Score (out of 100)	**65**	**61**	**63**	**80**	**76**	**78**
8	"Community Standards" Score (out of 35)	16	16	16	30	28	29
	"Individual Personality" Score (out of 10)	8	9	8.5	8	9	8.5
	"Form and Ideas" Score (out of 30)	20	22	21	25	24	24.5
	"Communicative Effectiveness" Score (out of 25)	19	17	18	18	22	20
	Total Score (out of 100)	**63**	**64**	**63.5**	**81**	**83**	**82**
9	"Community Standards" Score (out of 35)	20	18	19	26	30	28
	"Individual Personality" Score (out of 10)	9	6	7.5	9	10	9.5
	"Form and Ideas" Score (out of 30)	21	15	18	20	23	21.5
	"Communicative Effectiveness" Score (out of 25)	19	13	16	17	20	18.5
	Total Score (out of 100)	**69**	**52**	**60.5**	**72**	**83**	**77.5**
10	"Community Standards" Score (out of 35)	17	16	16.5	25	28	26.5
	"Individual Personality" Score (out of 10)	8	5	6.5	7	8	7.5
	"Form and Ideas" Score (out of 30)	16	11	13.5	17	19	18
	"Communicative Effectiveness" Score (out of 25)	15	13	14	12	16	14
	Total Score (out of 100)	**56**	**45**	**50.5**	**61**	**71**	**66**

11	"Community Standards" Score (out of 35)	32	30	31	33	34	33.5
	"Individual Personality" Score (out of 10)	10	8	9	10	10	10
	"Form and Ideas" Score (out of 30)	27	25	26	24	28	26
	"Communicative Effectiveness" Score (out of 25)	20	18	19	22	23	22.5
	Total Score (out of 100)	**89**	**81**	**85**	**89**	**95**	**92**
12	"Community Standards" Score (out of 35)	30	28	29	26	29	27.5
	"Individual Personality" Score (out of 10)	9	9	9	8	8	8
	"Form and Ideas" Score (out of 30)	22	21	21.5	25	25	25
	"Communicative Effectiveness" Score (out of 25)	19	18	18.5	20	18	19
	Total Score (out of 100)	**80**	**76**	**78**	**79**	**80**	**79.5**
13	"Community Standards" Score (out of 35)	18	20	19	26	28	27
	"Individual Personality" Score (out of 10)	8	7	7.5	8	10	9
	"Form and Ideas" Score (out of 30)	21	21	21	22	27	24.5
	"Communicative Effectiveness" Score (out of 25)	15	15	15	20	21	20.5
	Total Score (out of 100)	**62**	**63**	**62.5**	**76**	**86**	**81**
14	"Community Standards" Score (out of 35)	28	24	26	30	30	30
	"Individual Personality" Score (out of 10)	9	9	9	9	10	9.5
	"Form and Ideas" Score (out of 30)	22	27	24.5	25	22	23.5
	"Communicative Effectiveness" Score (out of 25)	19	21	20	21	22	21.5
	Total Score (out of 100)	**78**	**81**	**79.5**	**85**	**84**	**84.5**

15	"Community Standards" Score (out of 35)	28	23	25.5	31	33	32
	"Individual Personality" Score (out of 10)	8	8	8	9	10	9.5
	"Form and Ideas" Score (out of 30)	22	22	22	26	26	26
	"Communicative Effectiveness" Score (out of 25)	17	19	18	17	19	18
	Total Score (out of 100)	**75**	**72**	**73.5**	**83**	**88**	**85.5**

Appendix 19

Complete results of paired two-sample t-tests (for revision, writing quality, time, typing rate and number of errors) as calculated and reported by Excel for Windows Version 4.00

t-Test: Paired Two-Sample for Means - Revision - Formal Changes

	[1]PP	[2]WP
Mean	**23.7666667**	**39.633333**
Variance	495.9595238	2868.909524
Observations	15	15
Pearson Correlation	0.665682221	
Pooled Variance	794.0511905	
Hypothesized Mean Difference	0	
df	14	
t	**1.457861**	
P(T<=t) one-tail	0.083472329	
t Critical one-tail	1.76130925	
P(T<=t) two-tail	**0.16694466**	
t Critical two-tail	2.144788596	

t-Test: Paired Two-Sample for Means - Revision - Meaning-Preserving Changes

	PP	WP
Mean	18.86666667	21.5
Variance	481.9095238	1743.5
Observations	15	15
Pearson Correlation	0.848099516	
Pooled Variance	777.3928571	
Hypothesized Mean Difference	0	
df	14	
t	**0.393833**	
P(T<=t) one-tail	0.34981876	
t Critical one-tail	1.76130925	
P(T<=t) two-tail	**0.699637**	
t Critical two-tail	2.144788596	

[1]PP = 'pen and paper'
[2]WP = 'word processing'

t-Test: Paired Two-Sample for Means - Revision - Microstructure Changes

	PP	WP
Mean	14.23333333	21.06666667
Variance	733.602381	1410.780952
Observations	15	15
Pearson Correlation	0.96376721	
Pooled Variance	980.4654762	
Hypothesized Mean Difference	0	
df	14	
t	**1.95396401**	
P(T<=t) one-tail	0.03549086	
t Critical one-tail	1.76130925	
P(T<=t) two-tail	**0.07098172**	
t Critical two-tail	2.144788596	

t-Test: Paired Two-Sample for Means - Revision - Macrostructure Changes

	PP	WP
Mean	0.566666667	3.233333333
Variance	1.495238095	13.63809524
Observations	15	15
Pearson Correlation	0.692282574	
Pooled Variance	3.126190476	
Hypothesized Mean Difference	0	
df	14	
t	**3.46564913**	
P(T<=t) one-tail	0.001892512	
t Critical one-tail	1.76130925	
P(T<=t) two-tail	**0.003785024**	
t Critical two-tail	2.144788596	

t-Test: Paired Two-Sample for Means - Writing Quality - "Community Standards"

	PP	WP
Mean	21.96666667	28.93333333
Variance	20.65952381	5.066666667
Observations	15	15
Pearson Correlation	0.532108988	
Pooled Variance	5.444047619	
Hypothesized Mean Difference	0	
df	14	
t	**7.0045717**	
P(T<=t) one-tail	3.10146E-06	
t Critical one-tail	1.76130925	
P(T<=t) two-tail	**6.2029E-06**	
t Critical two-tail	2.144788596	

t-Test: Paired Two-Sample for Means - Writing Quality - "Individual Personality"

	PP	WP
Mean	7.966666667	8.833333333
Variance	0.802380952	0.55952381
Observations	15	15
Pearson Correlation	0.417531249	
Pooled Variance	0.279761905	
Hypothesized Mean Difference	0	
df	14	
t	**3.7472047**	
P(T<=t) one-tail	0.001082662	
t Critical one-tail	1.76130925	
P(T<=t) two-tail	**0.00216532**	
t Critical two-tail	2.144788596	

t-Test: Paired Two-Sample for Means - Writing Quality - "Form and Ideas"

	PP	WP
Mean	21.16666667	23.43333333
Variance	9.166666667	6.245238095
Observations	15	15
Pearson Correlation	0.773328501	
Pooled Variance	5.851190476	
Hypothesized Mean Difference	0	
df	14	
t	**4.5579988**	
P(T<=t) one-tail	0.000223413	
t Critical one-tail	1.76130925	
P(T<=t) two-tail	**0.00044683**	
t Critical two-tail	2.144788596	

t-Test: Paired Two-Sample for Means - Writing Quality - "Communicative Effectiveness"

	PP	WP
Mean	16.7	19.2
Variance	4.064285714	5.314285714
Observations	15	15
Pearson Correlation	0.67087506	
Pooled Variance	3.117857143	
Hypothesized Mean Difference	0	
df	14	
t	**5.4616431**	
P(T<=t) one-tail	4.18963E-05	
t Critical one-tail	1.76130925	
P(T<=t) two-tail	**8.3793E-05**	
t Critical two-tail	2.144788596	

t-Test: Paired Two-Sample for Means - Time spent per writing session

	TIMEPP	TIMEWP
Mean	158.6666667	160.6666667
Variance	11504.34524	11845.05952
Observations	15	15
Pearson Correlation	0.794810194	
Pooled Variance	9278.184524	
Hypothesized Mean Difference	0	
df	14	
t	**0.1118846**	
P(T<=t) one-tail	0.456251621	
t Critical one-tail	1.76130925	
P(T<=t) two-tail	**0.91250324**	
t Critical two-tail	2.144788596	

t-Test: Paired Two-Sample for Means - Typing rate - characters per minute

	RATEPP	RATEWP
Mean	128.5	89.6
Variance	1056	1833.185714
Observations	15	15
Pearson Correlation	0.673397177	
Pooled Variance	936.9285714	
Hypothesized Mean Difference	0	
df	14	
t	**4.7281574**	
P(T<=t) one-tail	0.000161756	
t Critical one-tail	1.76130925	
P(T<=t) two-tail	**0.0003235**	
t Critical two-tail	2.144788596	

t-Test: Paired Two-Sample for Means - Number of errors per minute

	PP	WP
Mean	0.466666667	1.866666667
Variance	0.623809524	4.766666667
Observations	15	15
Pearson Correlation	0.463244042	
Pooled Variance	0.798809524	
Hypothesized Mean Difference	0	
df	14	
t	**2.78413585**	
P(T<=t) one-tail	0.007314954	
t Critical one-tail	1.76130925	
P(T<=t) two-tail	**0.014629907**	
t Critical two-tail	2.144788596	