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HOW DO SECONDARY SCHOOL STUDENTS WRITE POETRY? HOW CREATIVE WRITING PROCESSES RELATE TO FINAL PRODUCTS

TALITA GROENENDIJK*, TANJA JANSSEN,
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ABSTRACT. Do different creative writing processes lead to qualitatively different writing products? In this study we examined how Dutch speaking secondary school students (16-years old, 11th grade) wrote two poems. Students' on line writing processes were recorded by a keystroke logging program: Inputlog. Text production, pausing, and several types of revision activities were coded. Each poem was holistically rated for quality by seven judges. Next, we examined the relationship between students' writing processes and the quality of their final text. We found that relatively much text production in the beginning of the writing process and relatively many high level revisions towards the end of the writing process, influenced the final text positively. Pausing and other types of revision were negatively related to the text quality, at least in some of the phases of the writing process.

KEYWORDS: writing process, creative writing, creativity, secondary education

Chinese

[Translation Shek Kam Tse]

標題：中學生怎樣寫作詩歌？探討創意寫作的過程和最終作品的關係

摘要：不同的創意寫作過程，會不會引致作品出現質量上的差異？本研究調查荷蘭語中學生（十六歲，就讀第十一級）寫作兩首詩歌的情況。研究員把學生在網上進行創作的過程，利用記錄電腦按鍵的程式Inputlog錄下來。研究員把學生創作時文本的產生、停頓、以及不同種類的修改活動，進行編碼。每首詩歌由七名評審員全部評分。跟著，研究員調查學生的寫作過程和最終作品質素的關係。研究結果發現，寫作過程中初期的文本產生，和寫作過程後期的高層次的修改，對學生最後作品的質素有正相關，而且相關度很高。在寫作過程中幾個階段，出現停頓和其他種類的修改，則與最終作品的質素有負相關。

關鍵詞：寫作過程、創意寫作、創意、中學教育

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Dutch

[Translation Tanja Janssen]

TITEL. Hoe schrijven leerlingen in het voortgezet onderwijs gedichten? Over de relatie tussen creatieve schrijffprocessen en uiteindelijke producten

SAMENVATTING. Leiden verschillende creatieve schrijffprocessen tot kwalitatief verschillende schrijfproducten? In dit onderzoek hebben we bestudeerd hoe Nederlands sprekende leerlingen uit het voortgezet onderwijs (16 jaar oud, vijfde leerjaar) twee gedichten schreven. De ‘on line’ schrijffprocessen van de leerlingen werden vastgelegd met behulp van het computerprogramma Inputlog. Tekstproductie, pauzes en verschillende soorten revisie-activiteiten werden gecodeerd. De globale kwaliteit van ieder gedicht werd beoordeeld door zeven beoordelaars. Vervolgens onderzochten we de relatie tussen de schrijffprocessen van de leerlingen en de kwaliteit van hun uiteindelijke tekst. Uit de resultaten komt naar voren dat relatief veel tekstproductie aan het begin van het schrijffproces en relatief veel revisies op zinsniveau aan het eind van het schrijffproces, de kwaliteit van de uiteindelijke tekst positief beïnvloedden. Pauzeren en andere typen revisie waren negatief gerelateerd aan de tekstkwaliteit, dat wil zeggen in sommige fasen van het schrijffproces.

TREFWOORDEN: schrijffproces, creatief schrijven, creativiteit, voortgezet onderwijs

French

[Translation Laurence Pasa]

TITRE. Comment les élèves du secondaire écrivent-ils la poésie ? Explorer le rapport entre des processus d’écriture créative et le produit final

RÉSUMÉ. Les différents processus d’écriture créative mènent-ils à des productions qualitativement différentes ? Dans cette étude nous avons examiné comment des lycéens hollandais (âgés de 16 ans, 11^{ème}) ont écrit deux poèmes. Les processus d’écriture des lycéens ont été enregistrés en temps réel par un programme de notation de frappe: Inputlog. La production des textes, les pauses, et plusieurs types de révision ont été codés. La valeur holistique de chaque poème a été évaluée par sept juges. Nous avons ensuite examiné le rapport entre les processus d’écriture des lycéens et la qualité de leur texte final. Nous avons constaté que l’élaboration d’une part importante de la production au début du processus d’écriture, ainsi qu’un nombre relativement élevé de révisions de niveau supérieur vers la fin du processus d’écriture, influencent positivement le texte final. Les pauses et d’autres types de révision sont liés négativement à la qualité des textes, tout au moins dans certaines phases du processus d’écriture.

MOTS-CLÉS: processus d’écriture, écriture créative, créativité, enseignement secondaire

Greek

[Translation by Panatoya Papoulia Tzelepi]

Τίτλος. Πώς γράφουν ποίηση οι μαθητές του δευτεροβάθμιου σχολείου; Εξερεύνηση της σχέσης μεταξύ διαδικασιών δημιουργικής γραφής και τελικού προϊόντος

Περίληψη. Οδηγούν διαφορετικές διαδικασίες δημιουργικής γραφής σε ποιοτικά διαφορετικά αποτελέσματα;. Σ’ αυτή τη μελέτη εξετάσαμε πώς, ομιλητές της Ολλανδικής γλώσσας, μαθητές δευτεροβάθμιου σχολείου (16 χρονών, στην 11 τάξη) έγραψαν δύο ποιήματα. Οι διαδικασίες γραφής “on line” καταγράφηκαν με ένα πρόγραμμα “Inputlog”. Παραγωγή κειμένου, παύση και πολλοί τύποι αναθεώρησης του γραπτού κωδικοποιήθηκαν. Κάθε ποίημα αξιολογήθηκε ολιστικά για την ποιότητά του από επτά κριτές. Στη συνέχεια εξετάσαμε τη σχέση μεταξύ των διαδικασιών γραφής των μαθητών και της ποιότητας του τελικού κειμένου. Ευρήκαμε ότι σχετικά μεγάλη παραγωγή κειμένου στην αρχή της διαδικασίας γραφής και σχετικά πολλές αναθεωρήσεις υψηλού επιπέδου προς το τέλος της διαδικασίας γραφής, επηρέασαν θετικά το τελικό κείμενο. Οι παύσεις και άλλοι τύποι αναθεώρησης σχετίζονται αρνητικά με την ποιότητα του κειμένου, τουλάχιστον σε κάποιες φάσεις της διαδικασίας γραφής.

Λέξεις κλειδιά: Διαδικασία παραγωγής γραπτού, δημιουργική γραφή, δημιουργικότητα, δευτεροβάθμια εκπαίδευση

Italian

[Translation Manuela Delfino, Francesco Caviglia]

TITOLO. In che modo gli studenti di scuola secondaria scrivono poesia? Esplorazioni sulla relazione tra i processi di scrittura creativa e i prodotti finali

SINTESI. È vero che diversi processi di scrittura creativa conducono a prodotti finali qualitativamente diversi? In questo studio abbiamo esaminato come studenti di scuola secondaria di lingua olandese (16 anni di età, undicesimo anno di istruzione) hanno scritto due poesie. I processi di scrittura su computer da parte degli studenti sono stati registrati da un programma di registrazione dei tasti premuti, *Inputlog*. Eventi quali la scrittura del testo, le pause e i vari tipi di attività di revisione sono stati codificati separatamente. Ogni poesia è stata valutata da un punto di vista qualitativo nella sua interezza da sette giudici. Successivamente, abbiamo esaminato la relazione tra i processi di scrittura messi in atto dagli studenti e la qualità del testo finale. Abbiamo notato che il testo finale era influenzato positivamente da una produzione relativamente abbondante di testo nella fase iniziale e da un numero relativamente alto di revisioni generali su contenuto e organizzazione. Le pause e altri tipi di revisione erano correlati negativamente con la qualità del testo, almeno in alcune delle fasi del processo di scrittura.

PAROLE CHIAVE: processi di scrittura, scrittura creativa, creatività, scuola secondaria

Polish

[Translation Elżbieta Awramiuk]

TITUŁ. Jak uczniowie szkół średnich piszą poezję? Badanie relacji między procesami kreatywnego pisania a produktem finalnym

STRESZCZENIE. Czy różne procesy kreatywnego pisania dają w efekcie różne produkty finalne? W niniejszej pracy badamy, jak holenderskojęzyczni uczniowie szkół średnich (szesnastoletni, z jedenastej klasy) pisali dwa poematy. Uczniowie podczas procesu pisania byli nagrywani programem *Inputlog*. Kodowano produkowanie tekstu, pauzowanie i kilka sposobów redagowania tekstu. Każdy poemat był całościowo oceniany przez siedmiu sędziów. Następnie zbadano relacje między procesami uczniowskiego pisania i jakością produktu finalnego. Okazało się, że relatywnie wiele produkcji tekstu na początku procesu pisania i relatywnie wiele wysokich poziomów korekty pod koniec procesu pisania wpływało na produkt końcowy pozytywnie. Pauzowanie i inne typy sprawdzania były skorelowane negatywnie z jakością tekstu, przynajmniej na niektórych fazach procesu pisania.

SŁOWA-KLUCZE: proces pisania, pisanie kreatywne, kreatywność, nauczanie w szkole średniej

Portuguese

[Translation Paulo Feytor Pinto]

TÍTULO. Como é que os alunos do secundário escrevem poesia? Explorando a relação entre processos de escrita criativa e produtos finais. (Groenendijk et alii)

RESUMO. Diferentes processos de escrita criativa levam a produtos de escrita qualitativamente distintos? Neste estudo examinamos a forma como estudantes do ensino secundário falantes de neerlandês (16 anos, 11º ano) escreveram dois poemas. Os processos de escrita dos alunos em linha foram gravados através de um programa de registo de batidas no teclado: *Inputlog*. A produção de texto, as pausas e vários tipos de actividades de revisão foram codificados. A qualidade de cada poema foi holisticamente classificada por sete avaliadores. Depois, examinámos a relação entre os processos de escrita dos estudantes e a qualidade dos seus textos finais. Detectámos que uma relativamente maior produção de texto no início do processo e um relativamente alto nível de revisão no seu final influenciavam positivamente o texto final. Pausas e outros tipos de revisão surgiram negativamente relacionados com a qualidade do texto, pelo menos durante algumas fases do processo de escrita.

PALAVRAS-CHAVE: processo de escrita, escrita criativa, criatividade, ensino secundário.

Spanish

[Translation Ingrid Marquez]

TÍTULO. ¿Cómo escriben poesía los estudiantes de bachillerato? Una exploración de la relación entre los procesos de creación literaria y los productos finales

RESUMEN. ¿Las variaciones en los procesos de creación literaria llevan a productos escritos de diferente calidad? En este estudio, examinamos cómo escriben dos poemas los estudiantes de nivel bachillerato de habla holandesa (de dieciséis años, en segundo año). Con Inputlog, un programa que registra los golpes del teclado, se documentaron los procesos de escritura de los estudiantes. La producción de texto, las pausas y varios tipos de actividades relacionadas con la revisión se codificaron. Siete jueces calificaron cada poema holísticamente. Posteriormente, examinamos la relación entre los procesos de escritura de los estudiantes y la calidad de su texto final. Encontramos que la mayor producción de escritura toma lugar al principio del proceso, con un nivel relativamente alto de modificaciones por el final, mejorando el texto producido. Acciones como pausar o participar en algunos tipos de edición tuvieron un impacto negativo en la calidad de la escritura final, cuando menos durante algunas fases del proceso creativo.

PALABRAS CLAVE: proceso de escritura, creación literaria, creatividad, bachillerato.

1. INTRODUCTION

Exploring the relationship between creative writing processes and final products, Carey and Flower (1989) describe creative tasks as ill defined problems, which means that these tasks have many possible solutions. Some tasks are more ill defined than others. In the case of artistic work, the problem itself is often not entirely (or not at all) formulated, nor are strategies to solve the problem, or the nature of the solution given (Getzels & Csikszentmihalyi, 1976). We know very little of how secondary school students solve these types of problems, and even less about the relationship between the creative writing process and the final product. Therefore, we carried out a small scale study of students' creative writing processes, in relation to the quality of their final texts.

In the following sections we will first present a theoretical framework, combining findings from two different domains: creativity research and writing research. Creativity research has provided interesting theories of creative processes involved in a variety of tasks. In writing research, sophisticated methodologies have been developed to study students' (writing) processes. In both domains, the relationship between process and product has been examined.

1.1 *The Creative Process*

The creative process is traditionally described as consisting of four stages: preparation, incubation, illumination, and verification. According to Lubart (2001), creativity research has moved away from such a stage-model with a fixed sequence of activities, laying more emphasis on the sub processes engaged in creative work. Various models have been proposed to describe the sub processes of creative work. Finke, Ward and Smith (1992), for instance, proposed a model of creative cognition called "Geneplore". In this model, generative and exploratory cognitive processes

are emphasized. Generative processes involve the initial creation of an idea, whereas in the exploratory processes the idea is examined and interpreted in different ways. The two sets of processes are combined in cyclical sequences that lead to creative products.

In several empirical studies a relationship was found between particular creative processes and the creativity of the resulting product. Getzels and Csikszentmihalyi (1976) examined the problem finding process in art making; creativity requires problem finding, because there is no clear-cut problem presented to the solver. As a consequence, the artist first needs to discover his own problem. Getzels and Csikszentmihalyi (1976) studied problem finding behaviour in a real life situation; they observed fine art students' still life drawing activities under experimental conditions. They included both students' problem finding behaviour before they started drawing, while composing the still-life arrangement (problem formulation stage), and after they started drawing (problem solution stage). Problem finding during the problem formulation stage was operationalised as the number of objects manipulated, interaction with the objects while composing the still life arrangement, and uniqueness of chosen objects. Problem finding during the problem solution stage was operationalised as openness of the problem (length of time the problem remained open; not structured in its final form), exploratory behaviour (switching medium, making sketches), and changes made from the still life arrangement to the final product. This was studied by examining the sequence of photographs of the drawings in progress (taken every six minutes), observing students at work, and comparing the still life arrangement to the final product. Finally, students were interviewed to study their awareness of their discovery oriented behaviour.

For problem finding behaviour during both stages, a positive correlation with creativity was found. Students who were engaged in an extended problem-formulation process, exploring while drawing, produced work that was evaluated as more creative and original compared to students who defined the artistic problem soon after drawing commenced. The interviews revealed that students with high problem finding scores, interpreted the task in terms of their own problem (giving personal meaning to the still life objects). Besides, they did not have a representation of the final drawing visualised before starting to draw. The 'colours and shapes unfolding before their eyes' changed the meaning of the work (Getzels & Csikszentmihalyi, 1976: 95).

This study demonstrated the importance of problem finding in the creative process, not only in the initial idea generation stage, but also during the creative process. Besides, it shows that we can study problem finding behaviour by studying the work in progress (snapshots) and students' manifest behaviour. However, this study did not deal with students from secondary education. Oostwoud Weijdenes (1983) studied high school students working on artistic tasks and concluded that some of them do not engage in problem finding at all.

1.2 The Writing Process

Flower and Hayes (1980a) developed an influential model of the writing process. This model, based on general problem solving expert models, describes the writing process as iterative and composed of three main processes: planning, translating, and reviewing. A monitor manages, controls, and regulates the activation of processes and sub processes.

Bereiter and Scardamalia (1987) presented a developmental model of the writing process. This model consists of two main strategies: knowledge telling and knowledge transformation. The former, a novice model of writing, depends highly on retrieval of content from the Long Term Memory without reorganizing. The latter, an expert model of writing, is a problem solving model that makes readjustments to retrieved content according to rhetorical and pragmatic goals.

Galbraith (1999) proposes a dual process model of writing, consisting of a knowledge transforming component and a knowledge constituting component. The latter component differs from the one mentioned before, because it supposes that writing involves finding out what to say, rather than being a matter of translating preconceived ideas into text. Text production happens in successive circles; feedback on an initial utterance adds a new source of input to a network of conceptual features which alters the pattern of activation of this network and produces a different idea. This succession of ideas leads towards discovery during writing.

These models of the writing process describe the presence of various sub processes within the writing process, their cyclic nature, and the developmental aspect involved. Cognitive activities, as described by these models, have been studied in different ways. Think aloud protocol analysis has been used as a way to study these processes directly (Van den Bergh, Rijlaarsdam & Breetvelt, 1993; Van den Bergh & Rijlaarsdam, 1999; Breetvelt, Van den Bergh & Rijlaarsdam, 1994). Other researchers have studied writing processes indirectly, for example by analysing the final product or by examining traces of the writing process from computer records of the work in progress. In the case of expository genres, for different writers, typical patterns of writing behaviour have been identified, based on computer records of the writing process (Van Waes & Schellens, 2003; Levy & Ransdell, 1996). In these studies, researchers have focused on pausing behaviour, revision and text production.

1.3 Experts and novices

Much research on writing processes has been carried out within the expert-novice paradigm (focussing on expository texts). Novices differ from experts in their task representation and goal setting (Flower & Hayes, 1980b). For instance, novices tend to depart from task constraints, while experts re-represent the task for themselves. Experts and novices seem to solve different problems.

Revision behaviour also tends to differ between experts and novices, older and younger writers. Taxonomies have been developed to analyse revision behaviour (Lindgren & Sullivan, 2005; Van Gelderen & Oostdam, 2004; Faigley & Witte, 1981). For expository texts, it was found that older or more competent writers revise

more and make more revisions to the meaning of the text and on a more global level than younger, less competent writers (Faigley & Witte, 1981).

Carey and Flower (1989) found that expert writers revise more globally (dealing with larger text segments). In their study, they relate this to problem finding. In fact, revision problems can be seen as ill defined problems, because the writer first has to define a problem (there is no clear-cut problem that needs to be revised), before being able to solve it. Carey and Flower found that expert writers define the problem more globally. This research shows that we should take level of revision into account when analysing the revision processes.

Linearity of writing seems to be related to competence as well. Linear writers, composing text in the order of its final presentation (Severinson Eklundh, 1994), were in most instances found to be the weaker writers (Williamson & Pence, quoted by Severinson Eklundh, 1994).

1.4 Relation between process and product in writing

Van den Bergh, Rijlaarsdam and Breetvelt (1993) and Breetvelt, Van den Bergh and Rijlaarsdam (1994) did not study the differences in writing behaviour between experts and novices, but instead examined the writing behaviour of novices and the variability within a group of novices in relation to the quality of their final products. Van den Bergh et al. (1993) found that in essay writing, revision behaviour is related to the quality of the final text. Rereading of the last part of text written so far, evaluating text passages, and changing sentences are related to better final texts.

Breetvelt et al. (1994) found that good and weak writers differed not in the frequency of cognitive activities, but in the stage of the writing process at which they were engaged in a cognitive activity. It was found that revision behaviour only differed significantly between students in the last phase of the writing process and only contributed to better texts when performed in the last phase. This research shows us the importance of timing of activities in the writing process.

1.5 Research questions

Whereas students' writing processes of expository texts and their relation to the final product are well-documented (Rijlaarsdam, Braaksma, Couzijn et al., 2005), few studies exist on the processes involved in the writing of literary or creative genres. Most research about creativity in writing, is about creativity in writing of expository genres (Carey & Flower, 1989; Galbraith, 1999; Flower & Hayes, 1980b). These studies examine idea generation processes and initial task definition (Carey & Flower 1989, Van den Bergh & Rijlaarsdam, 1999). These processes are generally studied by using think aloud protocol analysis. Getzels and Csikszentmihalyi (1976), however, studied problem finding behaviour during the problem solution stage by examining manifest behaviour.

In the present study we examine the manifest writing activities of novices in poetry writing. We assume that differences in quality are a result of different processes or a different organization of sub processes, reflected in observable patterns of writ-

ing behaviour (Van Waes & Schellens, 2003; Levy & Ransdell, 1996). Furthermore, we assume that different writing activities have a different impact depending on the moment in the writing process they are employed (Breetvelt et al., 1994).

Our research questions are:

- How do secondary school students compose a poem, in terms of the frequency and organization of their text production, pausing and revision activities during composing?
- Is there a relationship between characteristics of the writing process and the quality of the final product?

2. METHOD

2.1 *Subjects and design*

The raw data were collected in a previous study (Janssen, Broekkamp & Smallegange, 2006) focused on the relationship between literary reading and creative writing abilities. In this study, nineteen students from different schools (pre university level) in Belgium and the Netherlands (16-years old, 11th grade, 13 girls and 6 boys) participated. Students were selected by their teachers and the researchers on the basis of their literary reading abilities; they were either very good or poor readers of literature. Each student completed two poetry writing tasks:

- 1) Write a poem that contains the following words: music/ bicycle/ shiver/ green/ resembles. Each line should contain one of these five words (each word can only be used once) (available time: 10 minutes)
- 2) Write a cinquain, starting with the word 'summer'.

Form: Line 1: First word
 Line 2: Two adjectives about the first word
 Line 3: Three verbs about the first word
 Line 4: A sentence about the first word (decide upon the length yourself)
 Line 5: Repeating the first word
 (available time: 5 minutes)

Each student worked individually on a computer, using MS Word. The writing session was recorded by Inputlog, the keystroke logging program we will describe below. After the students performed the writing tasks, open attitude interviews were held with each participant about their attitudes towards creative writing in general and about the tasks carried out in particular.

Seven experts rated the poems independently and in random order, according to the consensual assessment technique (Amabile, 1982; see Janssen et al., 2006). This technique has proved to provide reliable and valid quality scores in previous research. It requires a group of experts that rates creative products subjectively, without being trained by the researcher. The experts in our study were five teachers of Dutch language and literature and two experts. They assigned overall quality scores (rank order) to the poems. The inter-rater reliability was high (Cronbachs alpha .87 for the five-line poem, and .82 for the cinquain).

2.2 *Keystroke logging*

To record and analyse students' writing processes, we used keystroke logging. Keystroke logging programs register all physical writing activities that subjects perform on a computer and enable the researcher to reconstruct the complete composing process; the continuous shaping and reshaping of the text. Text production activities, pauses, mouse movements, revisions, and the temporal course of these activities in the writing process are recorded.

Keystroke logging is an on line (or synchronous) method to collect data. This means that data are collected while the process develops; in real time. It is an indirect way to collect data; it studies the text production process in order to uncover some of the underlying cognitive processes. It does not deal directly with the writer's cognitive, mental operations, but studies the traces of cognitive processes. In contrast to thinking aloud protocol analysis or interview analysis, keystroke logging is a non-reactive and non-intrusive way to obtain information on writing processes (Leijten & Van Waes, 2005).

In this study we used Inputlog to record the writing sessions, because, in contrast to other keystroke logging programs, this program is word processor independent. Inputlog produces a general logging file (storage of session information), statistical analyses, and linear output. In addition, it has a replay function (it replays the writing session).

2.3 *Coding*

The linear output of Inputlog was coded manually per 5-second time interval. In the coding system (presented in Table 1) four main activities were distinguished: text production, pausing, mouse movements, and revision. Revisions were further classified in precontextual and contextual revision, based on Lindgren and Sullivan's taxonomy (2005). Precontextual revision takes place at the point of inscription, while contextual revision takes place in a context, followed and preceded by text. Precontextual revision can not be classified further, because it is unknown what the writer had in mind. We do not know if the writer decided to use another word at the beginning of the line or if he/she decided to use a completely different sentence. Contextual revision was classified, based on Lindgren and Sullivan (2005), in micro and macro level revision: character level (letters, punctuation), word level, and sentence level (or line in the poem).

Typing errors were not included in the analysis because these errors are not relevant to creative processes; besides, they would bias the frequency of text production activities. We coded the pauses that became visible by coding the 5-second intervals. Empty intervals were coded as pauses. Students' final texts and the replay function of Inputlog were used to trace and classify the revisions. To examine the intra-coder reliability, the data were recoded by the same coder, after several months. The reliability was acceptable (Cohen's kappa = .83). An example of a coded fragment is presented in Table 2.

Table 1. *Coding scheme of writing activities*

Activity	Description	Example
1. Text production	Production of new text that is not part of a revision.	
2. Pausing	Only the longer pauses (of 5 seconds and more), visible when splitting up the process in 5-second intervals.	
3. Mouse movements	Mouse movements and other activities on the keyboard that can not be classified as text production, pausing or revision	
<i>4. Revision</i>		
4.1. Pre-contextual Revision	Revisions made at the point of inscription (we do not know what the person intended to write, so we cannot classify these further).	everything [Backspace 1][BS 1][BS 1][BS 1][BS 1] the sun is (writer revises at the point of inscription; directly after writing 'everything', he/she erases it and starts writing again).
<i>4.2. Contextual Revision</i>		
4.2.1. Character level Revision	Revision of one (or more) characters (punctuation mark or capitalization) that occurs within a word.	<i>summer</i> becomes: <i>Summer</i>
4.2.2. Word level Revision	One or two entire words are deleted/added/substituted/permutated, without causing another revision, that is grammatically necessary (in verb or subject), in the rest of the sentence.	<i>Even music is at play</i> becomes: <i>Even tinkling music is at play</i>
4.2.3. Sentence level Revision	Revision of an entire line in the poem or substitution of one word that causes other revisions in the same line. In both cases we coded one sentence level revision.	<i>He gives a shiver without an end</i> becomes: <i>A shiver before taking the final swimming test</i> or <i>with music that pleases me</i> is replaced by: <i>with music that I please</i>
4.2.4. Other Revision	All contextual revisions we could not classify further.	

Table 2. *Example of a coded fragment*

Final text:	Summer Sunny, warm Swimming, tanning, partying Enjoying with friends on holidays	Summer
Legend:	T= text production P= pause M= movements (mouse and other) in text R-CW= Revision-contextual: word level BS 1=back space, one character UP 1= movement upward, one line	

Interval number	Writing activities	Description	Coding
1	summe	Text production Line 1	T
2	r[ENTER 1]	Text production Line 1	
3	sunny,	Text production Line 2	
4	cost[BS 1] y[ENTER 1]	Text production Typing error Line2	
5		Pausing	P
6	swimming,	Text production line 3	T
7	tanning	Text production line 3	
8	, pa	Text production line 3	
9	rtyinf[BS 1] g	Text production line 3 Typing error	
10	[UP 1]	Moving back to line 2	M
	[BS 1]	Deleting "cosy"	
	[BS 1]	Inserting "warm"	
	[BS 1]	Contextual, word level revision	R - CW
11	[BS 1] [BS 1] [BS 1] [BS 1] warm		

2.4 Analysis

To answer our first question, two kinds of data were collected; data provided by Inputlog and interview data. To describe the writing process, protocols from Inputlog were coded as described above. The writing process was divided into three equal parts, based on total session time. Frequencies of different writing activities in the

three phases of the writing process were computed, and weighted by their session time. A factor analysis was used to reveal patterns of writing behaviour.

Subsequently, linearity of the writing processes was considered; plots were derived from the coded intervals. These plots show the line (or verse) the student works on and the interval of the process. We plotted all productive and revision activities, following Severinson Eklundh (1994), excluding punctuation and capitalization revisions. Based on the linearity plots, we made a distinction between linear, intermittent and non linear writers. Linear writers show a purely linear writing process. Intermittent revisers proceed linearly, but show one or two non linear leaps to other lines. Non linear writers show more than two leaps to other lines. Types of writers were illustrated by quotes from the interviews.

To answer our second research question, whether there is a relation between process and product quality, we conducted a linear regression analysis, with the quality score of the final product as the dependent variable, and the writing activities in each phase as independent variables (see Van den Bergh et al. 1993; Breetvelt et al. 1994). The obtained regression model provides insight into the influence of individual predictors per phase on the quality scores.

3. RESULTS

In this section, we will answer the first research question by describing the writing process in both a quantitative and a qualitative way. Next, we will turn to the second research question, examining the relationship between writing process and quality scores on the final product.

3.1 Students' poetry writing processes

Table 3 shows the mean frequency of students' writing activities during three phases of the writing process. Results represent an average over the two poetry writing tasks.

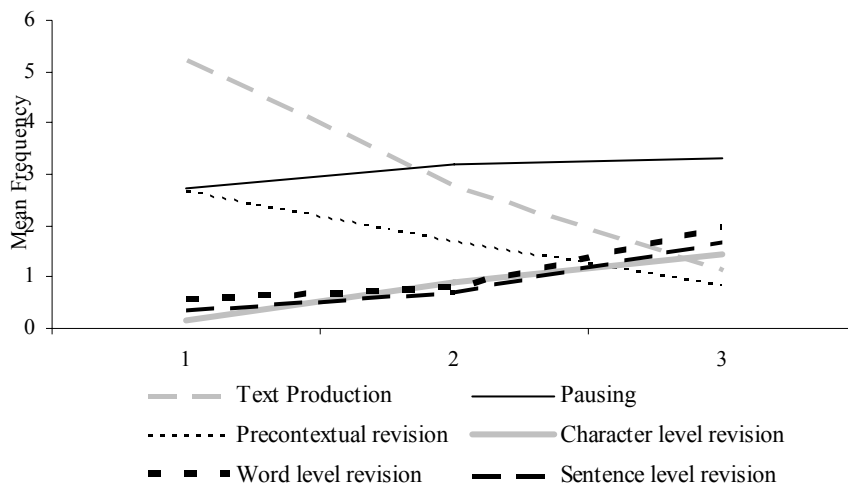
Table 3. Mean frequency of writing activities in the three phases of the writing process

	Phase 1		Phase 2		Phase 3	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Text Production	5.24	2.98	2.76	1.74	1.14	1.27
Pauses	2.72	1.60	3.18	1.86	3.32	1.76
Precontextual revision	2.63	2.77	1.69	1.69	.83	1.04
Character level revision	.17	.37	.90	1.51	1.46	2.15
Word level revision	.53	.78	.78	1.15	1.94	2.17
Sentence level revision	.34	.56	.72	.96	1.67	1.96

As shown by Table 3, text production is the predominating activity in the first phase of the process. In the second phase, text production, pauses and all revision categories together are almost equally present, while in the third phase pausing and revision activities dominate. The large standard deviations, especially for revision categories, indicate large individual differences between students in their revision behaviour.

Figure 1 provides a visual representation of the results, illustrating the general course of the various writing activities over the writing process. The figure shows that text production and precontextual revision are similarly distributed over the writing process as a whole; both activities decrease over time. Contextual revision, on the other hand, increases towards the end of the writing process, whereas pausing remains more or less constant.

Figure 1. Distribution of writing activities over three phases of the writing process



To discover patterns of writing behaviour, we performed a factor analysis. Results of the factor analysis are presented in Table 4. Distinguished writing activities and the phases in which they occur are listed in column one and two. The patterns of writing behaviour (factors) are presented vertically in the remaining columns. Factor loadings indicate that an activity occurs relatively often for that particular factor. For example, .842 in column three indicates that the production-phase1-factor is also characterised by relatively many precontextual revisions in phase 1. Higher factor loadings reflect a relatively large influence of that particular activity on a factor.

The factor analysis resulted in 6 factors, explaining 80 % of the variance between students¹. The different factors show that, for different students, writing activities are

¹ In the study by Janssen et al. (2006), students were originally selected on literary reading ability. We examined whether including 'literary reading ability' as a variable would affect the outcomes of our analysis. This was not the case; including literary reading ability in the

unequally distributed over the three phases. Students that produce relatively much text, at the beginning of their writing process, in phase one, do not do so later on, in phase two. The factor analysis also shows that *task* only plays a role in one factor (factor five), which explains only 8 % of the variance. Apparently, the particular writing task does not have a major influence on patterns of writing behaviour.

Table 4. *Results of factor analysis: Patterns within the writing process (factor loadings)*

Phase	Writing activity	Pattern					
		Production phase 1	Pausing	Production phase 2	Character level revision	Task dependent factor	Production phase 3
1	Text production	.650			.439		
1	Pausing		.905				
1	Precontextual revision	.842					
1	Character level revision				.919		
1	Word level revision	.405	.531				
1	Sentence level revision		.531	.490			
2	Text production			.783			
2	Pausing		.556			.557	
2	Precontextual revision	.490		.757			
2	Character level revision				.883		
2	Word level revision	.841					
2	Sentence level revision					.758	
3	Text production						.859
3	Pausing		.640				
3	Precontextual revision			.455			.748
3	Character level revision	.772					
3	Word level revision	.503	.647				
3	Sentence level revision			.748			
	Task					.785	

Factor one represents a writing pattern, characterized by relatively much text production in phase one. Text production in phase one goes together with relatively much precontextual revision in phase one and contextual revision (low level; character and word level) in phase two and three. Factor two represents a pausing pattern. As we have seen, pausing behaviour is a constant activity that is distributed equally over the three phases (see Figure 1). Pausing in phase one is related to pausing in phase two and three. Factor three is characterized by text production during the middle of the writing process. Again, text production is accompanied by precontextual revision in the same phase and revision in the following phase (high level; sentence

factor analysis resulted in a seventh factor which explained only five percent of all the explained variance.

level). Factor four shows a strong focus on character level revision; punctuation, capitalization and small changes within words. The task dependent factor shows, apart from a main influence of *task*, also a main influence of sentence level revision in the second phase of the process. This is not surprising, since the two poetry writing tasks differ in the required number of complete sentences; of the five lines in the cinquain, only one is a complete sentence (line 4). We would expect less sentence level revision in this task then. Factor six is characterized by relatively much text production in phase three, again accompanied by relatively many precontextual revisions in the same phase.

Students not only differed from each other in the frequency of activities employed and the orchestration of their activities during writing. They differed in the linearity of their writing process as well. We observed that some students started writing the first line of what would become their final poem, followed by the second, the third etcetera (composing the poem in the order of its final presentation; Severinson Eklundh, 1994), while other students proceeded in a nonlinear fashion, starting with a sentence that would, for example, end up as the third line in the final poem. The following example illustrates a non linear production process of one writer. The numbers indicate the order of her actions. Every step in the process is shown to give an impression of how the poem developed. Production stadia are, as it were presented as pictures of the developing text:

Step 1: text production

It is like everything around you disappears and only you are still there,	(writes line 4 of final poem)
When you are on your bicycle.	(writes line 5 of final poem)
Floating over grass so green.	(writes line 1 of final poem)
The shiver of your bell, when you make it ring	(writes line 3 of final poem)
The tone, it sounds like music to my ears	(writes line 2 of final poem)

Step 2: substitution of a line

It is like everything around you disappears and only you are still there,
 When you are on your bicycle.
Cycling through pathways and lanes of green
 The shiver of your bell, when you make it ring
 The tone, it sounds like music to my ears

Step 3: substitution of a verb

It is like everything around you disappears and only you are still there,
 When you are on your bicycle.
Floating through pathways and lanes of green
 The shiver of your bell, when you make it ring
 The tone, it sounds like music to my ears

Step 4: changing the order of lines

Floating through pathways and lanes of green
The shiver of your bell, when you make it ring
The tone, it sounds like music to my ears

It is like everything around you disappears and only you are still there,
When you are on your bicycle.

Step 5: rewriting part of a line

Floating through pathways and lanes of green
While you feel the shiver of your bell when you make it ring
The tone, it sounds like music to my ears
It is like everything around you disappears and only you are still there,
When you are on your bicycle.

Step 6: substitution of a noun

Floating through pathways and lanes of green
While you feel the shiver of your bell when you make it ring
The sound, it sounds like music to my ears
It is like everything around you disappears and only you are still there,
When you are on your bicycle.

Step 7: changing the order of lines

Floating through pathways and lanes of green
The sound, it sounds like music to my ears
While you feel the shiver of your bell when you make it ring
It is like everything around you disappears and only you are still there,
When you are on your bicycle.

This writer does not proceed linearly, but she goes back and forward in her developing text, rewriting sentences, substituting verbs and nouns, and changing the order of lines.

Figure 2 illustrates the two types of processes (linear and non linear) in a visual manner. The left-hand panel shows the process of a linear writer; the right-hand panel shows the non linear process from the example above. The five-second time intervals are presented on the horizontal axes, the line numbers in the final text are presented on the vertical axes. The linear process shows a linear plot, while the non linear process shows a recursive distribution of activities over line numbers and intervals.

Figure 2. A linear and a non linear writing process (time interval on x-axis, line number on y-axis).

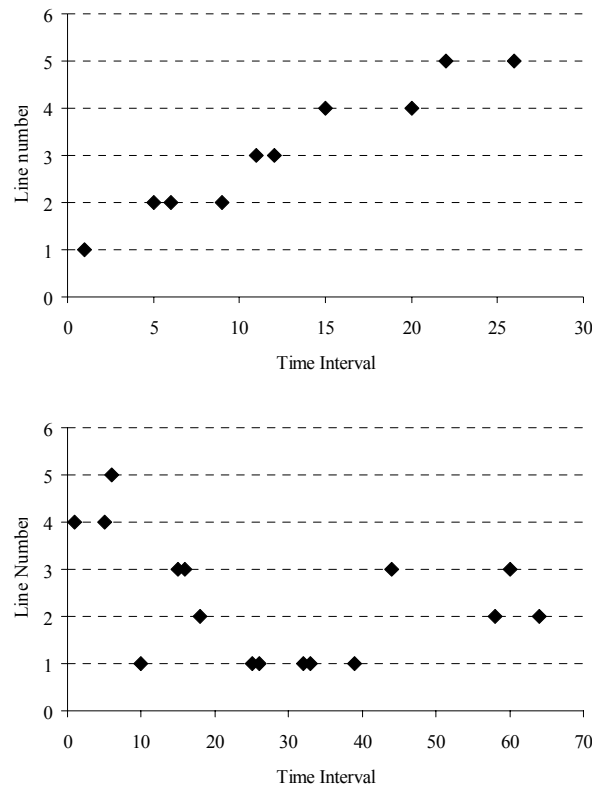


Table 5 presents the number of students that performed the poetry writing tasks in a linear, intermittent and non linear way. The Table shows that there is an effect of task on linearity of the writing process. The five-line poem task elicited more non linear behaviour than the cinquain task, that led to more linear and intermittent behaviour. This may be due to the more directional nature (fixed form aspects) of the cinquain task. Three writers are consistent linear writers (in both tasks). Two writers are consistently non linear, and three students are consistent intermittent writers.

Table 5. Linearity of the writing process (number of students)

	Poem	Cinquain	Consistent writers in both tasks
Linear	3	4	3
Intermittent	4	13	3
Non linear	12	2	2

Non linearity appears to be related to revision; that is, students tended to revise in other lines than the ones they were working on. However, some students produced in a non linear manner; writing one line, moving to the beginning of that line, and then writing the preceding line. The consistent linear writers produced text in a linear fashion *and* did not revise. These students were conscious of the fact they did not revise, as became clear from the interviews; they said they did not think very much about it, but just wrote down whatever occurred to them.

(..) I did not think very much about it. I just did something (..), I just thought: word word, word....I don't really like to do it either.

(..) It was just writing, when a word occurred to me, that should fit, just write it down, because, I am so bad at that, really! Me and poetry, that just doesn't....Especially with that bicycle, bicycle and shiver and I don't know what else. Then I was really like: 'what should I make up?' Then I just felt like 'write down whatever comes to you and, ready'. Because, well, I really can't do that.

The first fragment shows that the writer is not very motivated (although, in the same interview, he said he liked the tasks). In the second fragment, the writer expresses low self-efficacy. Some students provided indications of why they did not revise. One student said he did not know what to write:

(..) I don't know what's good. I write all kind of things, but I don't know if that's the right thing.

Non linear writers, on the other hand, tended to revise a lot. They seemed to be very conscious of their revision behaviour:

(..) I always think it is easy, but I always correct it a thousand times until a good text emerges.

(..) Sometimes, sometimes an entire story comes out. But what I find difficult, is to write something in one go. That is also a bit of a problem when I don't get high marks for Dutch writing assignments, because writing at home, I am writing comfortably behind my computer. I let it rest for a few days and I read it again. Then I read it and I think: 'this is really bad', so I change it. A good text will finally be written, but I just need more time for that.

The revising writers seemed to be engaged in another kind of process than the non revising, linear writers. They expressed more extensive and more profound involvement in the task, than the writers who said they wrote without thinking.

(..) Hm.. I found that Japanese poem [the cinquain] quite difficult, because you have to be very good at finding powerful words and words that are expressive. Maybe I needed more time for that, because you have to stick to the number of verbs and adjectives given. And well, the second poem, there were just five lines and each had to include one word, I thought, well, I can just write a poem and try to insert one such word in each line, but I first tried to remember a feeling and then, integrate a word into that and not just focus on the words.

3.2 *Relationship between writing process and the quality of the final product*

To examine the relationship between characteristics of the writing process and the quality of the final product, we used regression analysis. The outcome of the regression analysis is presented in Appendix A2. The presented model explains 65% of the variance. All writing activities were found to contribute to the prediction of the quality of the final product, either in a positive or in a negative direction, depending on the particular phase of the writing process in which the activity took place.

Table 6 shows the direction of the relationship between the occurrence of an activity in a particular phase and the quality of the final product. The phases are presented horizontally. A plus reflects a positive influence of the activity in that particular phase on final text quality. A minus reflects a negative influence of the activity in that particular phase on final text quality.

Text production and sentence level revision both have a positive influence on product quality; text production more in the beginning and middle of the writing process, and sentence level revision more towards the end. Pausing and precontextual revision have a negative effect on text quality in most phases. Character level revision has a positive influence on text quality in the second phase and a negative influence in the first and third phase of the writing process. Word level revision influences text quality positively in the first and second phase and negatively in the third phase.

Table 6 shows that revision is an important predictor of text quality. As shown, higher level revisions (word level and sentence level) influence the scores more positively than low level revision (precontextual and character level revisions). In the third phase, only relatively many sentence level revisions seem to predict the text quality positively.

In general, the linear writers who did not revise at all, all wrote low quality poems. Apparently, an entirely linear writing strategy without revision is not very effective. However, we cannot conclude that a non linear strategy is more effective; not all non linear writers received high scores on their poems.

² Including literary reading ability into this regression analysis does not result in major changes to the model.

Table 6. Direction of relation between writing activities and quality of final products

Activity in the writing process	Influence on text quality		
	Phase 1	Phase 2	Phase 3
Text Production	+++	++	
Pausing	---		-
Pre-contextual revision	--	--	
Character level revision	-	+	-
Word level revision	++	+	-
Sentence level revision		++	+

4. DISCUSSION

In this study, we examined the writing process of high school students, who performed two poetry writing tasks. We examined differences in the occurrence of various activities (text production, pausing, and revision) over time, in different phases of the writing process. We found that the mean frequency of text production decreases over time, while the mean frequency of various types of revision increases. Pausing behaviour, on the other hand, remains stable over the course of writing.

We found individual differences in the way they distributed these writing activities over the three phases. However, the main patterns of writing behaviour were fairly consistent over the tasks. Students differed in the linearity of their production process as well. Three students wrote in a consistently linear manner; these students did not revise. They seemed to ‘just write what occurred to them’, without thinking. The non linear writers revised relatively much. They seemed to be engaged in a very different kind of process, adding new criteria to the task themselves.

Furthermore, a relation was found between process and quality of the final poem. Text production in the beginning of the process and sentence level revision in the end were found to have a positive impact on text quality. This means that students who produced relatively much and revised relatively much on a high level, especially towards the end of the process, wrote better poems. Pausing and precontextual revision influenced the text quality negatively in almost all phases. Low level revision (character level and word level revision) influenced the text quality positively in the middle of the writing process, but negatively in the final stage of writing.

Students who wrote their poems in a linear manner, in both tasks, all received low quality scores. Quality of the poems written by the non linear and intermittent writers varied. Linearity seemed to be task related as well. As a consequence, it was difficult to make firm claims about the relationship between linearity of the process and text quality.

Our findings are in line with Faigley and Witte (1981) and Carey and Flower (1989), who found that better writers revise more on a global level. In these short poetry tasks, sentence level revisions can be considered as global revisions. Van den Bergh et al. (1993) also found that changes of sentences are related to text quality. Our results confirm findings from Breetvelt et al. (1994) as well; the timing of some of the writing activities matters. Our data could not confirm the negative correlation between revision in the first and second phase of the writing process and the quality of the text, as reported by Breetvelt et al. (1994). This may be due to effects of genre and/or text length. While Breetvelt et al. examined essay writing (essays of two pages or more), we studied poetry writing (very short poems of only five lines).

We found that several students wrote in a non linear manner, whereas Severinson Eklundh (1994) found very few non linear composers among novices. The non linearity we found may be connected to the nature of the tasks. Apparently, the writing of short poems stimulates students more to play with language and words, revising and changing order of sentences, than writing of prose.

Finally, our findings correspond to findings from research in art education. Getzels and Csikszentmihalyi (1976), for instance, found that exploratory behaviour during drawing was related to the quality scores on the final product. Revision behaviour can be considered as exploratory behaviour in our tasks. Sentence level revision is very effective in the last phase of the writing process, these students leave their 'problem' open to discovery until late in the writing process. The interviews revealed problem finding behaviour too. As Flower and Hayes (1980) stated: strong and weak students solve different problems. While some students interpreted the problem in their own way, adding their own criteria to the task, others wrote down immediately what occurred to them in response to the task, without further exploration. This is consistent with Oostwoud Weijdenes' findings that some students in secondary education do not engage in problem finding at all. These were the writers who did not revise and wrote low scoring poems.

Our study has several limitations. One limitation is that we focused mainly on observable, externalised processes. Mental processes involved in poetry writing and students' changing task representations were not examined. As Inputlog does not capture mental processes and preexisting ideas, other methods of data collection, such as think aloud protocol analysis, could be added as complementary to keystroke logging data.

Caution is needed in generalising the results of this study. We used relatively few tasks, relatively few students participated, and participants were not selected at random. Instead, they were selected on the basis of literary reading skills by Janssen et al. (2006). The participants belonged to two extreme groups; weak readers versus good readers of literature. In our analysis, we controlled for literary reading competence. The inclusion of this variable did not considerably alter our findings.

Despite these limitations, we succeeded in uncovering meaningful differences between students' creative writing processes. We contributed to the development of research on writing processes by examining poetry writing - an artistic creative genre that has not received much attention in writing research- and by applying research methods that have not been applied before to artistic-creative tasks. In a follow-up study, we intend to examine the writing of narrative texts, which will enable

us to compare students' writing processes in response to different creative writing tasks and genres.

We believe that a better understanding of students' creative processes may contribute to the development of instruction methods for creative tasks. Our findings give some indications of successful processes in poetry writing. This knowledge may be useful in designing process-oriented writing instruction.

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APPENDIX A

Linear regression analysis

<i>Activity in the writing Process</i>	<i>Phases in the writing process</i>					
	1		2		3	
	<i>Unstandardized Regression Coëfficiënt</i>	<i>Standard Error</i>	<i>Unstandardized Regression Coëfficiënt</i>	<i>Standard Error</i>	<i>Unstandardized Regression Coëfficiënt</i>	<i>Standard Error</i>
Text Production	.267*	.007	.287*	.006	.035*	.005
Pausing	-.437*	.007	-.069*	.005	-.087*	.004
Precontextual revision	-.170*	.009	-.304*	.006	-.109*	.010
Character level revision	-.886*	.036	.146*	.008	-.106*	.004
Word level revision	.495*	.009	.137*	.012	-.069*	.004
Sentence level revision	.243*	.015	.394*	.010	.166*	.004

*p<.001

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