How to measure PhD. students' conceptions of academic writing – and are they related to well-being?

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Abstract: This study investigated PhD students' conceptions of writing and how they saw themselves as writers. The Writing Process Questionnaire was created to analyse PhD students' ideas of academic writing. In addition, it was of interest, what the relation between conceptions of writing and the PhD students' well-being was. The participants were 669 PhD students from a major Finnish university who volunteered to fill in a questionnaire. The present study covered scales for measuring six distinct theoretical constructs that were created by forming sum variables of 26 questions: Blocks, Procrastination, Perfectionism, Innate ability, Knowledge transforming, and Productivity. Confirmatory factor analysis (CFA) was used to verify the six-dimension construct. Exhaustion, stress, anxiety and lack of interest all correlated positively with Blocks, Procrastination, and Perfectionism, and negatively with Productivity. Confirmatory factor analysis conducted by LISREL confirmed the six-factor structure of the writing scale. In conclusion, there is good evidence that the questionnaire is a reliable and valid tool, and it captures some essential aspectsof academic writing process and its emotional dimensions.

Keywords: academic writing: writer's block; procrastination, perfectionism, PhD education; doctoral students, writing process; learning environment; stress; feedback, commitment, instrument, questionnaire

1. Introduction

In all academic activity, writing is crucial for success. Particularly for PhD students, socialization to literate practices provides the instruments that allow them to become active and valued members of their respective disciplines (Bazerman, 2006; Dysthe, 1993; Kamler, 2008; Lea & Street, 1998). Academic writing is also a medium for generating new ideas and producing scientific knowledge and, therefore, a crucial instrument for collaborative knowledge creation (Hakkarainen et al, 2004, Paavola, Lipponen, & Hakkarainen, 2004; Tynjälä, Lonka & Mason, 2001). In sum, the practice of writing is at the core of doctoral studies.

Writing a PhD dissertation is, however, a complex and lengthy process. Although PhD students are a highly selected and talented group, there are still a number of students who qualify to write a dissertation but never finish it (Boice, 1993; Golde 2000; Lovitts, 2001; McAlpine and Norton, 2006). A main reason for this shortfall lies in the lack of support for academic writing (Boice 1993). Learning academic writing is difficult because it requires adopting partially tacit and implicit knowledge across extended socialization to disciplinary practices. Consequently, academic writing is extremely hard to share and to teach (Lonka, 2003). Another problem is that writing is not, in general terms, seen as a learning process to be deliberately supported, but rather, PhD education often focuses on the end products, that is, the thesis itself or the degree (Aitchison, 2009; Björk & Räisänen, 1996; Pyhältö, Stubb & Lonka, 2009). Recent research indicates that focusing too much on the product (e.g., thesis itself) may be a risk in terms of well-being and, paradoxically, finishing the thesis (Stubb, Pyhältö & Lonka, 2011b). Accordingly, there is a need to create new educational tools and instruments in order to identify the main problems of PhD students' learning in academic writing.

Conceptions of writing may play a crucial role as to PhD students' approach to their thesis writing, their explanations for success and failure, their commitment to developing their academic literacy skills, and their actual practices and procedures for writing. Maladaptive and biased beliefs are often socially shared and thus affect the nature of interaction in scholarly communities (Stubb, Pyhältö & Lonka, 2010). This study aimed to identify and assess PhD students' understanding and perceived difficulties concerning writing as well as their conceptions of themselves as writers. The purpose was to validate an instrument, The Writing Process Questionnaire (Lonka, 1996; 2003), for assessing PhD students' ideas of academic writing, especially in terms of their thesis writing.

2. Conceptions of writing

Academic writing is not only an individual act, but also a social condition: a form of participating and becoming a member of scientific community and culture (Dysthe, 1993; Lea & Street, 1998; McAlpine & Amundsen, 2008). Academic writing relies on

historically evolving, but relatively stable disciplinary genres and their systems (Bazerman, 2004). Genre may be characterized as a socially and culturally recognisable form of textually mediated communication or discursive practice (Hyland, 2004) whose norms are implicit. When PhD students participate in the practices of scientific community, it is important that they learn the conventions and ways of thinking that are typical of that specific literary tradition. This includes, for instance, learning how to frame arguments and use the language of their own specialty in accordance with strict disciplinary norms and regulative conventions. This process is challenging because the participants' knowledge of disciplinary genres is often implicit in nature, rather than something of which they are reflectively aware. Conceptions of writing are based on such understanding of textual practices (Lonka, 2003).

Learning textual practices in a given discipline is closely intertwined with one's personal development as a scholar. The participants have to learn how to adopt the corresponding authoring role and respective social position in the community. While producing their texts, the doctoral students are, so to say, "authoring themselves"; they cultivate their own academic voices (Holland, Lachicotte, Skinner, & Cain, 1998). PhD students, like any other authors, may feel threatened in the face of a multitude of potential current and future critics (Kamler, 2008); hence their liability to procrastination, perfectionism, and writer's block. Novices may produce weak academic texts because they end up reproducing and recounting information, rather than generating advanced, knowledge-creating discourse (Bereiter & Scardamalia, 1987). Technical writing manuals may not help doctoral students who suffer from problems in writing (Thomson & Kamler, 2007). Rather, their problems often lie within identity, dialogue, and discursive work related to academic writing (see e.g., Ivanič, 1998). There are also several affective and social "by-products" of academic writing, such as increasing self-confidence and developing the awareness of the meaning of writing (Perpignan, Rubin, & Katznelson, 2007). Accordingly, skillful writing is not only about cognitive and epistemic processes; the writing process is also affected by motivational and emotional issues as well as the culture and shared knowledge practices of the scientific community. Taken together, academic writing is a challenging task to many PhD students. Without sufficient guidance, PhD students may develop and maintain conceptions of writing that are not optimal in respect of successfully their completing doctoral studies.

2.1 Adaptive ideas about writing

The art of scientific writing calls for various skills, competencies, and knowledge. Scardamalia and Bereiter (1991) referred to this whole set of academic skills connected with expertise in various domains as *literate expertise*. They originally described two basic approaches to reading and writing: 'knowledge telling' versus 'knowledge transforming' (Bereiter and Scardamalia, 1987). The former refers to a reproductive activity that minimizes cognitive load, whereas the latter engages learners in effortful,

reflective and dialectic processes of using writing for advancing and developing knowledge.

Knowledge transforming. Research on skilled writers shows the critical importance of particular cognitive strategies, such as building deep-level mental representation of the task, engaging in active and reflective problem-solving, reflecting and relating to the nature of the task, and taking the anticipated audience into consideration (e.g., Hildyard, 1996; Olson, 1994); these skills are labelled as *knowledge transforming* (Bereiter and Scardamalia, 1987). We hypothesize that PhD students who have learned to understand academic writing in terms of transforming rather than merely reproducing knowledge, are more likely to succeed in finishing their dissertation. They would see writing as a creative and collaborative act, not just recounting and rearranging things that are already known. Such PhD students tend to be more likely to establish a dialogue with others, write multiple drafts, be open for receiving feedback and revise their work on the basis of comments. Expert writing entails largely tacit capacities of using disciplinary genre to construct engaging as well as rigorous "stories" of one's investigations so as to communicate with specific academic audiences.

Productivity and self-efficacy. We claim that optimism and self-efficacy beliefs in writing are essential for PhD students to become productive authors. Seeing oneself as a productive and active agent in the scholarly community is an important part of this process (Pyhältö, Nummenmaa, Soini, Stubb & Lonka, 2012). Bandura (1977) suggested that all psychological activities alter the level and strength of task-specific self-efficacy. Beliefs and expectations of personal efficacy determine how much effort will be expended in carrying out a certain task, and how long it will be sustained, even when facing obstacles and aversive experiences. As for writing, a higher level of self-efficacy may prevent self-sabotaging behaviour, such as procrastination.

Bandura (1982) also identified social conditions that are likely to develop into experiences of collective inefficacy. In the case of writing, such collective experiences might be related to shared ideas of seeing writing as an innate "gift" and underestimating the role of deliberate and systematic efforts of stretching one's capabilities of writing. The sense of one's own productivity is an important part of self-efficacy in writing. Regardless of obstacles and problems during the thesis project, it is necessary that one hold onto a self-image as an active agent and a productive author.

2.2   Beliefs in innate ability

It may be misleading to think that writers mainly work alone and have a special, innate gift to communicate their valuable message (see, e.g. Sawyer, 2009). Even if writing itself appears to be a solitary activity, it is essentially a form of communication that takes place in the scientific community, increasingly often, in research groups. Research on writing emphasizes the importance of persistence, regimen, and social support in productive writing (Boice, 1993). Students' personal epistemologies and views about knowledge may also have relevance to their study practices in higher education (Lonka et al., 2008). Studies on undergraduate students showed that those

students who see knowledge as an unorganized set of discrete and absolute truths (dualists) may emphasize fact-based standards, whilst students who perceive knowledge as an array of interpreted and integrated positions (relativists) may be more likely to value comprehension (Lonka & Lindblom-Ylänne, 1996).

Schommer (1990; 1993) wanted to go beyond the dualist/relativist dichotomy in describing epistemologies. She construed one's personal epistemology as a system of more or less independent dimensions and constructed a questionnaire to assess several epistemological dimensions. The belief in *innate ability*, where students believed that the ability to learn is determined at birth, was one important dimension. It is quite likely that a strong epistemological belief in innate ability might be contradictory to seeing writing as a creative and collaborative act of knowledge transforming. Such a belief may also develop in certain cultures where individualistic ideas are nurtured (Sawyer, 2009). Further, writing capability may be seen as an on/off characteristic; this would lead to thinking that one either does or does not have it. . Such beliefs would decrease the likelihood that one revises one's texts or tries to develop oneself as an author.

2.3   Problems in writing

As described above, beyond the individual act, writing involves appropriating disciplinary genres. Learning academic writing is not easy because of the challenges concerning how to transform knowledge into a comprehensible and disciplinarily acceptable entity for a specific audience. It is not only about the adoption of disciplinary concepts and theories, but it also requires practical mastery of the methods and practices of disciplinary activity which can only be achieved gradually, in a supportive context. Some conceptions and practices of writing may be harmful in terms of developing academic literacy.

Writer's block refers to the inability to write productively which is not due to insufficient literary skills or intellectual capacity (Rose, 1980). Even experienced and skillful writers may suffer from blocks in their writing process. Boice's (1993) review addressed the most often mentioned reasons for writing blocks: internal censors, fears of failure, perfectionism, early negative experiences, procrastination, and poor mental health. He concluded that blocking seldom has a single cause, and that many different maladaptive thoughts may be related. Boice (1990) also developed a self-help guide for academic writers to increase productivity, including a self-diagnosing questionnaire for reflection on problematic writing behaviours. From an educational perspective, such problems may arise from rigid rules, premature editing, and the writer's narrow range of strategies to help cope with complexity (Thompson & Kamler, 2007).

Procrastination refers to the pattern of postponing or failing to start tasks that are important in terms of success; such behaviour undercuts their productivity. It may be defined as a form of self-regulatory failure, which is extremely prevalent in academic work (Steel, 2007). Onwuegbuzie (2004) reported 42% of graduate students procrastinating on writing assignments, 40% on reading for exams and 60% on weekly reading assignments. Klassen et al. (2009) found that writing assignments were more

susceptible of academic procrastination than other tasks. Writing may be especially likely to lend itself to procrastination, since it is a non-recurring task in nature, and seldom offers short term rewards (Boice, 1990).

Procrastination is described either as adaptive or maladaptive (Schraw et al 2007; Howell et al., 2007; Lee 2005; Chu & Choi 2005; Moon & Illingworth 2005; Klassen et al., 2008; Kearns et al., 2008a; Schraw et al., 2007; Ferrari& Thompson 2006; Knaus 2000; Ferrari et al., 2005; Bui, 2007; Spada et al., 2006). The former means that procrastinators aim at improved time management and efficiency. Further, adaptive procrastination may include a very focused last-minute effort that leads to an intensive experience of engagement. The maladaptive version occurs, for example, when students fear failure, are anxious, or lack volition.

Perfectionism in academic writing is one's constant insistence on a perfect product, with the result that one attempts to rework on material until it is free of all flaws, or ultimately gives up the effort (Boice, 1990). Such behavior is often related to fear of failure, avoiding criticism or attempts to impress others and makes it difficult for the student to share drafts, receive feedback, and often leads to writing problems. Perfectionism often associates with the problems of procrastination (Boice & Jones, 1984; Kearns et al., 2008a, 2008b; Onwuegbuzie, 2000; Ferrari & Thompson, 2006; Alexander & Onwuegbuzie, 2007; Bui, 2007; Steel, 2007; Van Eerde, 2003). Neumeister (2004; see also Seo, 2008) presented two variants of perfectionism: *Self-oriented* perfectionists set themselves mastery goals and work hard and procrastinate less, whereas the *socially prescribed* types seek to avoid failure. This goal is pursued either by making no effort at all, i.e. procrastinating, or working even harder to avoid failure at all costs.

Problems in academic writing are interrelated (Boice, 1993). A vicious circle may emerge, where PhD students first procrastinate, then get negative feedback, and start procrastinating even more. Constant negative experiences may cause fear of failure, perfectionism, and in the worst case, a total writer's block. Blocks and procrastination may be most detrimental in terms of productivity or mental health. If procrastination involves problems in starting to write, perfectionism may implicate problems in finishing texts. A total block, of course, indicates that nothing is being produced. Perfectionism may be harmful as well, but since it is related to attempts to make the text better, it may be less likely to decrease productivity than procrastination.

2.4 General dysfunctional emotions related to writing

Writing a doctoral dissertation is a challenging and sometimes anxiety-provoking process (Traweek, 1988; Delamont et al., 2000): Practically all students go through some socio-emotional stress during their doctoral process. In previous studies, also Finnish PhD students reported feelings of frustration, inadequacy, disorientation, and exhaustion (Pyhältö, Stubb, & Lonka, 2009; Stubb, Pyhältö & Lonka, 2011a): Excessive mental distress during PhD education appeared to have a negative impact on thesis work and lead to problems in productivity.

There are, however, conflicting reports as to the relationship among factors that may account for difficulties in thesis writing. Gute & Gute (2008), for instance, presented blocks and procrastination as forms of academic disengagement. Stress, burnout and exhaustion were reported to increase procrastination (Schraw et al, 2007; Blunt & Pychyl, 2000; Chu & Choi, 2005), whereas Ferrari & Thompson (2006) presented emotional exhaustion as a result of procrastination. Anxiety was also linked to procrastination (Schraw et al., 2007; van Eerde's meta-analysis, 2003; Fritzsche et al., 2003; Spada et al., 2006, Neumeister, 2004, Alexander & Onwuegbuzie, 2007), yet Steel's (2007) meta-analysis did not support this finding.

The present study explores how PhD students' approaches to writing tasks are related to emotional problems. This project was done in order to validate the writing questionnaire. It was assumed that writer's blocks, procrastination and perfectionism would be related to dysfunctional emotions that are potentially harmful such as stress, anxiety, lack of interest and exhaustion (Lonka et al., 2008).

3. The Aims of the Present Study

To date, there is a lack of an instrument developed specifically for understanding doctoral students' conceptions about academic writing that may affect their commitment and persistence in PhD studies. Even though there are some previous instruments that measure, for instance, "by-products" of writing (Perpignan, Rubin, & Katznelson, 2007), a structured and easily manageable tool has been missing. The present study aims to fill in this gap by developing an instrument, *The Writing Process Questionnaire*, for assessing PhD students' conceptions of scientific writing. We examine the reliability and validity of this instrument based on data collected from a sample of Finnish PhD students, with the ultimate goal of identifying the dispositions of students that may promote or inhibit their doctoral studies. Students' ideas concerning academic writing were validated in relation to criterion variables measuring such negative emotions as stress, anxiety, lack of interest, and exhaustion.

3.1 Development of the Writing Process Questionnaire

The Writing Process Questionnaire, in its original form, was a 25-item scale based on an instrument developed by Lonka (1996, 2003). Her instrument was designed for the assessment of academic writing in the higher education context in general, but not designed specifically for PhD students. In order to capture PhD students' perceptions on academic writing, we reformulated the questions according to the doctoral context.

A pilot test was conducted for testing the first version of the Writing Process Questionnaire. More specifically, the first version of the scale was administered to 41 PhD students from different fields, such as physics, biology and meteorology. Based on the results of the pilot study, and the feedback received from the students, researchers and academics, we further modified the instrument: those items that were ambiguous were rephrased or deleted. The final version of the Writing Process Questionnaire was

designed to comprise six sub-scales on the adaptive ideas or problems in writing, including (1) Block, (2) Procrastination, (3) Perfectionism, (4) Innate Ability, (5) Knowledge Transforming, and (6) Productivity. The present study examined the reliability and validity of the final version of the Writing Process Questionnaire.

3.2   Research Questions

This study aims to answer four research questions. As reported, the Writing Process Questionnaire was specifically designed to capture six conceptions on writing. Therefore we hypothesised the scale would comprise a six-factor structure (see Figure 1). Nevertheless, it was also possible to find a more general two-factor structure, with one factor based on adaptive ideas on writing (formed by the items on Knowledge Transforming and Productivity) and another factor based on problems in writings (formed by the items on Block, Procrastination, Perfectionism and Innate Ability).

Therefore, our first research question was,   (I) Does the Writing Process Questionnaire capture (1) Block, (2) Procrastination, (3) Perfectionism, (4) Innate Ability (5) Knowledge Transforming, and (6) Productivity of a writing process? Or does it just capture (1) problems and (2) adaptive ideas of a writing process in general? To answer this question, the structure of the Writing Process Questionnaire was examined, using confirmatory factor analysis. We expected the goodness-of-fit indices of a six-factor model to be significantly better than those of the two-factor model.

Second, (II) To what extent are subscales of the Writing Process Questionnaire internally consistent? We expected the internal consistency of each subscale to reach at least 0.6.

Third, (III) What are the intercorrelations between the subscales, and how do these scales correlate with the dysfunctional emotions or dispositions (i.e., Stress, Exhaustion, Lack of Interest and Anxiety) occurring in the writing process? We expected to find positive correlations among Knowledge Transforming and Productivity, and so too between Block, Procrastination, Perfectionism and Innate Ability. Nevertheless, Knowledge Transforming and Productivity were expected to be negatively correlated with the other four constructs. Also, Knowledge Transforming and Productivity are expected to be negatively correlated with negative emotions. In contrast, Block, Procrastination, Perfectionism and Innate Ability are expected to be positively correlated with negative emotions. This research question was important in order to investigate the validity of the instrument.

Last, (IV) Are there any differences among subgroups of students (such as male vs. female, full-time vs. part-time students and older vs. younger students)? It was assumed that expressed problems in writing would be related to prolonged studies. We did not have any expectations about demographic variables.
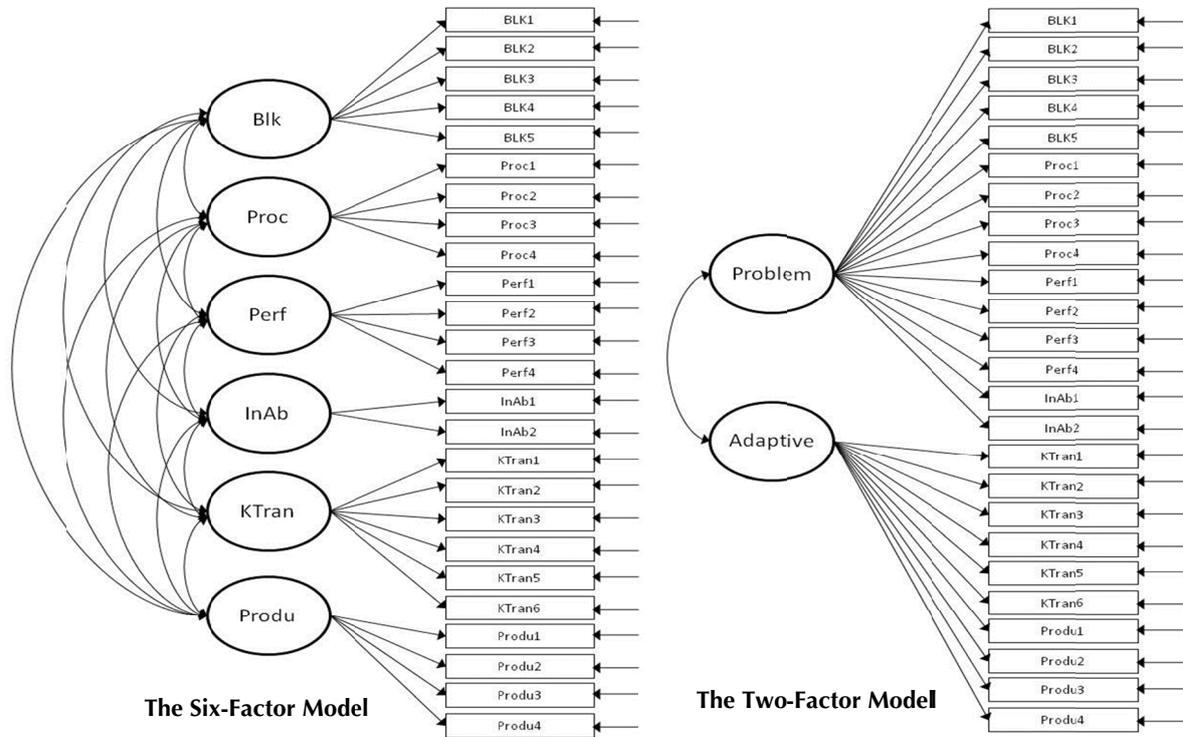
Figure 1. The hypothetical six-factor and two-factor model: Blk= Block, Proc = Procastination, Perf = Perfectionism, InAb = Innate Ability, KTran = Knowledge Transforming, Produ = Productivity, Problem = Problem in Writing, Adaptive = Adaptive ideas for Writing.

4. Method

4.1 Participants

The present study included data collected from three faculties at the Helsinki University: Faculty of Arts, Faculty of Medicine, and Faculty of Behavioural sciences. Altogether 669 (female: 496; male: 168; mean age: 39; Med: 35) doctoral candidates responded to the survey. The total response rate was 38.4%. From these participants, 664 gave answers to the Writing Process Questionnaire and they were included in the analysis.

The participants were in different phases of their doctoral studies, and they all had either MA's or licentiate degrees. Table 1 show that half of the students reported working full-time and the other half part-time on their thesis. A majority of them were working alone and about one fifth either completely or partly in a research group.

Altogether 43% of the students had considered interrupting their doctoral studies at some point during their thesis process. Before conducting the present inquiry, a pilot group of 41 PhD students in natural sciences answered and commented on the first version of the survey.

Table 1. Age, gender, research group status and working status of the participants (Stubb, 2012)

	Medicine	Arts	Behavioral Sciences	All
Age (mean/median)	38/34	34/34	34/34	39/35
Gender				
Women	129(80%)	244(70%)	123(79%)	496(75%)
Men	33(20%)	102(30%)	33(21%)	168(25%)
Research group status				
Alone	65(43%)	314(93%)	117(78%)	496(78%)
Both	29(19%)	14(4%)	20(13%)	63(10%)
In a group	59(38%)	9(3%)	13(9%)	81(12%)
Working status				
Full-time	85(55%)	183(55%)	51(34%)	319(50%)
Part-time	70(45%)	143(46%)	101(66%)	314(50%)

4.2 Materials

The data presented in this article were part of a more extensive study (Pyhältö, Stubb, & Lonka, 2009. In the present study, the Likert-scaled statements were included that measured negative emotions and conceptions of writing constituting The Writing Process Questionnaire. In addition, other sections included questions that were related to emotional distress and background information.

1. *Writing process*. Writing Process Questionnaire contained 26 statements about different aspects of writing. Table 2 shows the statements that were designed to measure blocks, negative thoughts, knowledge transforming, productivity, procrastination, perfectionism, and innate ability.

2. *Experienced dysfunctional emotions*. These were measured by using a modified version of the MED NORD questionnaire (Lonka et al., 2008; Stubb, Pyhältö & Lonka, 2011ab). Altogether 10 items measured dysfunctional emotions, that is, experienced stress (Elo et al., 2003), exhaustion (Maslach & Jackson, 1981) as

well as anxiety and lack of interest (Mäkinen et al., 2004). Moreover, doctoral students' engagement to the thesis process was measured with a background question that concerned their intentions to interrupt studies.

Table 2. The Writing Process Questionnaire

Scale	Items
Blocks	(Blk 1) Q6:"My previous writing experiences are mostly negative"
	(Blk 2) Q10:" I sometimes get completely stuck if I have to produce texts"
	(Blk 3) Q14:"I find it easier to express myself in other ways than writing"
	(Blk 4) Q15:"I only write when the situation is peaceful enough"
	(Blk 5) Q19: "I hate writing"
Procrastination	(Proc 1) Q3:" I often postpone writing tasks until the last moment"
	(Proc 2) Q9:"Without deadlines I would not produce anything"
	(Proc 3) Q11:"I find it difficult to start writing"
	(Proc 4) Q18:"I start writing only if it is absolutely necessary"
Perfectionism	(Perf 1) Q5:"I find it difficult to write, because I am too critical"
	(Perf 2) Q24:"Writing is difficult because the ideas I produce seem stupid"
	(Perf 3) Q21: "I could revise my texts endlessly"
	(Perf 4) Q17:"I find it difficult to hand over my texts, because they never seem complete"
Innate ability	(InAb1) Q16:"The skill of writing is something we are born with; it is not possible for all of us to learn it"
	(InAb2) Q23:"Writing is a skill, which cannot be taught"
Knowledge transforming	(KTran1) Q26: "Writing often means creating new ideas and ways of expressing oneself"
	(KTran2) Q27: "Writing develops thinking"
	(KTran3) Q25:"Rewriting texts several times is quite natural"
	(KTran4) Q4:"Writing is a creative activity"
	(KTran5) Q1:" It is useful to get other people's comments on texts"
	(KTran6) Q2:"When I write I am concerned about whether the reader understands my text"
Productivity	(Produ1) Q8: "I produce a large number of finished texts"
	(Produ2) Q20" I am a regular and productive writer"
	(Produ3) Q7:"I write regularly regardless of the mood I am in"
	(Produ4) Q22:"I write whenever I have the chance"

Note. All the scales ranged from one to five; "1" meaning "Do not agree" and "5" meaning "Fully agree". In single item stress scale "1" meant "Not at all" and "5" meant "Very much".

3. *Socio-demographic background information section*. There were 18 questions covering information about students' age, gender, form of the thesis (i.e., monograph versus article-based) and working full-time vs. part-time (see Table 1). Students were also asked about their main subject, main source of funding and whether they were mainly working alone, in a research group or both alone and in a group. The type of questions and the number of alternatives varied across questions.

4.3   Data collection

The PhD student survey was conducted during spring 2006. The questionnaires were first sent by mail to students' home addresses; both Finnish and English questionnaires were available according to the student's language preference. After this, a reminder with a link to the online questionnaire was sent to the students' email accounts.

4.4   Statistical Analyses

Confirmatory factor analysis (CFA) was employed to test the hypothesized factor structure of the scale items with the use of Mplus statistical package version 7.11 (Muthén & Muthén, 2013). It is a statistical procedure which allows researchers to specify the relationship between variables and latent factors, so as to construct measurement models for confirming or challenging hypothesized latent variable structures (Byrne, 1998). The statistical adequacy of the CFA model was evaluated by a set of goodness-of-fit statistics, including Root Mean Square Error of Approximation (RMSEA) developed by Steiger (1990), Comparative Fix Index (CFI) developed by Bentler (1990), and Standardized Root Mean Square Residual (SRMR). A model with RMSEA smaller than 0.08, CFI equal or larger than 0.9, and SRMR equal or below 0.08 was considered a good fit to the data (Kelloway, 1998; Hu & Bentler, 1999; Diamantopoulos & Siguaw, 2000). The CFA analyses were performed as follows: First, the six-factor and two-factor theoretical models of the Writing Process Questionnaire were estimated independently, with the missing values handled by Maximum likelihood estimation. Next, for determining whether a six-factor solution or a two-factor solution for the two hypothetical models fitted the data better, we compared the goodness-of-fit of these two models based on their χ^2 statistics.

Upon completing CFA, the Cronbach's alpha of each subscale was calculated to answer the second research question. Then, correlations of the subscales and the negative emotion measures were calculated to answer the third research question. Lastly, a series of t-test (significance level $p < .05$) was carried out to test if there were differences in ideas of writing items between a) male and female PhD students, b) those students who have considered interrupting their studies and those who have not, c) those students who are writing their theses in a monograph form or summary of articles, and d) those students who worked full-time and those who worked part-time. The effect sizes for the t-test were calculated using Cohen's d. Following Cohen (1988), a *d*-value between 0.3 to 0.5 was considered a small effect; a *d*-value between 0.5 to 0.8 was

considered as a medium effect; a *d*-value higher than 0.8 was considered as a strong effect.

5. Results

5.1 Structure of the Writing Process Questionnaire

The first research question concerns the latent factor structure of the Writing Process Questionnaire. More specifically, we were interested in evaluating if Writing Process Questionnaire could capture (1) block, (2) procrastination, (3) perfectionism, (4) knowledge transforming, (5) innate ability and (6) productivity as six separated constructs or if the instrument was more suitable in measuring (1) problems in writing and (2) adaptive ideas of the writing process in general. To answer this question, the six-factor and two-factor models were specified separately (see Figure 1). Based on the goodness-of-fit indices, the six-factor model fitted the data well, $\chi^2 = 917.1$, $df = 260$, $N = 664$, $p < .001$, RMSEA = .06, CFI = .9, SRMR = .06. On the other hand, the two-factor model did not fit the data, $\chi^2 = 2008.8$, $df = 274$, $N = 664$, $p < .001$, RMSEA = .1, CFI = .6, SRMR = .09. The follow-up comparison of the χ^2 indices of the two models further indicated that the six-factor model showed a significant increment in fit compared to the two-factor model, two factor models vs six-factor: $\Delta\chi^2 = 1091.7$, $df = 14$, $N = 664$, $p < .001$. These results supported the idea that the Writing Process Questionnaire comprises the six latent constructs, as we had designed and expected.

5.2 Reliability and Measurement Invariance

The second research question concerns the internal consistency of the items and the subscales of the Writing Process Questionnaire.Table 3 shows the descriptive analyses of the scales with the number of items, internal consistency (Cronbach's Alpha), scale means, standard deviations, as well as maximum and minimum values of each variable. We further run a CFA model for each subscale to examine the factor loadings of the items (except innate ability, as such procedures could not be done on a subscale with only two items). The standardized factoring loading coefficients for each item ranged from .24 to .68 for blocks, .63 to .79 for procrastination, .38 to .84 for perfectionism, .27 to .78 to knowledge transforming, and .53 to .75 for productivity. The results show that the reliability is satisfactory or good for each scale.

In addition, measurement invariance was examined to assess the comparability of block, procrastination, perfectionism, knowledge transforming and productivity between female and male. For each subscale, a measurement model with factor loadings constrained to be equal across genders (i.e., metric invariance model) was compared with the less constrained baseline model. Metric invariance was supported for procrastination, knowledge transforming and productivity, indicating equivalence of relations between items and their respective latent construct across genders (RMSEA = .02 to .08, CFI = .92 to .99, SRMR = .03 to .07). Partial metric invariance was found for

blocks (RMSEA = .06, CFI = .95, SRMR = .05). Scalar invariance for procrastination, knowledge transforming and productivity was further tested by comparing the metric invariance models with models that constrained equal intercepts across genders. Scalar invariance was found for procrastination and productivity (RMSEA = .03 and.05, CFI = .99 and .99, SRMR = .04 and .03, respectively). Partial scalar invariance was found for knowledge transforming (RMSEA = .08, CFI = .92, SRMR = .07). No evidence of measurement invariance between genders was found for Perfectionism.

Table 3. Descriptive analyses of the scales, internal consistency (Cronbach's Alpha), scale means, standard deviations (SD), and minimum and maximum values.

Scale	N	Alpha	Mean	SD	Min	Max
Conceptions of writing						
Blocks	5	.60	2.3	.67	1	4.6
Procrastination	4	.81	2.8	.95	1	5
Perfectionism	5	.67	2.7	.79	1	4,75
Knowledge transforming	6	.63	4.4	.47	2.67	5
Innate ability	2	.75	2.0	.88	1	5
Productivity	4	.76	2.7	.83	1	5
Negative emotions						
Stress	1	_	2.8	1.2	1	5
Exhaustion	4	.82	2.7	.92	1	5
Lack of interest	2	.76	2.1	1.1	1	5
Anxiety	3	.65	2.7	.97	1	5

The above measurement invariance analyses were repeated to examine the comparability of the subscales across participants from Faculty of Arts, Faculty of Medicine, and Faculty of Behavioural Sciences. Scalar invariance was supported for procrastination (RMSEA = .04, CFI = .99, SRMR = .05). Partial scalar invariance was found for knowledge transforming and productivity (RMSEA = .07 and .05; CFI = .90 and .99, SRMR = .08 and .06, respectively) and partial metric invariance was found for blocks (RMSEA = .06, CFI = .95, SRMR = .05). No evidence of measurement invariance between students across faculties was found for Perfectionism.

5.3 Convergent, discriminant and concurrent validity

The third research question relates to the validity of the construct. The convergent and discriminant characteristics were demonstrated by the intercorrelations between the six subscales of the Writing Process Questionnaires. The correlations between the subscales are listed in Table 4. As expected, blocks, procrastination, and perfectionism correlated positively with each other, while knowledge transforming and productivity correlated positively with each other. These results supported the convergent validity of these subscales. On the other hand, productivity correlated negatively with procrastination, blocks, and lack of interest. Further, knowledge transforming correlated negatively with blocks and innate ability. These results indicated the discriminant validity of these subscales.

For evaluating the concurrent validity of the Writing Process Questionnaire subscales, we further calculated the correlations between these subscales with the negative emotion measures. Referring to Table 3, all negative emotions correlated significantly with problems in writing. Blocks, perfectionism, and procrastination correlated positively with stress, exhaustion, anxiety and lack of interest. Students who suffered from writing blocks, procrastination and perfectionism also expressed more stress, exhaustion, anxiety, and lack of interest. Further, reported lack of interest, stress, anxiety, and exhaustion had significant negative correlations with productivity. In addition, viewing writing as innate ability was also related to lack of interest. Students who reported high productivity and viewed writing as knowledge transforming experienced the least lack of interest in their studies.

5.4 Comparisons among subgroups

Further investigation showed that students' who had considered interrupting their studies differed from others in terms of blocks (t = 5.518, df = 656, p < .001, Cohen's d = 0.43), procrastination (t = 5.937, df = 656, p < .001, Cohen's d = 0.46), perfectionism (t = 3.123, df = 654, p < .05, Cohen's d= 0.25) and productivity (t = -5.651, df = 651, p < .001, Cohen's d = -0.44). Students who had considered interrupting their studies reported experiencing more blocks (mean = 2.43) than others (mean = 2.15). They also reported more procrastination (mean = 3.02) and perfectionism (mean = 2.80) than others (mean for procrastination = 2.59 and mean for perfectionism = 2.61). Furthermore, students who had not considered interrupting their studies, reported being more productive (mean = 2.88) than others (mean = 2.52).

Full-time students differed from part-time students in terms of how productive they reported themselves to be (t = 1.983, df = 622, p < .05, Cohen's d = 0.16). Full-time students reported being more productive (mean= 2.80) than part-time students (mean = 2.67). Moreover, students who were writing a monograph reported less blocks (t = -4.082, df = 645, p < .001, Cohen's d = 0.33), viewed writing more often as knowledge

Table 4. Correlations among variables

	1	2	3	4	5	6	7	8	9
Problems									
1 Blocks	1								
2 Procrastination	.525**	1							
3 Perfectionism	.415**	.378**	1						
4 Innate ability	-.006	-.017	.011	1					
Adaptive ideas									
5 Knowledge transforming	-.164**	-0.005	.078*	-.175**	1				
6 Productivity	-.435**	-.586**	-.226**	.052	.126**	1			
Negative emotions									
7 Stress	.224**	.249**	.231**	.006	-.049	-.109**	1		
8 Lack of interest	.235**	.284**	.150**	.155**	-.163**	-.295**	.260**	1	
9 Anxiety	.327**	.446**	.326**	.039	.028	-.294**	.540**	.444**	1
10 Exhaustion	.300**	.234**	.263**	.019	-.048	-.085*	.678**	.274**	.592**

Note. ** Correlation is significant at the 0.01 level (2-tailed).* Correlation is significant at the 0.05 level (2-tailed)

transforming (*t* = 3.182, *df* = 642, *p* < .001, Cohen's *d* = 0.24) and considered themselves more productive (*t* = 2.429, *df* = 640, *p* < .05, Cohen's *d* = 0.2) than students writing a thesis in the form of a summary of articles. In addition, students who were writing a monograph reported a higher level of perfectionism than their counterparts (*t* = 2.382, *df* = 643, *p* < .05, Cohen's *d* = 0.19). Men and women differed from each other in respect of knowledge transforming (*t* = 3.498, *df* = 657, *p* < .001, Cohen's d = 0.3). Women more often (mean = 4.45) reported that they consider writing as knowledge transforming than men (mean = 4.31). We repeated all the above comparisons (except comparisons on innate ability) using Mplus. More specifically, for each subscale, we compare a model which constrained the means across different groups to be equal with a model without such a constraint. This series of analyses yielded the same result patterns.

Age correlated statistically significantly with perceiving writing as innate ability (P=.099, *p* < .01). Older PhD students tended to report writing as innate ability more often than younger students.

5.5   Comparisons to national data

In order to assess the representativeness of our group of participants, we compared our sample with all Finnish PhD students with respect to gender and age (Table 5). Our sample represented the population quite well in respect of gender distribution. In terms of mean age, it appeared that students from humanities and behavioural sciences who completed the survey were slightly younger than the average, whereas medical students were slightly older than average. PhD students who were in the last third of their process were slightly overrepresented. These students had more experience, and therefore they might have felt that they could describe their process as a whole.

Table 5. Statistics (year 2008) of gender distribution and mean age in different disciplines in the University of Helsinki according to Statistics Finland and the university's own statistics

Stub Head	Women	Men	Age (mean)
Humanities	66%	34%	42.4
Behavioural sciences	76%	24%	53.1
Medicine	71%	29%	35.3

Furthermore, in the absence of detailed national level statistics on Finnish doctoral students, we analysed the representativeness of our sample by comparing it to a larger national survey of Finnish doctoral students (Hiltunen and Pasanen 2006, International Postgraduate Student Mirror 2006). The proportion of full-time (59%) and part-time students (41%) was rather similar to our sample (full-time students = 50%; part-time students = 50%). Also, the working conditions were quite similar. In the national study, the majority of the students (71%) reported working alone and only 6% mainly as part

of some research group. The remaining 23% reported working equally much alone and in a group. The same percentages in our study, respectively, were as follows: those who reported working alone, 78%, those working in a group,13%, and those who reported working both alone and in a group, 9%. The only difference in our sample compared to the national study was that the majority of the students who answered our survey characterized themselves to be in the last third of their doctoral process, whereas most of the respondents in the national survey were in the beginning stages.

6. Discussion

To sum up, there is good evidence that *the Writing Process Questionnaire* is a reliable and valid instrument to measure PhD students´ ideas of writing. The structure of the instrument was confirmed, based on the present data. Further, the background variables correlated with the writing scales in logical ways.

Cognitions and conceptions of writing are crucial in avoiding blocks (Boice, 1993). Writers' active engagement in and reflection about writing will help them talk about problems and strategies, monitor their writing effectively, and develop a variety of adaptive writing strategies (Lonka, 2003). Therefore it was important to develop a new instrument that could reliably capture some essential conceptions of writing. The previous versions of *the Writing Process Questionnaire* were useful as a tool for reflection by PhD students in various practical workshops. Hence it appeared to be important to test the instrument, based on a large data set, in a situation where it would be appropriate and functional i.e., the context of PhD studies.

The results indicated that problems in scientific writing, such as blocks and procrastination, perfectionism, and seeing writing as the result of innate ability, were all negatively related to productivity. At the same time, viewing writing as a process of knowledge transforming was positively related to self-reported productivity, and negatively related to viewing writing as an innate ability. As we expected, those PhD students who believed in knowledge transforming were more likely to see writing as something that can be taught and learned, rather than as an innate gift.

The present study was based on the assumption that conceptions of writing do matter in the success in academic writing. They are not only seen as individual conceptions, but also as shared belief systems. It is important to reflect on such basic assumptions, since maladaptive conceptions may mediate the interaction between PhD students, their supervisors, and peers. The beliefs of the community may colour their interactions. For instance, it may cause communication problems if the supervisor strongly believes in innate ability and the PhD student is more likely to see writing as a process of knowledge transforming. Especially, the sense of self-efficacy may affect both individual and collective agency (Bandura, 2006). In the present study the experienced sense of productivity was interpreted to reflect self-efficacy beliefs in academic writing.

6.1   Representativeness

The target population represented three different contexts: behavioural sciences, medicine and humanities. The gender and age distributions were quite similar to the whole population of the PhD students at the University of Helsinki. The older age of the postgraduate students is understandable, given that the part-time students tend to be mature people who work outside the university. Further, our population was very similar to those described in national and international surveys.

The response rate was not very high. One reason we were not able to attain better response rate is due to the student registers. We mailed the questionnaire to every registered doctoral student in the three contexts, but these records also include many students who have registered but were no longer active in their thesis process. Until recent years, it was possible to continue registering regardless of progress. In Finland, there are benefits for being a registered PhD student, and many people remain in the register without truly studying. Unfortunately, we were not able to exclude such cases from our mailing list.

We also conducted a study where we interviewed those (volunteering) students who had not finished in time (Vekkaila, Pyhältö & Lonka, 2013). This became possible, since Finnish universities have started to do follow-ups every three years: Those who have not progressed in their studies must either resubmit a research plan or abandon their status as a PhD student.

6.2   Reliability

The reliabilities of the six scales appeared satisfactory or good in terms of internal consistency. The confirmatory factor analysis was used to corroborate the six-scale structure.

Since the questionnaire is not a psychological test, the Cronbach's Alphas may be regarded as at least satisfactory. The reliability measures were below .70 for blocks, knowledge transforming, and perfectionism. These constructs were likely to measure more than one dimension. For instance, knowledge transforming was both about how likely people were to revise their texts, but also about whether they see writing as a social act. Theoretically, however, we wanted to retain the concept as multidimensional. In the same way, perfectionism is both about being too self-critical and about endlessly revising a text. In the future, these two aspects may be split into two separate scales. The writer's block is the most complex and multifaceted of all our measures as a theoretical construct. Procrastination, innate ability and productivity appeared more unidimensional constructs, and the scales measuring these three aspects appeared to retain coherence more readily.

6.3   Validity

There are good arguments that any research instrument should be validated from scratch in each new context in which it is used. Similar-looking phenomena are identified in research across different systems of higher education, but they receive different interpretations within each system or culture (Richardson 2004). Questionnaires are extremely sensitive to nuances and interpretations. We spent several years carefully translating and adapting our instrument in its Finnish and English language versions. Several pilots and back-translations were used.

Construct validity means that the scales would measure the things that they are supposed to measure, which is usually assessed by factor analyses in the psychometric tradition. To this extent, our analyses were reasonable, since we were administrating confirmatory analyses to test the structure of our questionnaire. Content validity may be considered good because our exploratory analyses were in line with current theories of writing, but also added some new and unexpected dimensions. The relations between the scales and the variables measuring emotional distress strengthened the criterion validity. In all, the writing Process Questionnaire can be considered, based on the present evidence, a reliable and valid instrument for measuring PhD students' ideas concerning writing.

The Finnish and English versions are carefully validated. This instrument may be used in carrying out research in other countries with only minor adjustments. With other cultures and languages, a cross-cultural validation process is highly recommended. The questionnaire is already available in Spanish, and preliminary analyses look promising. In the future, it shall be interesting to see, whether this instrument is also related to producing more and better texts.

6.4   Educational implications for enhancing the PhD writing process

PhD studies take place in the context of the scholarly and scientific community. The scientific community as a learning environment consists of the knowledge practices of supervision, knowledge, learning and assessment as well as the physical learning environment (Pyhältö, Stubb & Lonka, 2009). The quality of the learning environment affects, for example, PhD students' ideas and practices of academic writing that they adopt during their studies.   Accordingly, challenges posed by the learning environment may also lead, for instance, to problems for PhD students in adopting a knowledge transforming approach, typical of skilled writers (Bereiter & Scardamalia, 1987).

The relationship between a PhD student and the learning environment is mediated by the specific student's prior learning experiences, goals and strategies as well as by situational factors (Pyhältö, Stubb & Lonka, 2009).   Furthermore, postgraduates' perceptions about their learning environment have been shown to partially determine the way supervisors approach supervision and ideas about research (McAlpine & Weiss 2000; Zhao, Golde, McCormick 2007).   Hence (mis)conceptions of thesis work and academic writing may mediate, promote or even hinder learning.

Our results showed that PhD students' ideas of writing are related to their well-being. Writing is not only a technical matter, but has a larger educational role (Perpignan, Rubin, & Katznelson, 2007; Thomson & Kamler, 2007). It is important to foster the development of literate expertise and reflective thinking in PhD students. Such forms of instruction as process writing and constructive feedback strategies could possibly prevent excessive prolongation and dropout from PhD studies (Lonka, 2003). Recently, writing groups and other forms of support have been suggested. More attention should be paid to developing PhD training that supports the development of academic writing skills. Part of this development is fostering adaptive ideas of academic writing that enhance both productivity and well-being. Here, The Writing Process Questionnaire may be helpful as a diagnostic tool.

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