

UNIVERSITY OF LISBON
FACULTY OF PSYCHOLOGY

UNIVERSITY OF COIMBRA
FACULTY OF PSYCHOLOGY
AND SCIENCE EDUCATION



IMPLEMENTING SELF-REGULATED STRATEGY DEVELOPMENT
FOR TEACHING ARGUMENTATIVE WRITING:
A MULTIDIMENSIONAL APPROACH

ANABELA DE ABREU DOS SANTOS MALPIQUE

DOCTORATE IN PSYCHOLOGY
(EDUCATIONAL PSYCHOLOGY)

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Thesis supervised by Professor Doctor Ana Margarida Vieira da Veiga Simão
submitted in fulfilment of the requirements for the degree of Doctor of Psychology,
specialising in Educational Psychology.

2014

To my family for all that matters

*Whether we write or speak or do but look
We are ever unapparent. What we are
Cannot be transfused into word or book.
Our soul from us is infinitely far.
However much we give our thoughts the will
To be our soul and gesture it abroad,
Our hearts are incommunicable still.
In what we show ourselves we are ignored.
The abyss from soul to soul cannot be bridged
By any skill of thought or trick of seeming.
Unto our very selves we are abridged
When we would utter to our thought our being.
 We are our dreams of ourselves, souls by gleams,
 And each to each other dreams of others' dreams.*

Fernando Pessoa, *English Poems*

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Declaration

In accordance with article 41^o of the Post-graduate Regulation of the University of Lisbon, approved by the Deliberation of the Rectory n^o 1506/2006, this dissertation includes scientific articles that have been submitted for publication to indexed international journals, in collaboration with other authors. The author declares that she is responsible for gathering the data, analysing and interpreting the results, as well as writing, submitting and revising the manuscripts of the articles presented for publication.

Anabela de Abreu dos Santos Malpique
Lisbon, December, 2014

“It’s like being on a high board, looking down to a cold, chilly pool. Then I give myself a little push. The water isn’t as cold as I thought.”

Neil Simon

Summary

For some time, writing was considered to be a neglected area of empirical research within educational psychology (Harris, Graham, MacArthur, Reid & Mason, 2011). Strangely, writing research has received far less funding and attention than reading, both in volume and in scope, which limited its impact on pedagogical practice (Myhill & Fisher, 2010). Only recently, and partly due to the globalisation of technology, which enabled and supported cross-disciplinary and cross-country research, it became possible to value and understand the strong body of scientific knowledge collected on writing from different areas and scopes over the years (Graham, Gillespie & McKeown, 2013). Following qualitative, quantitative or mixed-methods designs, several research studies were and are being developed in different countries, within different educational contexts, and languages of instruction, building a complex mosaic of what is writing, how writing is developed, and how writing is taught.

The current investigation was developed from the need to extend knowledge on best practices for teaching writing to students in transition to high-school (year 9) in intact whole-classroom settings. Considering writing as a multidimensional process, we designed two interrelated research projects to provide a more comprehensive view of assessing, adapting and implementing strategies to promote students self-regulated writing, and its effectiveness in Portuguese-speaking educational contexts.

The idea that there is a universal theory for literacy development has been questioned (Wood & Connelly, 2009 for a review). Authors have asserted that learning to read and write is different between languages, and argue for the need to locate the processes of learning and teaching reading and writing in their proper developmental context. Thus, to assess context before intervention, a first research project - backup project - was developed, consisting of two research outputs (Study 1 and Study 2). Shifting the unit of analysis, a second research project – base project – was designed to test the effectiveness of an adapted intervention model for teaching argumentative writing, unfolded also in two research outputs (Study 3 and Study 4).

In a first stage of this investigation, our aim was to identify strategies used by junior high-school students to self-regulate school writing tasks in Portuguese-speaking educational settings (Study 1). For that, the socio-cognitive model of self-regulated writing proposed by Zimmerman and Risemberg (1997) was used as a theoretical frame to develop a self-report instrument assessing the three major categories of self-regulatory influence, namely: environmental processes (physical and social settings); behavioural processes (overt self-regulatory activities); and personal processes (cognitive and effective states). The Self-Regulated Strategies for School Writing Tasks (SRSSWT) was administered in whole-classroom settings to Portuguese and Brazilian ninth-grade students ($n = 732$) to validate the instrument. This non-genre-dependent measure was later used in our base project, as a way to gain insights on how ninth-grade students initiated and controlled general school writing tasks before and after intervention. Exploratory analyses were computed to examine the psychometric properties of the instrument and underlying structure. Confirmatory factorial analysis provided evidence supporting a triadic second order structure of the instrument assessing 12 self-regulated strategies for writing. Finally, multigroup confirmatory factor analysis evaluated the cross-cultural equivalence of the instrument to estimate students' reported use of different strategies to control and initiate school writing tasks.

In a second stage, and to further evaluate and contextualise students' strategic options, we examined cross-cultural variations in the reported use of the 12 self-regulated strategies assessed (Study 2). By doing so, we examined a least explored piece within writing research, emphasising self-regulated learning as a socially and culturally situated process. Such perspective assumes that individual decisions concerning the adoption of self-regulatory processes and strategies, including those related with writing activities and tasks, may be influenced by one's social context and cultural experience (Purdie, Hattie & Douglas, 1996; Shi, Frederiksen & Muis, 2013). In this second study, we also offered to extend a socio-cognitive perspective to the study of gender in writing, investigating how gender intersects with culture and context by exploring diversity within the categories male

and female in the reported self-regulated strategies. A Two-way multivariate analysis of variance (MANOVA), 2 (group: Portuguese and Brazilian) x 2 (group: Male and Female), was computed with the 12 strategies serving as dependent variables. Results indicated clear variations in the reported use of personal self-regulated strategies for writing between countries, between and within gender groups. Nevertheless, findings also suggested patterns regarding ninth-grade students' self-regulation of school writing tasks, namely their reluctance to make a written plan before writing; their restraints regarding time planning strategies; their unwillingness to seek assistance facing school writing tasks; and their limited awareness of the need to accommodate writing having a potential reader in mind.

The option of assessing self-regulated writing in context - backup project - is consonant with research supporting a contextual and socio-cognitive perspective to investigate self-regulated learning (SRL) processes (Nystrand, 2006; Schultz & Fecho, 2000; Zimmerman & Schunk, 2009). By following this preliminary analysis on how students would use different writing strategies for text composing in Portuguese-speaking educational settings, we were able to move to a second phase of this investigation – the intervention – more able to make informed decisions in the process of adapting, designing, and implementing writing instruction responding to students' strategic trends and differences in the process of text composing.

The base study was designed from the need to implement evidence-based writing instruction in Portuguese whole-classroom contexts. The Self-Regulated Strategy Development (SRSD) (Harris & Graham, 1996) has been substantiated as an effective instructional approach for writing (Graham, McKeown, Kiuvara & Harris, 2012; Graham & Perin, 2007). Developed to promote writing performance, motivation, and knowledge, instruction includes letter strategies often combining visual mnemonics to facilitate learning and recall (Harris, Graham, Mason & Friedlander, 2008). Extending on the SRSD approach, we designed an intervention program to promote ninth-grade students' planning and argumentative writing. The goals for this study were twofold: a) to evaluate SRSD impact on students' writing performance (writing quality; development of ideas; organisation; language

facility; planning; and length); reported use of environmental, behavioural, and personal self-regulated strategies for writing; and knowledge of argumentative writing; b) to explore the contributions of visual coding at facilitating learning and maintenance effects. A quasi-experimental multi-method design (pretest, posttest, and follow-up) was developed, and SRSD instruction was implemented in two Portuguese intact classes, involving 73 ninth-grade students. In group one, students received SRSD instruction for planning argumentative writing combining verbal and visual mnemonics; in group two, SRSD instruction included verbal mnemonics alone; a control group under regular classroom instruction was randomly drawn from the remaining four ninth-grade intact classes.

In the pre-intervention stage (Study 3), we investigated students' knowledge about the writing process, their knowledge about argumentative writing, and whether such discourse knowledge predicted student's writing performance (writing quality and written plan). For that purpose, we used a modified version of an interview protocol initially designed by Graham, Schwartz & MacArthur (1993), and the written argumentative texts and plans produced by students at pretest data collection. The participants were 26 ninth-grade students selected from the two SRSD conditions, and chosen using a stratified random sampling procedure. We found positive correlations between writing performance measures and knowledge of substantive procedures related with argumentative writing. Furthermore, results supported a statistically significant correlation between reader's awareness and writing quality. Written plan development was also related with the quality of the argumentative essays produced at that stage.

Finally, we investigated the effectiveness of the adapted SRSD strategies for teaching argumentative writing implemented in whole-classroom contexts, and explored the effects of dual-coding mnemonics to support learning and recall (Study 4). Findings supported the incremental effects of combining verbal and visual mnemonics to the SRSD instructional routine. Multivariate analysis of variance (MANOVAs) and follow-up univariate tests were computed to determine whether the patterns of results across writing performance measures, and the reported use of self-regulated strategies were different between groups.

Findings showed positive effects of SRSD instruction on students' writing performance, discourse knowledge, and reported use of personal self-regulated strategies for writing across time. Results also suggested large positive effects of dual-coding SRSD instruction on students' writing performance, and on the reported use of personal self-regulated strategies after implementation. However, regarding students' knowledge of argumentative writing comparisons between SRSD-instructed students did not support the impact of dual-coding over the verbal-coding only mnemonics.

Results from Language Arts national exams completed 15 weeks after the development of the intervention program reinforced the ecological validity of the implemented SRSD model for teaching argumentative writing in Portuguese whole-classroom contexts. Further implications for theory and practice, and suggestions for future research are discussed in each of the studies here presented, as well as in the general discussion.

Keywords: writing; self-regulated strategy development; argumentative text; context

Resumo

A investigação empírica sobre a escrita foi, ao longo dos tempos, uma área preterida no âmbito da Psicologia Educacional (Harris, Graham, MacArthur, Reid & Mason, 2011). Como tal, recebendo menos financiamento e interesse para investigação do que a leitura, por exemplo, o impacto da investigação sobre a escrita nas práticas de ensino em contexto escolar tem sido particularmente limitado (Myhill & Fisher, 2010). Nos últimos anos, devido à globalização e às novas tecnologias, que têm estimulado a partilha de informação entre investigadores de diferentes áreas e contextos, tem sido possível conhecer e interpretar o conhecimento científico desenvolvido no âmbito da escrita (Graham, Gillespie & McKeown, 2013). Seguindo desenhos de investigação qualitativos, quantitativos e mistos, vários estudos empíricos foram e estão sendo desenvolvidos em diferentes países, em contextos linguísticos e educativos distintos, construindo assim um quadro complexo sobre o que é a escrita, como é desenvolvida, e como é ensinada.

Esta investigação em particular partiu da necessidade de desenvolver conhecimento sobre práticas eficazes para o ensino e aprendizagem da escrita em contexto de turma, com estudantes em transição do ensino básico para o ensino secundário (9º ano). Considerando a escrita como um constructo multidimensional, foram desenhados dois projetos de investigação interrelacionados (Morse, 2003), de forma a oferecer uma análise mais depurada dos processos de avaliação, adaptação e implementação de estratégias promotoras da autorregulação da composição escrita do estudante, e da sua eficácia em contextos de ensino-aprendizagem de língua portuguesa.

A existência de uma teoria universal para o desenvolvimento de competências de literacia tem sido questionada (ver Wood & Connelly, 2009 para uma revisão). Investigadores defendem que a aprendizagem da leitura e da escrita poderão ser processos que se desenvolvem de forma diferente, em contextos linguísticos distintos, defendendo, por isso, a necessidade de analisar estes processos no seu contexto de referência. Como tal, nesta investigação, e perante a necessidade de avaliar o contexto antes de intervenção,

foi desenhado um primeiro projeto - projeto de apoio -, desenvolvido e apresentado em dois estudos (Estudo 1 e Estudo 2). Mudando a unidade de análise, foi desenhado um segundo projeto – projeto de fundo – visando compreender a eficácia da adaptação de um modelo de intervenção para o ensino da composição escrita do texto argumentativo, desenvolvido também em dois estudos (Estudo 3 e Estudo 4).

Numa primeira fase, esta investigação teve como objetivo principal identificar estratégias que estudantes do 9º ano de escolaridade reportam para a autorregulação de tarefas de escrita escolares, em contextos de ensino-aprendizagem de língua portuguesa (Estudo 1). Para tal, foi utilizado o modelo sociocognitivo para a autorregulação da escrita proposto por Zimmerman e Risemberg (1997) na construção de um questionário medindo três grandes dimensões do processo de autorregulação, nomeadamente: processos ambientais (autorregulação dos contextos físico e social); processos comportamentais (atividades de autorregulação evidentes); e processos pessoais (cognitivos e emocionais). O instrumento desenvolvido - Questionário de Estratégias de Autorregulação para Tarefas de Escrita Escolares (QEARTEE) - foi aplicado em contexto sala de aula a estudantes Portugueses e Brasileiros frequentando o 9º ano de escolaridade ($n = 732$) para aferir a validade do instrumento. Posteriormente, esta medida foi utilizada para uma avaliação do contexto antes de intervenção, e para uma análise global das estratégias utilizadas pelos estudantes para a autorregulação da escrita de tarefas escolares antes e depois da intervenção (projeto de fundo). Inicialmente, a exploração dos dados realizou-se através de análise fatorial exploratória. Uma análise fatorial confirmatória no contexto dos modelos de equações estruturais confirmou o modelo tridimensional de segunda-ordem da medida. Posterior análise multigrupos comprovou a invariância desta estrutura para estimar diferentes estratégias reportadas por estudantes Portugueses e Brasileiros no processo de iniciar e controlar a composição escrita em contexto escolar.

Numa segunda fase, procedeu-se à análise de diferenças cross-culturais sobre a utilização das 12 estratégias de autorregulação para a composição escrita em contexto escolar consideradas (Estudo 2). Esta opção permitiu examinar abordagens menos

exploradas na investigação da escrita, considerando fatores contextuais e culturais – país e sexo - que poderão influenciar a forma como o estudante autorregula o processo de composição escrita. Tais perspectivas assumem que a gestão de decisões individuais no processo de autorregulação e pensamento estratégico, incluindo decisões relacionadas com o processo de escrita, pode ser influenciada pelo contexto social e cultural de referência (Purdie, Hattie & Douglas, 1996; Shi, Frederiksen & Muis, 2013). A significância dos fatores “país” e “sexo” sobre as 12 variáveis dependentes foi avaliada através de uma análise de variância multivariada (MANOVA) a dois fatores. Os resultados revelaram um efeito estatisticamente significativo de média dimensão para o fator país, e um efeito estatisticamente significativo para o fator sexo, de pequena dimensão. Comparações entre grupos do mesmo sexo mostraram diferenças significativas de dimensão média. As diferenças significativas encontradas foram maioritariamente em estratégias avaliando processos pessoais de autorregulação da composição escrita. Os resultados deste segundo estudo sugerem também consistência na utilização de determinadas estratégias por parte dos estudantes inquiridos. Nomeadamente, resultados globais indicam que estudantes do 9º ano de escolaridade optam com pouca frequência por planificar por escrito o texto antes da composição escrita; planificar e gerir o tempo para a tarefa escrita; pedir ajuda para a execução de tarefas de escrita; mudar o seu texto considerando a necessidade de adequar a escrita a um potencial leitor.

A opção de avaliar a autorregulação da escrita no contexto de referência antes de intervenção - projeto de apoio - é consonante com investigação defendendo a importância de uma abordagem sociocognitiva e contextual para o estudo dos processos de autorregulação da aprendizagem (Nystrand, 2006; Schultz & Fecho, 2000; Zimmerman & Schunk, 2009). Tal análise preliminar sobre as opções estratégicas no processo de autorregulação da escrita dos estudantes do 9º ano, em contextos de ensino-aprendizagem de língua portuguesa, possibilitou perceber padrões imergentes no processo de iniciar e controlar tarefas de escrita escolares. Partindo desta informação basilar, decisões mais informadas foram tomadas na adaptação, no desenho e na implementação da intervenção.

O projeto de fundo desta investigação foi desenhado partindo da necessidade de implementar práticas baseadas em evidência empírica (PBE) para o ensino da escrita em contextos sala de aula portugueses. Um modelo de desenvolvimento de estratégias para a autorregulação da escrita - Self-Regulated Strategy Development (SRSD) (Harris & Graham, 1996) - tem sido reportado como particularmente eficaz para o ensino da escrita em contexto escolar em diversas metanálises (Graham, McKeown, Kiuahara & Harris, 2012; Graham & Perin, 2007). Desenvolvido para promover no estudante a autorregulação do processo de escrita, o modelo SRSD visa melhorar o desempenho na escrita dos estudantes, a motivação e o conhecimento para a composição escrita através do ensino explícito de estratégias. Para tal, o modelo inclui o ensino de estratégias utilizando acrónimos, muitas vezes combinando mnemónicas visuais para facilitar a aprendizagem e a memorização (Harris, Graham, Mason & Friedlander, 2008). Para esta investigação, foi desenvolvido um projeto de intervenção baseado no modelo SRSD visando promover a competência dos alunos do 9º ano para a planificação e composição escrita do texto argumentativo. Dois grandes objetivos substanciaram o desenho deste projeto, nomeadamente: 1) avaliar os efeitos da implementação de estratégias SRSD no desempenho do estudante na composição do texto argumentativo (qualidade da escrita; desenvolvimento de ideais; organização lógica; expressividade de linguagem e respeito pelas convenções gramaticais; planificação; extensão); perceber os efeitos da intervenção na utilização de estratégias ambientais, comportamentais e pessoais para a autorregulação da composição escrita de tarefas escolares; avaliar os efeitos da intervenção no conhecimento metacognitivo sobre o texto argumentativo do estudante; 2) perceber possíveis contribuições da utilização de mnemónicas visuais para facilitar a aprendizagem e a utilização das estratégias SRSD. Com o intuito de atingir os objetivos traçados, foi desenhado um estudo quase- experimental misto, com medidas repetidas em pré-teste, pós-teste e follow-up, com dois grupos experimentais e um grupo de controlo ($n = 73$). A intervenção foi desenvolvida numa escola básica da região metropolitana de Lisboa, sendo as estratégias SRSD implementadas em grupo/turma, no contexto sala de aula. No Grupo

1, mnemónicas verbais e visuais foram incluídas no ensino das estratégias SRSD para a planificação e escrita do texto argumentativo; no Grupo 2, apenas mnemónicas verbais foram incluídas no ensino das estratégias SRSD; um Grupo Controlo, constituído por alunos das restantes quatro turmas, foi selecionado através de amostra aleatória estratificada.

Antes da intervenção (pré-teste), foi avaliado o conhecimento metacognitivo dos alunos sobre a composição escrita e sobre a composição escrita do texto argumentativo (Estudo 3), procurando perceber variáveis preditoras do desempenho do aluno na composição escrita do texto argumentativo (qualidade da escrita e planificação). Com esse propósito, utilizou-se uma versão adaptada de um guião para entrevista semiestruturada (Graham, Schwartz, MacArthur, 1993), e os dados recolhidos em pré-teste (produção escrita e planificação). Recorrendo a um método de amostragem aleatória estratificada, participaram neste estudo 26 alunos dos dois grupos/turmas selecionados para implementação das estratégias. Antes da intervenção, os resultados deste estudo sugeriam correlações positivas entre variáveis do desempenho e o conhecimento de processos substantivos (como planificação e organização) relacionados com o texto argumentativo. Os resultados sugeriam também uma correlação estatisticamente significativa entre a consciência de um potencial leitor e a qualidade do texto, bem como entre a planificação e a qualidade do texto produzido nesta fase.

Finalmente, num último estudo (Estudo 4) foi avaliada a eficácia da implementação das estratégias SRSD adaptadas para o ensino da composição escrita do texto argumentativo em contexto de turma, bem como analisados contributos da combinação de mnemónicas visuais e verbais para a sua eficácia. Para tal, comparações entre os grupos ao longo do tempo foram realizadas através de análise de multivariância (MANOVA), e posterior análise de variância univariada. Os resultados estimados sugerem um efeito positivo da intervenção SRSD no desempenho e no conhecimento metacognitivo dos alunos, bem como na utilização de algumas estratégias pessoais para a composição escrita. Foram também encontrados efeitos positivos da dupla-codificação das estratégias SRSD no desempenho e na utilização de estratégias pessoais para a autorregulação da

escrita. Contudo, não foram encontradas diferenças significativas entre grupos experimentais no que concerne o conhecimento metacognitivo do processo de composição do texto argumentativo. Por último, dados recolhidos dos exames nacionais do 9º ano de escolaridade, 15 semanas após a implementação do programa SRSD, parecem confirmar o efeito positivo da intervenção e a validade ecológica das estratégias SRSD adaptadas. Implicações desta investigação para a teoria e para a prática, bem como sugestões para futura investigação, serão discutidas nos quatro estudos apresentados e na discussão geral.

Palavras-chave: Escrita; desenvolvimento de estratégias de autorregulação; texto argumentativo; contexto.

General Index

List of Tables and Figures	xxxiii
List of Abbreviations	xxxiv
Introduction	1
Theoretical framework and conceptualization	3
Implementing Self-Regulated Strategy Development for writing:	
Plan of inquiry.....	5
Becoming a self-regulated writer: A socio-cognitive perspective.....	7
Learning and developing writing skills: What works?.....	13
To see, or not to see: That is the question	17
Adapting evidence-based practices for writing: A multidimensional approach.....	19
Methodological approach	21
Chapter I - Assessing Self-Regulated Strategies for School Writing: Cross-Cultural	
Validation of a Triadic Measure.....	27
Abstract.....	29
Introduction	
Self-regulated strategies for writing	30
A social contextual model of self-regulated writing	31
Method	
Participants and procedures	32
Instrumentation	33
Analytic plan	35
Results	
Exploratory factor analysis	36
Confirmatory factor analysis	38
Convergent and discriminant validities	39
Multi-group analyses of invariance	40
Discussion	
Interpretation of results	41
Limitations	42
Educational implications	42

Chapter II - Self-Regulated Strategies for School Writing Tasks:

A Cross-Cultural Report.....	45
Abstract	47
Introduction	
Social-cognitive perspective of self-regulated writing	48
Using self-regulated strategies for writing.....	49
The role of context	50
Gender diversity	51
The present study	52
Method	
Participants and settings	53
Procedure	55
Instrument	55
Results	57
Discussion.....	59
Assessing self-regulated strategies for writing from a social-cognitive perspective.....	63
Limitations and future research	63
Conclusions and implications for theory and practice	65

Chapter III - Argumentative Writing by Junior High-School Students:

Discourse Knowledge and Writing Performance.....	67
Abstract	69
Introduction.....	70
Literature review.....	71
Discourse knowledge	71
Discourse knowledge about argumentative writing	73
The present study	74
Method	
Setting	76
Participants	77
Procedures	
Writing performance	78
Discourse knowledge about writing	79
Interview scores	80

Results	82
Discussion	86
Limitations and implications for theory and practice	89

Chapter IV - More Than Meets the Eye: Self-Regulated Strategy

Development for Teaching Argumentative Writing	91
Abstract	93
Introduction	94
Literature review.....	95
Self-Regulated Strategy Development (SRSD): An integrative approach	95
Mnemonic strategies: Images and words	97
Overview of the present study	99
Method	
Setting	102
Participants selection procedures	
Students	102
Teachers	104
Assessment procedures	104
Reported use of the self-regulated strategies for writing	107
Argumentative writing performance	107
Discourse knowledge about argumentative writing	110
Teachers assessment and preparation	112
General instructional procedures.....	113
Intervention: Self-Regulated Strategy Development for writing.....	114
Treatment integrity procedures.....	115
Results	
Self-regulated strategy use	116
Writing performance.....	119
Writing quality	119
Developing ideas.....	121
Organising	121
Language facility	121
Planning	122
Length	122
National exams	122

Writing knowledge.....	123
Declarative knowledge	124
Procedural knowledge	124
Conditional knowledge	125
Social validity	125
Discussion	127
Conclusion	130
General Discussion	133
Conclusion and future research	139
References	141
Appendix A	162
Appendix B	166
Appendix C	170
Appendix D	176
Appendix E	180
Appendix F	184

List of Figures and Tables

Figure 1 - Plan of inquiry of the investigation.....	6
Figure 2 - A revised model of the writing process.....	9
Figure 3 - Macro-stages in the cognitive development of writing skill.....	10
Figure 4 - A multidimensional perspective of writing	20
Figure 5 - Methodological map of the investigation.....	22
Table 1- Sample demographics information of participants (study 1).....	33
Table 2 - Descriptive statistics of variables from the final version of the instrument (study 1).....	38
Table 3 - Convergent and discriminant validities (study 3).....	39
Table 4 - Parameters estimates of the first-order structural model (study 1)	40
Table 5 - Fits indices for invariance tests (study 1).....	41
Table 6 - Correlation estimates of the second-order structural Model (study 1).....	41
Table 7 - Descriptive statistics of variables in the study (study 2).....	57
Table 8 - Means (and standard deviations) results for strategy scores for country and gender (study 2).....	58
Table 9 - Means (and standard deviations) results for strategy scores for all-male and all-female groups (study 2).....	60
Table 10 - Mean number of responses (and standard deviations) for writing knowledge interview by category (study 3).....	85
Table 11 – Mean number of responses (and standard deviations) for substantive procedures by subcategory (study 3).....	85
Table 12 - Correlations between argumentative writing knowledge and writing performance variables (study 3).....	86
Table 13 - Students characteristics by instructional condition at the start of the study (study 4).....	104
Table 14 - Stages of the intervention process by condition (study 4)	107
Table 15 - Means (and standard deviations) results for strategy scores by condition, and time of testing (study 4).....	119
Table 16 - Means (and standard deviations) for writing performance measures by condition, and time of testing (study 4).....	121
Table 17 - Means (and standard deviations) for argumentative discourse knowledge measures by condition, and time of testing (study 4).....	125

List of Abbreviations

SRSD – Self-Regulated Strategy Development

SLD – Specific Learning Difficulties

LS – Learning Difficulties

CSIW – Cognitive Strategy Instruction in Writing

SIM – Strategic Instruction Model

EBP – Evidence-Based Practice

Introduction

“It may, in short, be easy to write poorly and difficult to write well. But that is a half truth which obscures virtually everything that is interesting about writing competence.”

(Bereiter & Scardamalia, 1987, p. 5)

Theoretical Framework and Conceptualisation

In the beginning, there was writing. Historically, and even before the printed word, writing has been serving human beings unique need to share knowledge, perpetuating images, ideas, feelings and emotions, as a material manifestation of culture. Writing is not, however, a natural process, as seeing, listening, or talking. Traditionally, reading and writing have been proposed as second-order language processes, which unlike first-order processes as listening and talking require formal and systematic instruction (Emig, 1977). Thus, as an artificial language process, writing needs to be taught. Moreover, since writing serves as a global instrument of communication, it has become a major tool in the digital age to assess content and curricular knowledge across subject areas, and in different educational environments (Graham, MacArthur & Fitzgerald, 2013).

Nevertheless, writing researchers and practitioners seem to share similar concerns regarding the writing difficulties of a large number of school-aged children and youth (Berninger, 2012). In Portugal, authors have been consistently reporting the writing difficulties of primary and secondary school students across multiple subject areas (Sousa, Ferreira, Castanheira, Pereira & Lourenço, 2010; Sousa, Ferreira, Romão, Pereira & Lourenço, 2013). Costa (2011) denoted a lack of awareness of the problems regarding the teaching of writing in Portugal, and that its main focus was on aptitude issues (e.g., writing as a gift).

Reading is a mischievous process, a brisk moment in which a reader confiscates a writer's time, effort, ideas and emotions, often abruptly. Thus, any reader is a thief. As a language arts teacher, I found myself playing the thief, reading and correcting my students' writings, often surprised by the creativity and skilfulness of some, but more regularly frustrated with the writing difficulties of others. All the same, from those experiences of teaching writing in different languages and educational contexts, text composing was always felt like an unbearable effort for many students, a challenging task, which in turn became

mine: *How could I teach my students to improve their writing skills? How could I empower them to share their knowledge and feelings through writing?*

My motivation to develop research on writing was further triggered by two reading moments. First, while working on my Master thesis reviewing work on adapting teaching strategies for students with literacy difficulties, I was surprised with Brooks (2007) conclusions regarding the response delivered in the UK to secondary school students with specific learning difficulties, which compelled the author to state that *"There is much less evidence [of what works] for secondary level than for primary; in particular, there is none at all for writing"* (p.25). Then, from further literature reviews, I found Graham and Perin (2007) meta-analysis on teaching writing for adolescent students. As a secondary school- teacher, this systematic review of best practices for teaching writing was a treasure, a source which could finally unfold empirical evidence of what worked for students struggling with writing. By then, this reading left me with three main assumptions. First, it confirmed my teaching experience that many students' writing failed to meet academic and professional standards, highlighting my belief that writing needed to be taught. Second, from the evidence accumulated on adolescent writing instruction, the explicit teaching of strategies for planning and/or revising – strategy instruction – was an especially powerful method for struggling writers. Finally, the effectiveness of one model in particular developed in the USA, the Self-Regulated Strategy Development, SRSD (Harris & Graham, 1996), was asserted. Nevertheless, despite the variety of instructional methods and procedures found to improve the quality of students' writing, there were only three studies to confirm the effectiveness of strategy instruction with older students (year 9 and beyond). From these findings and from a personal need to understand writing development and writing instruction, a research outline was drawn. Accordingly, the current investigation aimed to test the effectiveness of implementing SRSD strategies for writing in whole-class environments, and its impact on junior high-school students' writing performance, discourse knowledge, and self-regulated strategy use.

To present this investigation, this introduction will be structured in three sections. First, we will describe the plan of inquiry which substantiated this investigation, including general aims and questions. Second, the substantive theory which shaped this investigation, including Zimmerman and Risemberg's socio-cognitive model of self-regulated writing (1997), Harris and Graham (1996) Self-Regulated Strategy Development (SRSD) model for teaching writing, and Paivio's (1986, 2007) dual-coding theory of cognition. Third, we will present a multidimensional perspective of writing conceptualised as the theoretical cornerstone of this investigation. Finally, we will present and discuss the design and methodological options to address our inquiry frame. This introduction will be followed by the four research outputs which were produced to substantiate this investigation. Subsequently, a general discussion will provide an overall scope of research findings and educational implications, followed by a conclusion, in which we will consider paths for future research.

Implementing Self-Regulated Strategy Development for writing: Plan of inquiry

We developed a plan of inquiry for this investigation to enable us to provide a more comprehensive and nuanced approach of adapting SRSD for writing in whole-class Portuguese educational settings. Using a multimethod design, two interrelated research projects – a backup project and a base project - were developed and four research studies were produced to fulfil the following general aims: a) identify different self-regulated strategies for writing used by students in transition to high-school (year 9) in Portuguese-speaking educational contexts; b) evaluate the effectiveness of SRSD instruction for teaching argumentative writing in Portuguese whole-classroom settings; c) test the effects of SRSD instruction to improve students' argumentative writing performance, discourse knowledge, and use of self-regulated strategies for writing; d) explore incremental effects of combining visual and verbal mnemonics to the SRSD instructional routine. Figure 1 shows this investigation plan of inquiry developed to accomplish these aims, including the general questions addressed in each study.

The first step of this investigation – our backup project - was designed to assess self-regulated writing in context before implementing the adapted SRSD strategies. As little

research had been developed to understand how students in Portuguese-speaking educational contexts used strategies to self-regulate their writing, we found this option fundamental. Further, as our base project was designed to test the validity of genre-specific self-regulated strategies for writing, such initial screening would provide us with an insight of these students' options to initiate and control writing. For that purpose, we developed a self-report instrument following a socio-cognitive model of self-regulated writing (Zimmerman & Risemberg, 1997) with data collected in Portuguese and Brazilian schools – study 1 -, and further analysed cross-cultural variations in the reported use of the assessed strategies – study 2. The instrument was later used in our base project to assess the context in which SRSD strategies were being implemented – the school's ninth-grade population of students.

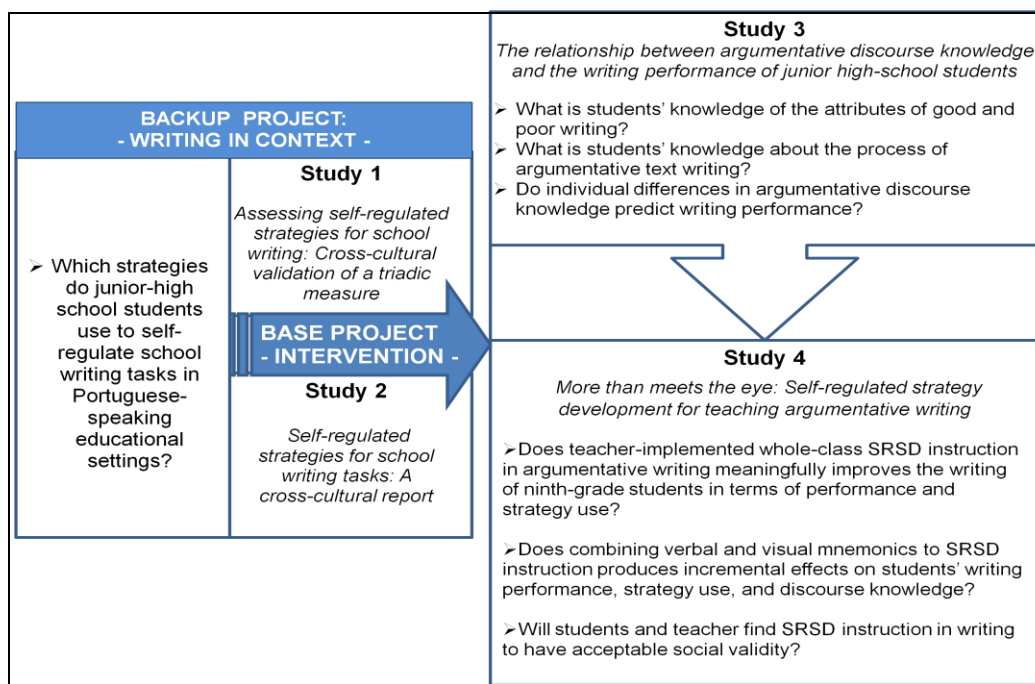


Figure 1. Plan of inquiry of the investigation

After that preliminary assessment, the adapted SRSD for teaching argumentative writing were implemented. The option of developing research on argumentative text writing had two main reasons. First, argumentation had been recognized as a key element in European educational systems, appearing in the European Parliament's recommendations in 3 of the 8 fundamental competences to be developed (see S-TEAM, 2010). Second, the

inclusion of the explicit teaching of argumentative writing was also part of the Portuguese Language Arts curriculum (Reis et al, 2009), and targeted in year 9 national exams to enter high-school (years 10 to 12). Study 3 was developed to examine students' metacognitive knowledge of argumentative writing. The SRSD instructional model was designed to develop students' self-regulated strategy use and discourse knowledge, as means to boost writing performance. A sample of students receiving SRSD instruction (n = 26) was interviewed at pretest following a modified version of an interview protocol initially designed by Graham, Schwartz & MacArthur (1993). Findings from this study were crucial in the process of designing and implementing the adapted SRSD strategies, as they provided us with information to optimise instructional procedures, responding to students' differences and needs.

Finally, study 4 embodies the process of implementing and evaluating the effectiveness of the adapted SRSD strategies. We find that the instruments developed and the findings from the three previous studies provided the required means and information to secure fidelity of implementation, and understand and interpret the impact of teaching argumentative writing through SRSD. To plan this investigation, interpret and report research findings, substantive theory regarding writing processes, writing development, and writing instruction was considered.

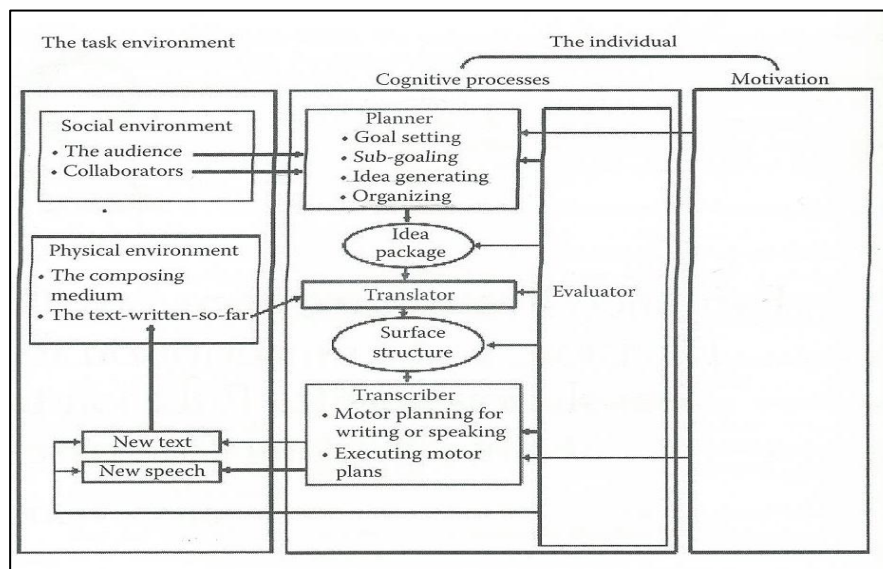
Becoming a self-regulated writer: A socio-cognitive perspective

Since the beginning of the 20th century, the traditional discourse about writing was mainly concerned with prescriptive rhetorical analyses and reflections, as focus was given on the written product. After 1970, pioneering studies from English educational programs (see Nystrand, 2006 for a review) emphasised a new discourse, defending the need to describe and explicate writing as a process of transforming thoughts into text. By then, a social dimension was added into writing research, with works by Shaughnessy (1977) and Hymes (1974) questioning Chomsky (1957) universal conception of language. The authors advocated writing as a social act of meaning making circumscribed within a community of

speakers, and thus historically, socially, and politically defined. Simultaneously, the seminal cognitive model of writing as a process (Hayes & Flower, 1980) was being conceptualised.

Hayes and Flower's (1980) model is unarguably the most influential cognitive model of the writing process. Using think-aloud protocols with adult writers, the authors were able to propose a formal model describing the organisation of writing processes, which included three basic components, namely: a) the task-environment, which involved external factors influencing text composing (e.g., topic, audience, exigency); b) three cognitive processes employed during writing, as planning (e.g., setting goals, generating ideas, and organising ideas into text), translating plans into written text, and reviewing writing to evaluate the process and product; c) the writers long-term memory (e.g., knowledge of topic, audience, and written plans), which interacts with the monitor in which the cognitive processes reciprocally and interchangeably operate in the process of writing.

A fundamental advantage of the Hayes and Flower's (1980) model was the highlight placed on individual differences in the writing process (Graham, 2006a). Nonetheless, several authors challenged this first cognitive model (see Nystrand, 2006 for a review), arguing that it failed to consider the impact of the social context in how writing is thought and perceived by the community of speakers within which writing takes place. Hayes (1996) offered a modified version of the model, which included two major parts: the individual and the task environment. This version explicitly included two sub-components of the task environment (e.g., social and physical environments); individual sub-components referring to motivational and effective states; and working memory, which was not included in the 1980's version. More recently, Hayes (2012) presented a revised version of the model, primarily focused on the process of translating thought to written words while text composing (Figure 2). As in the previous 1996's version, the model is divided in two major parts - task environment and individual. In this updated version, however, a primarily focus is given on individual cognitive processes, as writers become planners, translators, transcribers, and evaluators in "the process by which ideas are transformed into language" (p. 24).

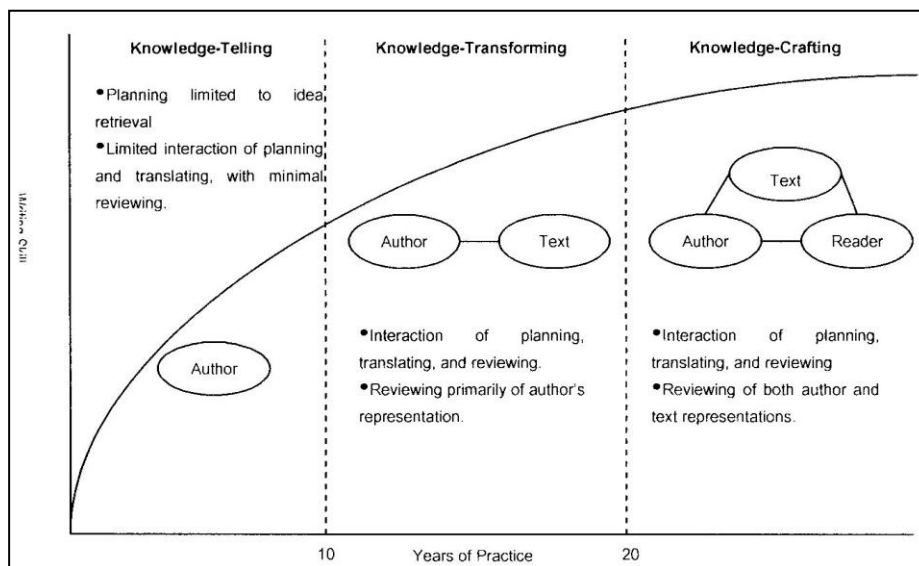


(Adapted from Hayes, 2012)

Figure 2. A revised model of the writing process.

As the writing process became a more complex and socio-cultural diverse process of translating ideas into written text, understanding writing development gained pivotal importance. Bereiter and Scardamalia's (1987) theory of writing offered two models of composing processes to explain the development of writing skills throughout the lifespan. The authors argued that novice writers rely on a "psychology of the natural", perceiving writing as a naturally acquired language ability learned through ordinary social experience. Following a *knowledge-telling* model, immature writers generate text by simply telling what is known about a topic, as a straightforward form of oral language production. This process relies heavily on the writer's knowledge of content (topic to be developed) and discourse (type of text), as long-term memory serves updating mental representations of the text. Interestingly, the authors suggested this *knowledge-telling* approach would be more common amongst elementary students, and likely to be retained on into university and beyond. On the other extreme of the writing continuum, the authors argued that experienced writers rely on a "psychology of the problematic", which serves as grounds of reflecting through writing. Under such *knowledge-transforming* model, experience writers formulate

and solve problems continuously while developing text. Thus, this process involves content and rhetorical planning and reviewing, in which the writer analyses the task, retrieves and transforms content and rhetorical knowledge, sets goals, and makes decisions to reach these objectives. Research findings have supported elementary-school students' use of the *knowledge-telling* approach for text composing (Barbeiro, 2010; Graham, 1990; Lin, Monroe & Troia, 2007; McCutchen, 1995). Nonetheless, little empirical research has been developed to test the validity of the *knowledge-transforming* model and the accuracy of its description of skilful writing (Graham, 2006a).



(Adapted from Kellogg, 2008)

Figure 3. Macro-stages in the cognitive development of writing skill

Considering Bereiter and Scardamalia theoretical models, Kellogg (2008) proposed a benchmarking timeline to explain writing development (see Figure 3). Arguing writing competence as a function of practice, the author proposed a line of two decades to achieve writing expertise, adding a third stage to Bereiter and Scardamalia's (1987) cognitive developmental perspective of writing. Such *knowledge-crafting* stage is characterised by the writers fully awareness of the needs to adjust content knowledge, rhetorical knowledge, and text representations to a potential reader. Sustained in documented reports of professional

writers, the author suggests that at this stage of writing development, writers continuously plan, translate and revise ideas while composing, coordinating author, text and readers' representations in the process. The focus given to a potential reader at this last stage of writing development does not, however, imply a lack of reader's awareness at earlier stages, as students aged 14 to 16 have been found to acknowledge the need to accommodate writing to a potential reader, and make some changes in meaning for that purpose (Myhill & Jones, 2007). The author offers an explanation for this, suggesting that at such stage of writing development, unlike expert writers, college students do not make deep structural changes to the text because they fail to focus their attention on the reader's perspective. As the act of text composing places heavy demands on working memory, it is further highlighted the need of adequate writing instruction and training to free executive attention resources, which enable self-regulated writing.

The models here reviewed provided theoretical support for writing research developed over the last three decades. Designed to explain primarily the cognitive processes associated with writing, these models seem to pay, however, less attention on how writers initiate and control the writing process, and which strategies may facilitate writing development. Zimmerman and Risemberg (1997) offered a model to address these issues. Grounded on Bandura's (1986) social-cognitive theory, three major factors acting in the process of self-regulation for writing were proposed to explain how writers act to deliberate control text composing - environmental, behavioural, and personal processes. The authors proposed 10 writing strategies framed in these triadic social contextual conceptions of self-regulated writing. Environmental processes were said to reflect arrangements made by the writers to structure physical and social settings to optimize writing- strategies towards environmental structuring; selecting social sources of writing knowledge; behavioural processes referred to writers' use of overt motoric performance strategies for writing – self-monitoring, self-consequating, and self-verbalising strategies; finally, personal processes were described as writer's regulation of personal (covert) cognitive beliefs and affective states while text composing - time planning; goal setting; self-evaluating; cognitive; and

mental imagery strategies. Interacting reciprocally in the process of writing, these environmental, behavioural and personal strategies were proposed to be continued or changed depending on an inactive feedback loop. Thus, writing was described as a recursive process in which writers monitor the effectiveness of different self-regulated strategies employed to manage a given writing task, and make decisions to modify or abandon them depending on feedback, self-efficacy beliefs, motivation, and achievement.

Zimmerman and Risemberg (1997) offered a model of the writing process distinct from the previous models here reviewed for three major reasons. The first regards the focus on how individuals initiate and control a writing task, adding to the prior cognitive processing models interactive elements such as environmental and social contingencies, motivation and self-efficacy to explain the writing process. The second concerns the focus given on change, proposing mechanisms – the feedback loop - through which writers chose to modify or maintain their strategic behaviour in the process of text composing. The third concerns the perspective taken to define writing and writing development. By offering a socio-cognitive view of self-regulation and strategic behaviour, the authors propose self-regulated writing as more than an individual-differences construct. The previous models here reviewed had highlighted the importance of self-regulatory strategies in writing, defining them as “strategies for managing one’s own cognitive behaviour during writing” (Bereiter & Scardamalia, p. 249). Self-regulatory strategies in writing, as defined by Zimmerman and Risemberg (1997), are more than just the intentional management of one’s cognitive performance, as they also identify and elaborate on strategies to regulate one’s motivational or affective states, behaviour, and social environment. Skilful writing is, therefore, a complex process where self-regulation and strategic thinking play a fundamental role.

For the current investigation, a first research project - backup project - grounded on Zimmerman and Risemberg’s (1997) socio-cognitive model of writing was designed from the need to identify different strategies used by Portuguese junior high-school students (year 9) to initiate and control writing. We focused on students in transition to high-school, who according to Kellogg’s (2008) model of writing development would still be approaching

writing tasks relying mainly on their knowledge of the topic - *knowledge-telling* stage- but beginning to understand the needs to coordinate authors and texts representations while composing- *knowledge transforming* stage. Moreover, as the author suggested, these students would fail to use strategies to accommodate writing to a potential reader. Hence, our backup study would provide an exploratory pattern of these students' strategic options in between stages of writing development.

We find this backup project was important for four main reasons. First, it substantiated the development of a new instrument to assess students' use of different strategies to self-regulate writing. We find this measure is a valid contribution to the field of writing research by supporting the interactive quality of self-regulated writing, and the relative efficacy of environmental, behavioural, and personal processes as predictors of students' use of distinct self-regulated strategies for writing. Second, as previously mentioned, such initial screening allowed us to have a preliminary understanding on how students in Portuguese-speaking educational settings may strategically approach school writing tasks. Third, the option of adding a cross-cultural scope to data collection and analyses provided us with interesting exploratory findings regarding writing as a culturally and contextualised bounded process. Fourth, it enabled us to make more informed and contextualised decisions when adapting, designing, and implementing the SRSD instructional model, our base project.

Learning and developing writing skills: What works?

Research testing “best practices” for writing instruction in school settings is expanding (Graham, MacArthur & Fitzgerald, 2013; Hooper, Knuth, Yerby & Anderson, 2009). Empirical research on literacy teaching has traditionally favoured reading over writing (MacArthur, Graham & Fitzgerald, 2006; Myhill, Fisher, Jones, Lines & Hicks, 2008). Over the last decades, however, several studies have been designed and implemented to validate methods, models, and practices to improve students' competences in writing and text composing. Research has found the explicit teaching of strategies for writing – strategy instruction - to be a particularly effective method to improve the writing skills of all students, with or without specific learning difficulties (SLD) (Englert, Raphael, Anderson, Anthony &

Stevens, 1991; Ellis, 2005; Graham, MacArthur & Fitzgerald, 2013). As a step-by-step problem solving method, evidence suggests that the explicit teaching and training of writing strategies (e.g., planning, organising, and revising) may make the writing process more visible and tangible.

Different instructional models for writing have been designed to directly and explicitly teach students how to independently use different writing strategies. Drawn from a socio-cultural theory of writing, Englert and colleagues (Englert, Raphael, Anderson, Anthony & Steven, 1991) proposed the Cognitive Strategy Instruction in Writing (CSIW), developed to provide opportunities for students to think writing based on four principles: one, the need to promote students' strategic thinking by applying strategies related to planning, organising, editing, and revising their texts; two, the importance of teachers modelling the writing process, thinking aloud strategies and using problem solving techniques while text composing; three, teachers scaffolding students' writing, providing guidance through the process of learning and implementing the writing strategies; four, the use of conceptual maps and graphic organisers, designed as objects-to-think-with, objects-to-talk-with, and objects-to-write-with (Englert, 2009). Other intervention programs have been developed to respond to the specific needs of struggling writers, especially students with learning difficulties (LD). The Strategic Instruction Model (SIM) (Deshler et al, 2001) was designed for teaching learning strategies in different areas including writing, and aiming to reduce the performance gap between students with LD and their peers. The authors suggest that once educational systems fail to respond to the individual differences and needs of students with LD struggling with writing this performance gap increases, leading to early school dropout and lack of academic success. For that, as an intervention program SIM includes the training of teachers to explicitly implement SIM-based strategies (e.g., sentence combining and paragraph writing), aiming to help at-risk students with the demands of the general education curriculum. Also characterised by explicit teaching and individualised instruction, the Self-Regulated Strategy Development (SRSD) model (Harris & Graham, 1986) was designed to provide effective writing instruction in school settings.

The SRSD instructional model for writing (Harris & Graham, 1986) was initially designed and tested to improve the writing performance of students with LD, thus implemented by researchers or tutors in small groups or individualised sessions. The SRSD methodology included the explicit step-by-step teaching of mnemonic strategies for planning and/or revising specific writing genres (e.g., narrative and expository texts). However, unlike other strategy instruction models, SRSD included the direct teaching of self-regulatory procedures, to engage students in the process of becoming independent learners and skilful writers (e.g., self-monitoring, and goal-setting).

Several meta-analyses have been conducted to identify practices which may have the power to transform students' writing competence, especially in the US educational context, and having English as language of instruction. Hillocks (1986) examined the effects of several models of writing instruction by calculating the average weighted effect size for experimental and quasi-experimental studies. He found the three most effective modes to be inquiry activities (ES = 0.56), goal setting activities (ES = 0.44), and sentence combining instruction (ES = .35). Moreover, a negative effect size for grammar instruction (ES = -0.29) seemed to highlight the lack of efficacy of a teaching practice that was traditionally the most recurrent in mainstream school settings. Almost twenty years later, two meta-analyses were also conducted to examine the effectiveness of different instructional approaches and practices for the teaching of writing (Graham & Harris, 2003; Graham, 2006b). The effectiveness of strategy instruction to teach writing to students from grades 2 to 10 was confirmed, with large effect sizes (ES = 1.47 to 1.57) found for the teaching of writing strategies by means of self-regulated strategy development (SRSD). A following meta-analysis (Graham & Perin, 2007) of writing instruction for adolescent students (grades 4 to 12) extended these findings and the overall effectiveness of strategy instruction over other different treatments for the teaching of writing (e.g., sentence combining, summarisation, prewriting, inquiry, and product goals). Moreover, results substantiated the effects of explicitly teaching strategies to plan and revise texts following the SRSD instructional model (ES = 1.14). Interestingly, once again findings suggested grammar instruction not to be an

effective treatment when compared to other conditions (e.g., process writing approach and strategy instruction), with effect sizes ranging from -0.43 to 0.04 . More recently, another meta-analysis (Graham, McKeown, Kiuahara & Harris, 2012) to support effective writing practices to teach elementary grade students confirmed previous findings, with statistically significant positive effect sizes for all 13 intervention programs – including strategy instruction ($ES = 1.02$) and SRSD instruction ($ES = 1.17$) – except for one, grammar instruction. Taken together, these findings suggested the robustness of the SRSD model as an evidence-based model of writing instruction.

The major purposes of our base project was to understand the effectiveness of a set of strategies to plan and write argumentative essays based on the SRSD model for writing instruction (Harris & Graham, 1996), and its validity in Portuguese whole-class environments. Research had provided evidence of the effectiveness of the SRSD model for teaching writing in several educational contexts. However, literature (Graham, McKeown, Kiuahara, Harris, 2012; Graham & Perin, 2007; Myhill, Fisher, Jones, Lines & Hicks, 2008) also suggested the need for further research to corroborate its effectiveness under different scopes. First, SRSD research was initially designed and developed to respond to the writing difficulties of students with LD, and implemented by researchers out of whole-class environments. Thus, few studies tested the effectiveness of teacher-implemented SRSD instruction in regular classrooms (Harris et al, 2012). Second, less research has been developed to test the effectiveness of the SRSD model with older students (year 9 and beyond). Third, as few studies (Budde, 2010; Festas et al, in press) have been developed to test the effectiveness of SRSD instruction in non-English speaking whole-class settings, its sustainability is still a matter poorly understood. Finally, SRSD instruction aims to develop students' writing performance, knowledge and motivation by including the explicit teaching of genre-specific writing strategies and several self-regulated strategies to help students manage the composing process. Therefore, as an instructional package, there is a need to understand which components of the SRSD model may extend its positive effects on

students writing performance, knowledge, and motivation (Graham, Harris & McKeown, 2013).

To see, or not to see: That is the question

Empirical evidence found in different meta-analyses show mnemonic-strategy instruction to be one of the most effective means to respond to the needs of students' struggling with writing (Graham & Perin, 2007; Swanson, Hoskyn & Lee, 1999). Mnemonics have been defined as "learning strategies that make elements of abstract information more familiar, and encourage students to form meaningful associations to these elements" (Wang & Thomas, 1996, p. 104.). Moreover, research found first-letter mnemonics, or acronyms, to be beneficial for teaching students with and without LD to successfully complete different process-oriented tasks (Hughes, 2011; Reid & Lienemann, 2006; Schumaker & Deshler, 2006). These strategies are used to guide students when completing complex learning tasks, as in text composing (Rosenshine, 1995). Their continued practice allows students to recall information when facing a task through a self-cueing process (Bellezza, 1981). Research has also found that storing information as images grants larger memory benefits than verbally stored information alone (Carney & Levin, 2012). Furthermore, evidence suggested that better recall can be expected when information is stored as both images and words, as a result of redundancy in stored material (Carney & Levin, 1994, 2000).

The theoretical rationale for the use of dual-coding mnemonics can be found in the cognitive theory of multimedia learning (Mayer, 2005), which is based on Paivio's dual-coding theory (1986, 2007). Highlighting the complexity and diversity of human language, Paivio argues that language, as a communication system, must be studied as part of larger "silent partner", the general cognitive system. In this general system, memory is seen as the engine of cognitive and linguistic evolution. Thus, dual-coding theory posits the benefits of combining verbal and visual materials in learning situations to reduce memory load, and to boost long-term memories, which constitute knowledge (Paivio, 2007). According to his conceptual peg hypothesis, the benefits of using images to support instruction is to use them as retrieval cues for other pictures as well as for words. Supported on Paivio's dual-coding

theory, research on writing instruction confirmed the importance of combining visual and verbal information/materials to promote language concreteness, which improves comprehension, interest, recall, and the writing quality of texts (Hillocks, 1986; Sadoski, Kealy, Goetz & Paivio, 1997).

Furthermore, the cognitive rationale for the integration of textual and visual learning materials relies on three essential features (Mayer, Bove, Bryman, Mars & Tapangco, 1996). First, conciseness, when verbal information is restricted to essentials parts, and actions of the step-by-step process being taught and visual illustrations are kept simple. Second, coherence, when visual illustrations and verbal information are clearly related to enable the reader to “build connections among the pieces for verbal information, yielding a verbal model, and to build connections among the piece of visual information, yielding a visual model” (p. 65). Third, coordination, when corresponding visual and verbal information are presented simultaneously.

Our world is today dominated by a visual culture, where verbal information and visual representations fill our minds in synergetic interactions (Eilam & Poyas, 2008; Paivio, 2007). Thus, literacy research and writing research in particular face increasing challenges to develop and validate evidence-based practices (EBPs) to implement in real-life educational environments. This investigation aimed to explore the effectiveness of dual-coding mnemonics in SRSD instruction (Study 4). The fourth stage of the SRSD model emphasises the need of promoting the memorization of the several steps of the composing strategy using mnemonics (Harris & Graham, 1996). For that purpose, word and images associations are recurrent in SRSD mnemonics for planning and/or composing different texts (Harris, Graham, Mason & Friedlander, 2008). Therefore, we examined incremental effects of visual mnemonics to support strategy use and maintenance, aiming to expand knowledge on the contributions of specific elements of the SRSD instructional package to improve students' writing performance, discourse knowledge, and self-regulated strategy use.

This investigation was developed following the presented inquiry frame. To sustain it, fundamental issues regarding the process of adapting EBPs were considered before, during, and after the implementation process.

Adapting evidence-based practices for writing: A multidimensional approach

In a time of global communication, our knowledge of best practices for teaching and learning writing has widened (Graham, MacArthur & Fitzgerald, 2013). Empirical evidence here reviewed support a growing body of evidence-based practices (EBPs) for writing. EBPs have been defined as “instructional approaches shown through high-quality research to result in generally improved student outcomes” (Cook, Smith & Tankersley, 2012, p. 495). However, there is still no clear-cut guideline for how the adaption of these models, methods and practices should be conducted across cultures, educational contexts, and languages of instructions (Rosenfield & Berninger, 2009; Soydan & Palinkas, 2014).

Cultural adaptation of academic interventions in school settings is a complex process, which involves more than a straightforward transportation and translation of methods and practices (Soydan & Palinkas, 2014). Different variables need to be considered toward a sustainable introduction, dissemination, implementation, and sustainability of an academic intervention in a new country including: a) the country’s acceptance to innovative interventions (cultural and historical variables); b) the relevance of the intervention within educational policies and priorities (political and economic variables); c) meaning and beliefs attributed by social agents (media), educators, families and students to the benefits of implementing the intervention (social and educational variables). Thus, changes made to the intervention need to be evaluated to better fit the circumstances in which the intervention is to be developed. In that process, threats to the fidelity of the intervention must be carefully addressed, as a balance between cultural adaptation and fidelity becomes the ultimate goal.

The process of adapting EBPs for writing in particular may impose serious constrains given the multidimensional nature of the construct. Therefore, for the current investigation, the cultural adaptation of the SRSD instructional model was theoretically framed under a multidimensional perspective of writing. Illustrating the complexity of implementing academic

interventions for writing, Figure 4 shows a number of variables to be considered when planning cultural adaptations. This perspective shows writing as a reciprocal process between four categories: writers, texts, readers, and context. Under this view, writers, texts and readers' variables interchangeably interact in the process of writing, which in turn affects and is affected by contextual variables. Despite relying heavily on socio-cognitive (Zimmerman & Risemberg, 1997) and socio-cultural (Nystrand, 1989, 2006; Schultz & Fecho, 2000) perspectives of writing, the current multidimensional approach encompasses cognitive perspectives, which have offered unarguably the most prominent models of writing as a process (Hayes & Flower, 1980; Bereiter & Scardamalia, 1987).

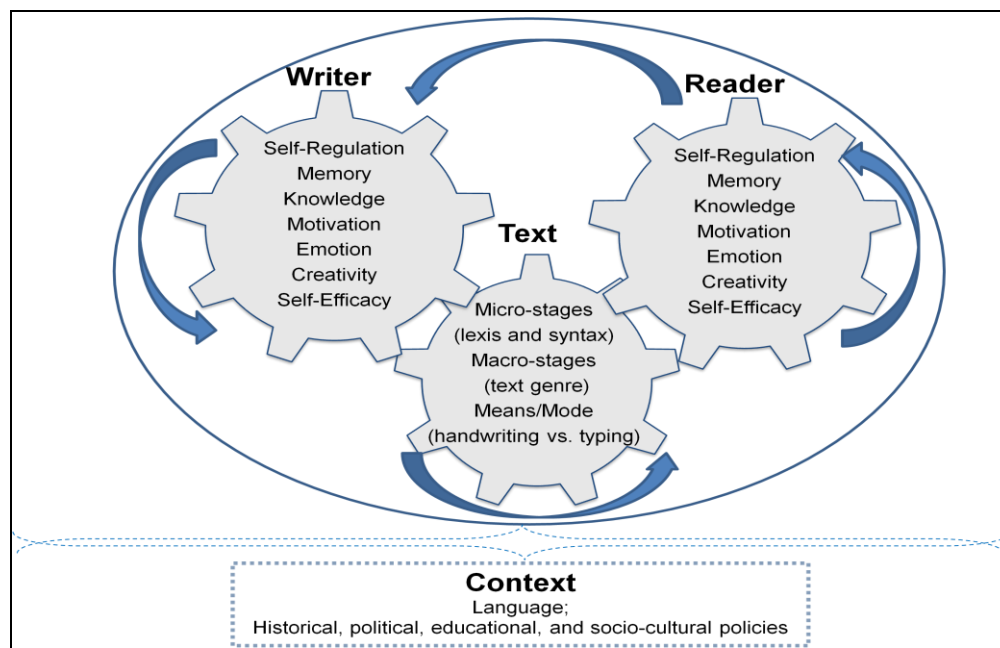


Figure 4. A multidimensional perspective of writing

Theoretical and empirical studies have been developed under different schools and paradigms to understand and test the four categories and related variables here presented (see MacArthur, Graham & Fitzgerald, 2008 for a review), and thus defining the strong body of writing research collected throughout the last century. Nevertheless, as many conceptualisations of writing as a process take it as an individual-differences construct, less

research has addressed the importance of contextualising the writing processes, writing development, and the teaching of writing. The current investigation extends knowledge on writing research by taking an enquiry frame that considers variables within the four components – writer, text, reader, and context - to understand the effectiveness of SRSD instruction for writing. Accordingly, a multimethod designed (Morse, 2003) was used to address questions and overall goals. Aiming to increase the scope and comprehensiveness of different levels of the data collected, different corresponding measures were adapted.

Methodological Approach

Discussing literacy education and test-driven research in the Australian educational context, Luke (2012) asserts “*schools are not laboratories, and everyday teaching and learning never follow the textbook designs of scientific experiments.*” (p. 10). The author argues against the over focus of experiments in educational settings on performance indicators, which questions teachers professionalism and students’ adaptability. The author further comments on methodological approaches developed in literacy research, which often neglect to address the ecological validity of treatments by failing to adapt designs, scopes and materials to real-life educational contexts. From the US, authors (Graham & Harris, 2014) have recently claimed for the need to develop higher quality research on teaching writing, stating that “the gold standard of such testing is randomised control designs or true-experiments” (p. 92). This argument relies on the premise that randomised experiments may increase the level of confidence on the effectiveness of a given treatment being tested, thus establishing the internal validity of the experiment.

These arguments mirror distinct and contextualised approaches of developing research in educational settings. For the current investigation, we followed an inquiry frame logic for conceptualising and conducting research in educational psychology (Butler, 2006; Shulman, 1988). Inquiry frames have been defined as “the logic of reasoning underlying a research study that creates coherence between theoretical frameworks, research questions, design features, and methods” (Butler, 2006, p. 903). Thus, when designing this investigation different methodological options were taken to answer particular types of

questions to solve our overall research problem: understanding the effectiveness of SRSD for teaching argumentative writing to junior high-school students in whole-class Portuguese settings. For that, we used a multimethod design (Morse, 2003) composed of two interrelated projects – backup project and base project– attempting to go “beyond the quantitative-qualitative divide” (Butler, 2006) in educational psychology research. Thus, four core research studies were planned and conducted to answer particular subquestions and goals. Figure 5 shows the methodological map of this investigation. Consent to conduct this investigation was requested and granted from the schools, parents, and students involved. Consent was also granted from the deontological committee of the authors’ faculty, as well as from the Portuguese Ministry of Education and Science (see Appendix A).

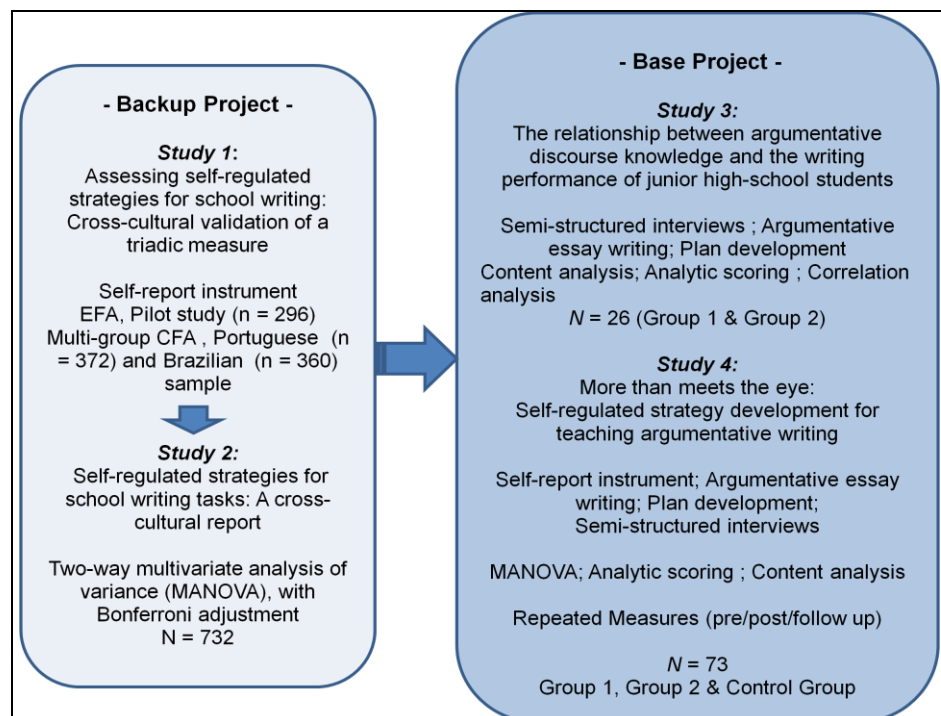


Figure 5. Methodological map of the investigation

For the backup project, the primarily focus was assessing the context before intervention. In study 1, our aim was to identify different self-regulated strategies that junior high-school students reported using to initiate and control their school writing tasks in Portuguese educational settings. For that, we designed a new measure, a self-report instrument driven by Zimmerman and Risemberg’s (1997) triadic model of self-regulated

writing. Hence, two sets of analyses were conducted to validate the psychometric properties of the measure, as well as its underlying structure and cross-cultural validity. We first administered the questionnaire in a sample of ninth-grade Portuguese students ($n = 296$), and performed an Exploratory Factor Analysis (EFA) to test its underlying factor structure. As we also aimed to confirm the second-order factor model and its cross-cultural validity, we performed a Confirmatory Factor Analysis (CFA) and multi-group analysis of structural invariance. For that, the questionnaire was administered in a sample of ninth-grade Portuguese ($n = 372$) and Brazilian ($n = 360$) students. In study 2, having established the validity of the developed second-order triadic measure, our aim was to further explore cross-cultural variations in the reported use of the 12 self-regulated strategies assessed. We also addressed between and within gender differences among students' responses. For that, a multivariate analysis of variance (MANOVA) was computed, univariate main effects were examined, and Bonferroni adjustments computed to reduce chances of obtaining false-positive results (Type I errors).

For the core project of this investigation (base project), focus was given on evaluating the effectiveness of the adapted SRSD for teaching argumentative writing. This project was developed in a Portuguese middle-school, part of a public cluster of schools located in an urban district in the Lisbon metropolitan area. Hence, the questionnaire developed on our backup study was used to assess context before intervention, and administered before the implementation of the SRSD strategies to the overall ninth-grade population of students. We also conducted an initial screening of students' writing skills using the average marks on Portuguese language arts from the previous school year. We used a quasi-experimental design with repeated measures, with two groups receiving SRSD instruction – two intact ninth-grade classes - and one group serving as control. Students from the four remaining ninth-grade classes were randomly selected to participate in the control group using a stratified random sampling procedure. To collect and assess data from different levels of the studied phenomenon we used different measures.

In study 3, our aim was to gain insights about the metacognitive knowledge on writing of the students who would be receiving SRSD instruction, to adapt the implementation of the SRSD strategies to students overall needs and differences. For that purpose, data collected at pretest were analysed. At this stage, our aim was to understand what students knew about writing and argumentative writing (declarative knowledge), and how they would go about on writing an argumentative text (procedural and conditional knowledge). Furthermore, we also wanted to perceive whether individual differences in students' discourse knowledge predicted writing performance (e.g., writing quality and plan development). A sample of students was taken from the two SRSD groups using a stratified random sampling procedure. Students' discourse knowledge was assessed through semi-structured interviews, using a modified version of an interview protocol developed by Graham, Schwartz & MacArthur (1993) (see Appendix D). As this was a non-genre-specific interview protocol, we modified it to include questions directly addressing the process of argumentative writing. Interviews were analysed through content analysis. Hence, we adapted the scoring system developed by Graham, Schwartz & MacArthur (1993), which have been used in several studies investigating differences between proficient and struggling writers (grades 2 to 8) (Gillespie, Olinghouse & Graham, 2013; Lin, Monroe & Troia, 2007; Olinghouse & Graham, 2009; Saddler & Graham, 2007), and in instructional studies (Harris, Graham & Mason, 2006). We also created two categories to assess students' conditional knowledge about the need to accommodate writing to a potential reader (see Appendix E for categories and definitions). We used two instruments to assess students' writing performance. First, a six-point scale adapted from the American National Assessment of Educational Progress (NAEP, 2010), and from the Portuguese Language Arts Program for the 3rd cycle (years 7-9) (Reis et al., 2009) (see Appendix C). Unlike most SRSD studies (Graham, McKeown, Kiuvara & Harris, 2012; Graham & Perin, 2007) using holistic scoring methods to evaluate writing quality, our option was to use an analytic scoring method. We find that by doing so we were able to have a more nuanced knowledge of students' skills in three fundamental traits for argumentative text composing (Toulmin, 2003),

namely developing ideas, organising, and overall language clarity. Two ninth-grade teachers were trained to use the scale following procedures from similar SRSD studies (Sadler & Graham, 2009). Moreover, literature (Graham, Harris, & Hebert, 2011) suggests a single writing prompt is not a reliable estimate of students writing achievement. Hence, following other SRSD studies (Olinghouse and Graham, 2009; Sadler & Graham, 2009) three writing prompts were administered to assess the quality of students argumentative writing. Second, to assess students written plan, we used a non-genre-dependent scale developed by Whitaker, Berninger, Johnston, and Swanson (1994). Finally, correlation analysis was conducted and we were able to have a preliminary understanding on how students discourse knowledge would predict writing performance before intervention, and adapt instructional procedures.

In study 4, the ultimate goals of this investigation are disclosed: to test the effectiveness of the designed intervention program on students writing performance, discourse knowledge, and self-regulated strategy use, and to explore the effects of using dual-coding mnemonics in the SRSD instructional routine. For that, we followed a mix-method approach for data collection. As previously mentioned, we used the questionnaire developed in our backup project to assess the context. From the six ninth-grade classes assessed, two classes were randomly assigned to receive SRSD instruction: dual-coding SRSD (Group 1, $n = 23$), and verbal-coding SRSD (Group 2, $n = 25$). Following a repeated measures design, we used the previously presented instruments and methods to collect data at pretest and posttest, (e.g., questionnaire, writing prompts, interviews). To examine maintenance effects, we administered a single writing prompt 12 weeks after SRSD instruction. The one prompt only option was taken to control for fatigue effects (Lavrakas, 2008). To test the hypotheses concerning the effects of SRSD instruction on students' writing performance, discourse knowledge, and self-regulated strategy use, we performed a series of multivariate analyses of variance (MANOVAs) with repeated measures. When following repeated-measures designs, the large majority of SRSD studies (Graham, McKeown, Kihara & Harris, 2012; Graham & Perin, 2007) conducted separate univariate

analysis of variance (ANOVA) for each dependent variable. This procedure has been questioned (Field, 2013; Graham & Harris, 2014) for increasing the chances of Type I errors. Hence, after verifying MANOVA's assumptions of normality and homogeneity of variance and covariance matrices were met, we were more confident to interpret effects and findings

CHAPTER I

Assessing self-regulated strategies for school writing:

Cross-cultural validation of a triadic measure

Assessing self-regulated strategies for school writing:**Cross-cultural validation of a triadic measure¹****Abstract**

This study reports on the construction of a questionnaire to assess ninth-grade students' use of self-regulated strategies for school writing tasks. Exploratory and confirmatory factorial analyses were conducted to validate the factor structure of the instrument. The initial factor analytic stage ($n = 296$) revealed a 13-factor scale, accounting for 61.35% of the variance. Cross-cultural validation was carried out involving Portuguese and Brazilian students ($n = 732$). Multi-group analyses of invariance were performed on the two samples. Results support a theoretically driven second-order model assessing twelve self-regulated strategies for writing. Full configural and metric invariance were established, suggesting that the 34-item measure may be robust to assess the model under investigation across cultures. Findings suggest the instrument can be a valid theory-based assessment tool to help researchers and practitioners examining how students in transition to high school initiate and control their school writing tasks.

Keywords: Writing, self-regulated strategies, assessment, cross-cultural

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Introduction

Writing is a powerful communication tool, often learned and developed at school, where it is used to assess students' knowledge across different curriculum areas, and subjects. However, writing has been considered to be a neglected area of empirical research within educational psychology, receiving far less funding and attention than reading both in volume and in scope, which limited its impact on pedagogical practice (Graham, Gillespie & McKeown, 2013). As a challenging developmental process, skilful writing requires the ability to manage a variety of self-regulation strategies for different purposes. Evidence suggests skilled writers are more self-regulated than struggling writers, supporting the role of self-regulated strategy development to improve students' writing achievement (Harris, Santangelo & Graham, 2010).

To understand how students self-regulate the writing process, Zimmerman and Risemberg (1997) introduced a social cognitive model of self-regulated writing. Theoretically driven by this three-dimensional model, the current study addressed the need to measure the multicomponent process of self-regulated writing. For that, we designed an instrument to assess students' reported use of strategies covering the proposed forms of triadic self-regulation. Confirmatory and multi-group invariance analyses were used to examine the validity of the triadic measure.

Self-Regulated Strategies for Writing

Skilful writing is a requirement for students' academic success. Understanding how students manage to self-regulate text composing and to identify the strategies they select to initiate and control school writing tasks is, therefore, fundamental (Graham, 2006a). Students use a variety of strategies to regulate their actions facing writing, from general cognitive strategies - as goal setting, planning, and revising - to contextual and behavioural strategies - as environmental structuring, and seeking social assistance (Harris, Santangelo & Graham, 2010).

Self-regulated learning (SRL) has become an important area of interest within educational psychology (Zimmerman & Schunk, 2011), and within writing research (Graham,

2006a). SRL is defined as an active process whereby individuals set goals to monitor and control emotions, thoughts and behaviours for learning, a process which is determined by the context where learning takes place. Several self-report instruments have been designed to measure SRL, and general strategies for SRL (for a review see Zimmerman & Schunk, 2011). The complexity of the learning process, however, may ask for the consistent use of less general strategies (Alexander, Graham & Harris, 1998). Strategy use may vary across content areas, as in language arts and mathematics. To achieve certain goals, learners may be asked to use either domain or task-specific strategies, as in the context of school writing tasks (Harris, Santangelo & Graham, 2010).

Research aiming to examine writing-specific self-regulated strategies is relatively scarce (Graham, 2006a). A self-report instrument (Kanlapan & Velasco, 2009) was designed to examine Zimmerman's (2002) eight self-regulatory processes in terms of the three cyclical phases of general SRL - forethought, performance, and reflection - contextualised in writing. Confirmatory factor analysis (CFA) validated a three factor model comprised by seven self-regulatory processes explaining the structure of self-regulated writing. Findings suggested attributing causation to results was not a significant contributor of self-regulated writing. Kaplan, Lichtinger and Gorodetsky (2009) investigated variations in the use of 14 self-regulated writing strategies between 211 ninth-grade students from different educational environments. The authors developed a self-report questionnaire to assess students' strategy use, which included metacognitive, motivational, and behavioural strategies for writing. They found contextual characteristics made the use of certain strategies more relevant for students' goal orientation for engagement.

A Social Contextual Model of Self-Regulated Writing

The current conceptualisation of writing as a process is supported by cognitive research developed during the 1980's. Hayes and Flower's first cognitive model of writing (Hayes & Flower, 1980) has become seminal to the current understanding of writing (Berninger, 2012). Following a developmental orientation, Bereiter and Scardamalia's model (1987) galvanised empirical research aiming to understand the development of writing skills

as a life-long progressive process. While such cognitive models of writing depicted writing as an individual process of meaning transforming, others advocated the role of contextual and cultural variables in the composing process (Nystrand, 2006).

Zimmerman and Risemberg (1997) added a social contextual perspective to understand how writers exercise control over their writings in proposing a triadic model of self-regulated writing. The authors defined self-regulated writing as "self-initiated thoughts, feelings, and actions that writers use to attain various literacy goals" (p.76), proposing 10 forms of self-regulation, which fall under three major processes of self-regulatory influence. Environmental processes reflect arrangements made by the writers to structure physical and social settings to optimize writing - environmental structuring, and selecting social sources; behavioural processes refer to writers' use of overt motoric performance strategies for composing – self-monitoring, self-consequences, and self-verbalization ; and personal processes express writers' adapted cognitive and affective methods for writing – time planning, goal setting, self-evaluating, cognitive strategies, and mental imagery. Interacting reciprocally in the process of writing, these 10 proposed forms of triadic self-regulation have been presented as allowing greater flexibility in studying self-regulated writing than prior cognitive models of the writing process.

This research was designed to identify multidimensional self-regulated strategies for writing used by ninth-grade students by factor analysing their responses to items regarding environmental, behavioural, and personal processes of self-regulated writing. A questionnaire was designed for that purpose, and its validity across two samples was investigated through multi-group invariance analyses.

Method

Participants and Procedure

Data were collected as part of a larger project aiming to evaluate the effectiveness of an intervention program to improve ninth-grade students' writing performance. Two sets of analyses were conducted to validate the questionnaire. First, to evaluate the psychometric properties of the items and underlying structure, a study was performed involving 296 ninth-

grade students from four mainstream public schools in the metropolitan area of Lisbon, Portugal. Second, to confirm the three-factor model, a study was developed with ninth-grade students from other five mainstream public schools in the Lisbon area, and a similar cohort of Brazilian students from twelve public schools in the South Region of Brazil ($N = 732$). The population that the schools serve is predominantly white, urban and middle class. Details of the participants are presented in Table 1.

Table 1. *Sample demographics information of participants*

	Pilot study ($N = 296$)	Main study ($N = 732$)	
Country	Portugal ($N = 296$)	Portugal ($N = 372$)	Brazil ($N = 360$)
Gender			
Male (%)	43.2	44.4	43.9
Female (%)	56.8	55.6	56.1
Age	$M = 14.3$, $SD = 0.043$ (range 13-17)	$M = 14.5$, $SD = 0.044$ (range 13-17)	$M = 14.2$, $SD = 0.054$ (range 12-17)

The questionnaire was administered to intact classes by the first researcher to students in Portuguese schools. A team of linguists reviewed the items to control for European and Brazilian Portuguese variations. The instrument was administered by a research colleague from the partner university to students in Brazilian schools. Parents' and carers' consent was obtained, and prior to completing the questionnaire all participants were briefed on the purposes of the study. Before completion, researchers read and explained the questionnaire's instructions. Students were asked to report the frequency with which they used the strategies described when facing written tasks in different subjects across the curriculum. Mean completion time was 15 minutes.

Instrumentation

A self-report instrument - the Self-Regulated Strategies for School Writing Tasks (SRSSWT) - was constructed to assess the frequency with which students use different strategies to self-regulated writing. To generate items for the questionnaire, two main approaches were used. First, reviews were performed to examine existing scales measuring similar constructs. Two scales designed to measure several variables within self-regulated writing, including strategy use, were located (Kanlapan & Velasco, 2009; Kaplan, Lichtinger & Gorodetsky, 2009). Although these instruments comprised strategies tapping the three

major categories we were aiming to assess, items were not grouped following the ten subscales proposed by Zimmerman and Risemberg (1997). 89 items appeared across the two instruments measuring different self-regulated strategies for writing. From this list, 28 items were selected - 15 from Kanlapan and Velasco (2009); 13 from Kaplan, Lichtinger and Gorodetsky (2009) -, and adapted to be grouped under the ten proposed subscales. No items were found measuring self-consequating strategies. Items were then translated into Portuguese, and back-translated into English in order to produce equivalent and culturally appropriate versions. The following criteria were used for the selection: definitions of environmental, behavioural, and personal conceptions were provided; alpha coefficients of the original scales were reported to be $>.75$, which reflects reliable scales (Segal & Coolidge, 2006).

Second, the researches constructed the self-consequating subscale, and created 21 items, which were missing from the previous scales. Three language arts teachers and three educational psychologists analysed and reviewed all items, proposed new formulations and adjusted them to the Portuguese context. Items were grouped in the proposed three major triadic categories of self-regulatory influence. Environmental processes included environmental structuring and help-seeking strategies; behavioural processes comprised self-monitoring, self-consequating, and self-verbalising strategies; personal processes included time planning, goal setting, self-evaluating, recalling/creating mental images, and six cognitive strategies, namely attention regulation, planning ahead, planning during writing, revising, organising, and reader's awareness.

To assess content validity, the questionnaire was given to 22 tenth-grade students for content validation for use with a year 9 population. Following these procedures, items were supported as appropriated in terms of wording, readability, and content. This first version of the instrument included 49 items assessing 15 self-regulated strategies for writing. Response options followed a five point Likert-scale, from 1 = *Very Rarely* to 5 = *Very Frequently*.

Analytic Plan

To achieve this study's aims two sets of analyses were conducted. Exploratory factor analysis (EFA) was used at an initial stage to evaluate the relationships between items and underlying factors, gaining information about internal structure. To establish construct validity, subsequent CFA was performed, and multi-group measurement invariance to test the degree to which measurements conducted across different populations produced similar attributes (i.e. construct comparability).

Aiming cross-validation of factor structure, CFA is typically carried out on new data following a first study in which a factor structure was derived by exploratory analysis. This approach has been questioned based on the possible lack of correspondence between EFA and CFA factor structure (Prooijen & Kloot, 2001). To rule out this substantive possibility, an EFA was performed on data collected for the second set of analyses, aiming to check and compare factor structures.

CFA was performed to evaluate the factor structure of the instrument. The factors in the model corresponded to scales of related items identified by exploratory factor analyses, and which were assumed to represent the lower order factors of the construct, the self-regulated strategies for writing. A structural model was built to examine the possibility that the distinct but related identified subscales could be accounted for by underlying higher order factors.

Second-order factor models have been used in different domains within educational psychology, including in reading (Nelson, Lindstrom, Lindstrom & Denis, 2012). A major advantage of second-order factor models is to offer a more parsimonious way of explaining covariance with fewer parameters by giving a structure on the pattern of covariance between the first order factors (Chen, Sousa & West, 2005). Based on the proposed triadic model (Zimmerman & Risemberg, 1997) we hypothesised that: 1) students' questionnaire responses could be explained by specified factors; 2) factors were related because they measured positive and mutually supporting components of the construct; 3) those related

factors could be accounted for by three underlying higher order factors; 4) the triadic model structure was equivalent across populations.

Multi-group CFA is used to test whether the latent factor means are distinct across groups. To assess cross-cultural measurement invariance, Hair, Black, Babin, Anderson, and Tatham (2006) suggested the need to substantiate group comparisons by establishing: a) configural invariance, to examine if the basic model structure (or baseline model) is invariant across cultures; b) metric invariance, to understand if groups respond similarly to the items, and thus warranting meaningful rating scale comparisons. For the purpose of this study, results from multi-group metric invariance tests were examined to understand the extent to which relationships between latent factors and indicators in the model were equivalent across two populations - Portuguese and Brazil.

Several goodness-of-fit indices and criteria were used to assess the match between models and data. Normed chi-square (χ^2) and p values were used as preliminary evidence of fit. Because χ^2 statistic is highly sensitive to larger sample sizes, the ratio of χ^2 to its degree of freedom was calculated (χ^2/df). A value of less than 3.0 is considered as indicator of an acceptable fit between the sample data and the testing model (Kline, 2005). Model evaluation criteria included the root mean square error of approximation (RMSEA) as a measure of absolute fit, and the Comparative Fit Index (CFI) as index of incremental fit. Values of .08 or less for RMSEA, and values of .90 and above for the CFI are reflective of appropriate fit (Hair et al., 2006). These goodness-of-fit indices were considered for the current study because they are less sensitive to sample size (Teo, Lee, Chai & Wong, 2009).

Results

Exploratory Factor Analysis

Data collected for the first study were submitted to EFA. To examine the adequacy of correlation of items, correlations for all pair-wise combinations of the 49 items were computed. The resulting matrix of correlations was appropriate for factor analysis, as supported by Bartlett's test of sphericity, $\chi^2 = 5254.419$, $df = 1176$, $p = .000$, and Kaiser-

Meyer-Olkin measure of sampling adequacy, .83, which indicated that the matrix was of good quality.

A principal component analysis on the items was performed aiming to extract factors. Thirteen factors with eigenvalues greater than 1 were identified using Kaiser's criterion. Taken together, the 13 factors accounted for 61.35% of variance, which is considered good. To improve interpretation, factors were rotated to discriminate between each other. Varimax rotation was used to maximise the dispersion of loadings within factors, producing a simpler and more interpretable structure. Similar results were produced with oblique rotation (direct oblimin), and allowing factors to correlate ($\delta = 0$).

From the initial 49 items, 14 were not within the .35 factor loading limit recommended by Hair, Anderson, Tatham and Black (1998) for a sample size of 296. They also recommend a minimum acceptable size of ten observations per variable. With fifteen variables, the sample size also met this criterion. Therefore, the 14 items were removed for having the lowest factor loadings on their respective scales, and/or diverging conceptually from other scale items. The option resulted in the suppression of two strategies - goal setting and attention regulation. Following DeVellis (1991) recommendations, six out of 12 categories had respectable and very good reliabilities, Cronbach's α s = .70 to .86. Three categories had acceptable reliabilities at .60 or above. Four categories manifested a somewhat lower reliability between .50 and .56. When conducting psychological research and assessment, values below .70 can be expected due to the complexity of the constructs being measured (Kline, 1999). Moreover, and especially in an early stage of research, values as low as .50 may suffice (Nunnally, 1978). As this was an exploratory stage of the study, and because writing has been more often qualified as a particularly complex process (Berninger, 2012), the aforementioned categories were kept. Caution is advised when interpreting Cronbach's alpha values, considering they should not be used as a measure of the "unidimensionality" of a construct (Field, 2013). Because the questionnaire comprised three scales, alpha values for each scale were also computed and evaluated separately (see Table 2).

Confirmatory Factor Analysis

An EFA using Varimax rotation was performed on the new data collected, preceding CFA for cross-validation of the questionnaire's factor structure. Items assessing planning ahead and planning during writing, with less reliable Cronbach's alpha values, were submitted as assessing the same strategy, planning. The procedures developed for the analysis of the first sample were replicated, fixing to 12 the number of factors to extract. The resulting matrix of correlations was appropriate for factor analysis (Bartlett's test of sphericity, $\chi^2 = 7028.581$, $df = 528$, $p = .000$, and $KMO = .86$) suggesting that the matrix was of good quality. The 12 factors accounted for 66.62% of variance, which is considered good. From the 35 items, one item assessing the use of self-verbalising strategies showing problematic loadings was removed. All the remaining item loadings ranged from .57 to .85 on their respective factor. The final version of the questionnaire comprised 16 adapted items - seven from Kanlapan and Velasco (2009); nine from Kaplan, Lichtinger and Gorodetsky (2009) -, and 18 items developed by the research team. The reliabilities of the subscales assessed by Cronbach's alpha appear in Table 2.

Table 2. *Descriptive statistics of variables from the final version of the Instrument*

Variable	No. items	<i>M (SD)</i>	α
Environmental processes			.68
Environmental structuring	3	3.46 (1.14)	.81
Help-seeking	2	2.43 (1.16)	.69
Behavioral processes			.62
Self-monitoring	3	3.16 (1.42)	.61
Self-consequating	3	3.25 (1.02)	.69
Self-verbalizing	2	3.23 (0.91)	.65
Personal processes			.88
Time planning	3	2.84 (0.91)	.67
Self-evaluating	3	3.83 (1.01)	.65
Planning	5	3.53 (0.76)	.67
Revising	2	3.73 (1.06)	.74
Organizing	2	2.83 (1.13)	.70
Reader awareness	3	2.64 (1.15)	.79
Recalling/creating mental images	3	3.52 (1.05)	.75

A second set of analyses was performed using CFA to test the theoretical proposed triadic model for writing. Multi-group CFA was used to test whether the same factor structure hold

in both Portuguese and Brazilian samples. The final version of the questionnaire appears in the Appendix B.

Convergent and discriminant validities. Evidence provided support for the convergent validity of the three-factor model of the questionnaire. As shown in Table 3, composite reliability exceeded the recommended value of .70 (Nunnally & Bernstein, 1994). The other indicator of convergent validity is the average variance extracted (AVE), which measures the amount of variance that is captured by the construct in relation to the amount of variance due to measurement error (Fornell & Larcker, 1981). AVE estimates of the second order factors for both the overall model and the Brazilian model all exceeded the recommended .5, except for the Portuguese model estimates on environmental processes and behavioural processes, just below .5.

Table 3. *Convergent and discriminant validities*

	Overall (n = 732)			Portugal (n = 372)			Brazil (n = 360)		
	FL	CR	AVE	FL	CR	AVE	FL	CR	AVE
EP		.71	.51		.77	.49		.75	.52
Environmental structuring	.80			.78			.82		
Help-seeking	.61			.61			.61		
BP		.70	.50		.71	.49		.76	.52
Self-monitoring	.70			.74			.61		
Self-consequating	.56			.51			.93		
Self-verbalizing	.83			.81			.53		
PP		.88	.52		.88	.50		.89	.52
Time planning	.70			.64			.73		
Self-evaluating	.71			.68			.75		
Planning	.79			.80			.77		
Revising	.66			.81			.77		
Recalling	.73			.67			.71		
Organizing	.75			.65			.64		
Reader awareness	.71			.68			.66		
	Whole sample			Portugal			Brazil		
	EP	BP	PP	EP	BP	PP	EP	BP	PP
EP	.71			.70			.72		
BP	.36*	.71		.29*	.70		.49*	.72	
PP	.27*	.34*	.72	.17*	.16*	.71	.32*	.31*	.72

Note. FL = factor loadings extracted using principal component analysis with Varimax rotation; CR = composite reliability: computed by $(\sum\lambda)^2/(\sum\lambda)^2 + (\sum\delta)$. AVE = average variance extracted: computed by adding the squared factor loadings divided by the number of factors of the underlying construct. EP = environmental processes; BP = behavioral processes; PP = personal processes.

*p < .01

Discriminant validity measures the extent to which a construct is truly distinct from the others. Grounded on Fornell, Tellis, and Zinkhan (1982) recommendations, discriminant validity was considered adequate when the variance shared between one construct and other constructs in the model was less than the variance that same construct shared with its

measures. Following Teo, Lee, Chai and Wong (2009) procedures, discriminant validity was assessed by comparing the square root of the AVE for each construct with the correlations between that same construct and all others. As shown in Table 3, diagonal elements, replaced by the square roots of the AVE, were greater than the off-diagonal elements in the corresponding rows and columns. Therefore, discriminant validity seemed satisfactory for each of the three second order dimensions, suggesting that each one shared more variance with its factors than it did with the other two dimensions.

Multi-group analyses of invariance. Multi-group analyses were performed using AMOS 20.0 (Arbuckle, 2011). Maximum likelihood was used as estimation method for each analysis, and supported on a covariance matrix. Preceding measurement invariance tests, model fit for the pooled sample, and for the separate samples was tested. Parameters estimates of the structural model (Table 4) provided evidence of a good fit of the model to the data. Tests for the measurement of configural and metric invariance were computed hierarchically by nested models, using distinct model fit indices.

Table 4. *Parameters estimates of the first-order structural model*

Parameters	Portugal	Brazil
Environmental processes → Environmental structuring	.587 (.663)	.789 (.820)
Environmental processes → Help-seeking	.467 (.392)	.209 (.268)
Behavioral processes → Self-monitoring	.901 (.719)	.735 (.756)
Behavioral processes → Self-consequating	.462 (.326)	.345 (.369)
Behavioral processes → Self-verbalizing	.913 (.738)	.850 (.854)
Personal processes → Time planning	.867 (.656)	.765 (.733)
Personal processes → Self-evaluating	.789 (.667)	.790 (.745)
Personal processes → Planning	.801 (.783)	.791 (.771)
Personal processes → Revising	.618 (.765)	.578 (.744)
Personal processes → Organizing	.651 (.655)	.652 (.639)
Personal processes → Reader awareness	.466 (.580)	.599 (.613)
Personal processes → Recalling/creating images	.592 (.666)	.811 (.714)

Note. Values in parentheses are standardized estimates.

The first step to evaluate multi-group measurement invariance was to establish a baseline model to test all the hypothetical relationships in the proposed triadic model. Making use of the entire pooled sample - Portuguese and Brazilian samples - this configural model was evaluated based on different goodness of fit indices. As shown in Table 5, the model offered an acceptable fit to the data. Achieved configural invariance, goodness of fit

indices suggested that the pattern of fixed and non-fixed parameters in the theoretical model was similar for Portuguese and Brazilian samples. Table 6 shows the parameters estimates of the second-order structural model for both samples.

Table 5. *Fits indices for invariance tests*

Test	χ^2	df	χ^2/df	p	CFI	RMSEA
Pool sample model	1,096.234	511	2.145	.000	.91	.040
Portuguese sample	948.452	511	1.856	.000	.89	.048
Brazilian sample	738.902	511	1.446	.000	.93	.035
Configural invariance (Model 1)	1,687.347	1,022	1.651	.000	.90	.030
Full metric invariance (Model 2)	1,712.176	1,042	1.643	.000	.90	.030

Note. CFI = comparative fit index; RMSEA = root mean square error of approximation.

Table 6. *Correlation estimates of the second-order structural model*

Parameters	Portugal	Brazil
Environmental processes ↔ Behavioral processes	.945 (.385)	.691 (.536)
Environmental processes ↔ Personal processes	.756 (.175)	.615 (.323)
Behavioral processes ↔ Personal processes	.906 (.225)	.932 (.322)

Note. Values in parentheses are covariance estimates.

To test for metric invariance, the factor pattern coefficients were constrained to be equal between groups. For nested model comparison, a likelihood ratio χ^2 test was performed to see if the constrained model was not significantly better. The χ^2 difference of 24.835 with twenty degrees of freedom was not statistically significant at $\alpha = .208$. Having established full metric invariance, construct equivalence across samples was corroborated. As suggested (DiStefano & Hess, 2005), RMSEA and CFI values were also interpreted, and full metric invariance across samples was supported.

Discussion

Interpretation of Results

Based on Zimmerman and Risemberg (1997) model of self-regulated writing, this study examined the validity of an instrument to assess ninth-grade students' reported use of self-regulated strategies for writing. We predicted that students responses would be explained by specific factors, 12 (Hypothesis 1), and that those factors would be related because they measured supporting components (Hypothesis 2). Exploratory and confirmatory factor analyses provided support for both hypotheses. The scales were positively related, indicating mutually supporting components.

Following the proposed triadic system of self-regulatory processes, we also predicted that the 12 variables could be accounted for by three underlying higher order variables (Hypothesis 3). Emphasising the interdependent nature of the relations between environmental, behavioural, and personal processes of self-regulated writing, Zimmerman and Risemberg claimed that proficient writers attempted to use those three processes in conjunction with each other while composing (1997). Current findings seem to corroborate the interactive quality of self-regulated writing, manifested by the strong correlation found between the three high-order factors.

Finally, we hypothesized that the structural model was equivalent across cultures, (Hypothesis 4). The full configural and metric invariance obtained indicated that factor loadings in the measurement part in each cultural group were similar. As explained by Dimitrov (2010), once metric invariance is established the same trait is measured in the same way for different populations.

Limitations

This study has several limitations. First, current findings and interpretations are restricted to the strategies here considered as indicators of self-regulated writing. Other strategies have been identified in the literature which should be assessed (Harris, Santangelo & Graham, 2010). Second, goal-setting and attention-regulation strategies, suppressed by low factor loadings, should also be examined in future research.

Capturing a full view of self-regulated writing is perhaps a quest doomed to consider a wide range of goals that can be measured in different ways. The questionnaire here presented may serve as one of such instruments, along with more complex measures as interviews, and observation of performance.

Educational Implications

As in different educational contexts, data collected nationwide regarding the academic achievement of Portuguese and Brazilian students suggested writing difficulties across multiple subject areas (Malpique & Veiga Simão, 2012). Few studies, however, have investigated self-regulated writing having Portuguese as language of instruction (Limpo &

Alves, 2013a, 2013b), which substantiates the need to develop empirical research to support educational practices of teachers and practitioners.

This research provides evidence of a valid second-order triadic factorial structure of the questionnaire that can be applied to ninth-grade students from different educational contexts. By testing the measurement invariance across two culturally-different samples, this study contributes to the understanding of the relative efficacy of environmental, behavioural, and personal processes as predictors of students' use of distinct self-regulated strategies for writing.

The instrument may be a valid tool to be used by teachers and practitioners to assess students' reported use of a number of different strategies to initiate and control writing. It may serve for initial measurement of the frequency with which the students from a particular school context or class use the strategies. It might also be interesting to use the questionnaire for between-groups, or pre-post intervention studies to measure differences achieved and sustained. Moreover, it might be used in longitudinal studies in conjunction with other qualitative methods aiming to examine which strategies become more or less important for students. By following a social contextual perspective of self-regulated writing, the questionnaire here presented may grant a more comprehensive if yet exploratory assessment of multidimensional strategies used to self-regulate school writing tasks.

CHAPTER II

Self-Regulated Strategies for School Writing Tasks:

A Cross-Cultural Report

Self-Regulated Strategies for School Writing Tasks:**A Cross-Cultural Report****Abstract**

The authors investigated cross-cultural differences in ninth-grade students' reported use of self-regulated strategies for writing. A theoretically driven second-order model was used to assess 12 self-regulated strategies for writing tapping environmental, behavioural, and personal self-regulated processes. Seven hundred and thirty two Portuguese and Brazilian students in transition to high-school ($M_{age} = 14.3$; 372 male and 306 female) from mainstream urban schools reported on their use of the strategies. Statistical analyses included a multivariate analysis of variance (MANOVA) with 12 dependent variables (self-regulated strategies for writing), and 2 between-subjects variables (country and gender). There were significant main effects for country with medium effect sizes, and statistically significant and small effect sizes for gender main effects. All-male and all-female comparisons indicated significant differences and medium effect sizes within gender groups. The majority of the differences were found assessing personal self-regulated strategies. Taken together, these findings suggest that initiating and controlling writing might be a culturally and contextualised bounded process.

Keywords: self-regulation, writing, strategies, cross-cultural, triadic model

Introduction

Becoming an expert writer is a developmental process, which requires high levels of personal regulation and strategic behaviour (Bereiter & Scardamalia, 1987; Zimmerman & Risemberg, 1997). Strategic processing is a demand for developing proficiency in any field of study (Alexander, Graham & Harris, 1998), and fundamental in a highly complex system of correlated processes as in text composing. A good strategy user is a student who identifies the most suitable strategies to use for a particular task and purpose; knows how to apply those strategies more effectively; and recognises the time and place to use them (Weinstein, Husman & Dierking, 2000).

Zimmerman and Risemberg (1997) proposed a socio-cognitive model of self-regulated writing, which has been considered a theoretical guideline to understand how writing development occurs. Defining self-regulated writing as a complex system of interdependent processes interacting reciprocally, the authors proposed a triadic model comprising 10 forms of self-regulated writing.

Theoretically driven by Zimmerman and Risemberg's model, the current research aims to contribute to extend knowledge on writing development by exploring contextual and cross-cultural variations in students' use of self-regulated strategies for school writing tasks. This exploratory research was designed to identify and compare environmental, behavioural, and personal strategies, which students reported using having officially the same language of instruction- Portuguese- but operating in different educational contexts - Portugal and Brazil.

Social-Cognitive Perspective of Self-Regulated Writing

Cognitive research developed during the 1980's has served as grounds for the current conception of writing as a process. Hayes and Flower's (1980) first formal cognitive model of writing, and Bereiter and Scardamalia's (1987) proposed model explaining the differences between novice and expert writers in text production, have been a major contribution to current understanding of what is writing and how it is developed. While these cognitive models described writing as mainly an individual process of thinking and meaning

transforming, others defended the importance that social cognitive and contextual variables may have in the writing process (Nystrand, 2006; Schultz & Fecho, 2000). Such perspective found support in two main assumptions: a) writing is often a solitary cognitive act of producing meaning, framed in the individual writer's imagination, knowledge and experiences (Berninger, 2012); b) writing is an act of communication between a writer, and an audience within a larger linguistic and socio-cultural context (Nystrand, 2006).

Zimmerman and Risemberg (1997) presented a social cognitive model for text composing, describing writing as a process depending on high levels of personal regulation. Defining self-regulated writing as 'self-initiated thoughts, feelings, and actions that writers use to attain various literacy goals' (p.76), the authors purposed 10 forms of self-regulated writing, which fall under three major processes of self-regulatory influence.

The model introduced self-regulated writing as a complex system of interdependent processes interacting reciprocally. Grounded on Bandura's social cognitive theory (1986), three major factors were proposed to explain how writers act to deliberate initiate and control their writing. Environmental processes, said to reflect arrangements made by the writers to structure physical and social settings to optimize writing; behavioural processes, referring to writers' use of overt motoric performance strategies for writing; finally, personal processes, described as writers' regulation of personal (covert) cognitive beliefs, and affective states associated with text composing. Describing self-regulation as more than a trait or ability one possesses, the authors suggested these three major forms of self-regulation interact during writing through a cyclic feedback loop. In the process, writers self-monitor the effectiveness of specific self-regulatory strategies and self-react, selecting either to continue using their strategies or to change using them if strategies are found to be ineffective. Proficient self-regulated writers are said to use all three major processes of self-regulation concurrently (Zimmerman & Risemberg, 1997).

Using Self-Regulated Strategies for Writing

Expressing and articulating complex ideas accurately in a number of different writing tasks, for different curriculum purposes, are requirements for the academic success of

secondary school students (grades 7-12). Thus, understanding how these students manage to self-regulate their writing process becomes vital, in particular to identify the strategies they select for such purpose (Graham & Harris, 2000). Research suggested skilled writers use a variety of strategies to regulate their actions: from general cognitive and metacognitive strategies, such as goal setting and planning, self-monitoring, organizing, self-evaluating and revising; to more contextual and behavioural strategies such as environmental structuring, self-selecting models, and seeking social assistance (Harris, Santangelo & Graham, 2010).

Despite the few studies examining students' use of self-regulated strategies having Portuguese as language of instruction, research (Limpo & Alves, 2013a) found middle-school students (Grades 7- 9) use planning strategies for story and opinion essay writings, but hardly included revision strategies in both texts' generation. Analysing students' discourse about writing, Barbeiro (2011) found sixth-grade students described using more frequently planning, revising, and editing strategies than younger students. Students failed to consider fitting writing to a potential reader, confirming research reporting younger students' reliance on a knowledge-telling approach for text composing (Bereiter & Scardamalia, 1987).

The Role of Context

There is extensive research on social and contextual influences in writing performance (see Prior, 2006 for a review). Schultz and Fecho (2000) seminal review discussing writing development as a social and contextual situated process highlighted the difficulties of establishing causal relations when examining writing from a multidimensional perspective. Reflecting on the importance of writing research and future needs, Miller and McCardle (2011) stressed the urgency of cross-cultural research to examine similarities and differences between writing across languages and across socio-cultural settings.

Research regarding students' use of self-regulated strategies for writing is scarce, particularly viewed from a social-contextual lens. Kaplan, Lichtinger, and Gorodetsky (2009) tested the hypothesis that self-regulated writing may vary in different educational contexts depending on the particular task engagement, and social goals shared in a learning environment. The authors compared 211 ninth-grade Israeli Jewish students enrolled in two

different educational environments: Traditional, in which content acquisition and evaluation were prioritised, and authentic, where learning was problem based, and students explored real life situations. After completing a writing assignment, participants were asked to answer a survey about their engagement in that specific writing task. Measuring students' achievement goal orientations, self-efficacy, and several self-regulated strategies for writing, their findings suggested that contextual characteristics of learning environments might make the use of certain strategies more relevant for students' pursuit of distinct mastery and performance goals. Considering self-regulated writing a multidimensional construct, the authors suggested, 'writing may mean something different in different learning environments' (p. 64).

Gender Diversity

Evidence of gender differences in text quality was found in national writing proficiency assessments across grades, reporting a pattern of female advantage (Gelati, 2012). Findings support girls as more able to produce texts with higher overall writing quality (Engelhand, Walker, Gordon & Gabrielson, 1994); to produce more coherent and organised texts (Swanson & Berninger, 1996); to have faster handwriting (McCutchen, 1995); and to be more motivated, presenting higher self-efficacy beliefs about successful outcomes (Graham, Berninger & Weihua, 2007; Pajares, Miller & Johnson, 1999).

Nevertheless, research has also shown conflicting findings on gender as predictor of writing quality. When controlling for other variables as compositional fluency (Berninger, Whitaker, Feng, Swanson & Abbott, 1996) results provided non-significant or mixed gender differences in text composing (Pajares, Miller & Johnson, 1999). Moreover, researchers have placed focus on gender identities shaping, and being shaped by different cultural and social practices (Jones, 2007, 2011). Focusing on what and how students write, markers of gender identities in writing have found evidence of boys' preference to write about fiction and sports, avoiding girls' favourite romance topics as a way to perform their masculine identity (Blake, 1995; Peterson, 2002). Analysing gender differences in writing from different

traditions and scopes has supported the need to find ways to represent gender diversity in writing (Jones, 2011).

The Present Study

From different educational contexts, authors share similar concerns regarding the writing difficulties of a growing number of school-aged children (Berninger, 2012; Myhill & Fisher, 2010). In Portugal, data collected nationwide on secondary students' academic achievement suggested writing difficulties across multiple subject areas (Malpique & Veiga Simão, 2012; Sousa, Ferreira, Romão, Pereira & Lourenço, 2013). In Brazil, studies reported similar findings discussing students writing problems across grade levels (Cunha & Santos, 2006). There is very little in the literature, however, that considers how students regulate the composing process having Portuguese as language of instruction (Barbeiro, 2011; Limpo & Alves, 2013a), which substantiates the need to develop empirical research to support educational practices.

The current research is part of a larger project aiming to evaluate the effectiveness of an intervention program to improve ninth-grade Portuguese students' writing achievement. The present exploratory research was developed to gain insights into the role contextual and cultural variables may play in students' use of different self-regulated strategies for writing.

Cross-cultural comparisons were grounded on Triandis (1995) definition of cultural contexts, as attributes of cognitive structures and cultural knowledge, which groups and peoples share. These 'attributes' are organised into unique patterns of beliefs, attitudes, norms, and values, becoming part of peoples' identity.

Specific research questions are presented next.

Research Question 1. The first research question addressed in the present study was, Do ninth-grade students from different cultural and educational contexts report using different strategies to initiate and control their school writing tasks? We predicted differences in the examined self-regulated strategies for writing between Portuguese and Brazilian students. Despite the limited research investigating self-regulated writing from a contextual perspective, research previously reviewed here suggested students might use different

strategies to initiate and control the writing process in different educational contexts (Kaplan, Lichtinger & Gorodetsky, 2009). Because a triadic measure was chosen to assess students' strategy use, a subsequent aim of the present study was to investigate whether such differences would tap environmental, behavioural, and personal strategies for writing. However, given the lack of cross-cultural studies examining these specific variations, we did not make any further predictions regarding this question.

Research Question 2. As noted earlier when reviewing research on gender differences in writing, a pattern of female advantages was considered in several variables measuring writing performance and quality. Therefore, we asked: What gender differences can be found in students' use of self-regulated strategies for writing? We predicted differences favouring girls in the reported use of a considerable number of the self-regulated strategies examined. Nevertheless, given the exploratory nature of the current study, and the lack of similar studies using a triadic measure to compare students' self-regulated strategy use for text composing, we could not anticipate in which of the three major process of self-regulated writing (e.g. environmental, behavioural, and personal) such differences would occur.

Research Question 3. The final question addressed was, Does gender intersect with cultural contexts in the process of initiating and controlling school writing talks? Besides investigating gender differences in self-regulated strategy use, a third aim of the current study was to investigate single-sex differences in the reported use of the 12 strategies. This option steamed from previously literature reviewed here (Jones, 2011) suggesting the importance of exploring single-sex cohorts to examine diversity within the categories male and female. This was an important question, but we did not make a prediction, as insufficient research exists related to this question

Method

Participants and Settings

Students in transition to high school ($M_{age} = 14.3$ years, $SD = 0.9$, age range 12 - 17) from five schools in Portugal and twelve schools in Brazil were used as participants for this study ($N = 732$). The Portuguese participants (Grade 9, $N = 372$, $M_{age} = 14.5$ years, $SD =$

0.8, age range 13 - 17; 165 male and 207 female) came from mainstream state schools, part of four public clusters in the Lisbon metropolitan area. Following a provision policy grounded in a social model, typical classes include students with different educational needs, and thus writing achievement of individual students varies considerably. Writing is systematically used as a learning and assessment tool across all subject areas. In the last two decades, and following the shift from product to process writing, statutory frameworks have been set to offer guidelines related to the teaching of writing in schools. However, middle school (year 7 to year 9) and secondary school (year 10 to year 12) curricular guidance for writing is restricted to Portuguese and Second Language learning classes. Students are tested frequently and receive numeric grades on their writing assignments throughout a school year, and on national exams (end of year 4, 6, 9, and 12). The population that the schools serve is predominantly white, urban, and middle class.

The Brazilian participants (Grade 9, $N = 360$, $M_{age} = 14.2$ years, $SD = 1.0$, age range 12-17; 158 male and 202 female) were a similar cohort of students from mainstream state urban schools, part of four public clusters in the South Region of Brazil. Since 2006, the length of compulsory education has been established for nine years, applied to children aged six. From the late 90's, national curriculum guidelines have set standards for the teaching of writing following a process-oriented approach. Achievement goals for writing are restricted to Portuguese language classes, in which teaching guidelines are provided on how planning, translating, and revising, can be taught. National standardised tests are administered to students in Grades 5, 9, and 12. The population of the schools involved is predominantly white, urban, and middle class.

The countries were compared on the schools average grades in language arts national exams (year 9 in both educational systems). General achievement scores of the Portuguese schools involved was $M = 2.96$ ($SD = .20$), results ranging from 2.7 to 3.2. Average scores of the Brazilian schools involved was $M = 2.99$ ($SD = .28$), ranging from 2.8 to 3.4. The average scores for the two countries did not differ statistically, $p = .67$.

Procedure

A questionnaire was administered to intact classes by the first researcher to students in Portuguese schools, and by the research colleague from the partner university to students in Brazilian schools. A team of linguists checked, and reviewed the items to control for EP and BP variations. The instrument was administered at the beginning of the school year in both countries (September/October in Portugal, and February/March in Brazil). Parents and carers' consent was obtained. Researchers explained the project to heads of schools and teachers, and informed students, verbally and in written form, that they were participating in a survey about the strategies they use in school writing tasks. Before completing the questionnaire, researchers read and explained instructions. Students were asked to report the frequency with which they used the strategies described when facing writing tasks in different subjects across the curriculum. Mean completion time was 15 minutes.

Instrument

Given the limited number of instruments measuring the use of self-regulated strategies for writing (Kanlapan & Velasco, 2009; Kaplan, Lichtinger & Gorodetsky, 2009), and their lack in the context of writing in Portuguese, a self-report instrument was designed and validated by Malpique and Veiga Simão (2013; in press) to assess twelve self-regulated strategies for writing. Following Zimmerman and Risemberg (1997) social cognitive model for writing, the questionnaire comprised items grouped on the 10 proposed subscales, measuring the three major categories of self-regulatory influence. The construction of the instrument involved exploratory and confirmatory analyses of the triadic factor structure. In the final version of the instrument, the first major category - environmental processes- included environmental structuring and help-seeking strategies; the second - behavioural processes - included self-monitoring, self-consequating, and self-verbalising strategies; the last category - personal processes - included strategies on time planning, self-evaluating, recalling/creating mental images, and four primarily cognitive strategies, namely planning, revising, organising, and reader's awareness.

Table 7 presents the descriptive statistics and the reliability of the variables in the study. The final version of the instrument included 34 items assessing 12 self-regulated strategies for writing. Response options followed a five point Likert-scale, from 1 = *Very Rarely* to 5 = *Very Frequently*. Analyses showed reasonably good reliability indices for each of the subscales, especially for Personal Processes, $\alpha = .88$. Except for Behavioural Processes, with only one measure, $\alpha = .61$, all measures had internal consistency Cronbach's alphas at .65 or above. As the purpose of this study was to identify more generally the students' reported use of self-regulated strategies for writing, and if cultural context influences may make certain strategies more or less relevant for students, we decided to include the aforementioned measure in the analyses. Conclusions concerning the findings related to that strategy should be taken with caution.

Table 7. *Descriptive statistics of variables in the study*

Variable	No. items	<i>M (SD)</i>	α
Environmental Processes			.68
Environmental structuring	3	3.46 (1.14)	.81
Help-seeking	2	2.43 (1.16)	.69
Behavioural Processes			.62
Self-monitoring	3	3.16 (1.42)	.61
Self-consequating	3	3.25 (1.02)	.69
Self-verbalising	2	3.23 (.91)	.65
Personal Processes			.88
Time planning	3	2.84 (.91)	.67
Self-evaluating	3	3.83 (1.01)	.65
Planning	5	3.53 (.76)	.67
Revising	2	3.73 (1.06)	.74
Organising	2	2.83 (1.13)	.70
Reader's awareness	3	2.64 (1.15)	.79
Recalling/creating mental images	3	3.52 (1.05)	.75

In most cross-cultural studies of SRL not much attention has been given to multi-group invariance analysis to ensure cross-cultural validity of the developed instrument (McInerney, 2011), which may substantiate meaningful comparisons between cultural groups. For that purpose, multi-group invariance tests were performed, with results suggesting that the 34 items measures of the questionnaire may be robust across the examined cultures, $\chi^2 (1042) = 1712.176$, $p < .05$, $\chi^2/df = 1.643$, comparative fit index = .90, root mean square error of approximation = .030.

Results

To investigate the relationship between self-regulated strategies for writing, cultural groups and gender, two-way multivariate analysis of variance (MANOVA) - 2 (group: Portuguese and Brazilian) x 2 (group: Male and Female) – was computed with the 12 strategies serving as dependent variables. Results indicated a significant multivariate main effect for country, $F(12,717) = 12.81, p = .000$; Wilk's lambda = .82, $\eta_p^2 = .17$, and for gender, $F(12,717) = 7.62, p = .000$; Wilk's lambda = .89, $\eta_p^2 = .11$. The interaction effect was not statistically significant.

Given the significance of the main effect for cultural groups, univariate main effects were examined to investigate differences between countries in the reported use of the 12 strategies. Tests of the 12 a priori hypotheses were conducted using Bonferroni adjusted alpha levels of .002 per test (.05/24). Table 8 shows mean strategy scores for cultural groups. The results indicated that the two groups differed significantly in the reported use of six of the 12 self-regulated strategies. Portuguese students scored significantly higher on self-monitoring, $F(1, 728) = 9.639, p = .002, d = 0.22$; time planning, $F(1, 728) = 52.903, p = .000, d = 0.53$; planning, $F(1, 728) = 15.102, p = .000, d = 0.25$; organising, $F(1, 728) = 84.923, p = .000, d = 0.68$; reader's awareness, $F(1, 728) = 9.138, p = .002, d = 0.24$; and recalling/creating mental images, $F(1, 728) = 36.296, p = .000, d = 0.44$.

Table 8. Means (and standard deviations) results for strategy scores for country and gender

	Strategy score			
	Country		Gender	
	Portuguese (n = 372)	Brazilian (n = 360)	Male (n= 323)	Female (n= 409)
Environmental Processes				
Environmental structuring	3.55 (1.05)	3.38 (1.23)	3.32 (1.20)	3.58 (1.08)
Help-seeking	2.40 (1.11)	2.47 (1.22)	2.39 (1.20)	2.47 (1.14)
Behavioural Processes				
Self-monitoring	3.32 (1.40) ^a	3.00 (1.43) ^a	3.05 (1.37)	3.26 (1.46)
Self-consequating	3.29 (.99)	3.22 (1.06)	3.33 (1.00)	3.20 (1.04)
Self-verbalising	3.44 (.77)	3.36 (.97)	3.31 (.89)	3.47 (.87)
Personal Processes				
Time planning	3.07 (.88) ^a	2.60 (.89) ^a	2.70 (.91) ^b	2.96 (.90) ^b
Self-evaluating	3.84 (.85)	3.83 (1.16)	3.64 (1.13) ^b	3.99 (.88) ^b
Planning	3.62 (.65) ^a	3.43 (.85) ^a	3.35 (.76) ^b	3.67 (.73) ^b
Revising	3.72 (.96)	3.76 (1.17)	3.43 (1.14) ^b	3.98 (.93) ^b
Organising	3.19 (1.02) ^a	2.46 (1.12) ^a	2.68 (1.07) ^b	2.96 (1.16) ^b
Reader's awareness	2.77 (1.11) ^a	2.50 (1.17) ^a	2.49 (1.11) ^b	2.76 (1.16) ^b
Recalling/creating images	3.75 (.96) ^a	3.30 (1.09) ^a	3.23 (1.07) ^b	3.75 (.98) ^b

Note: Coefficients in the same row that share a superscript are significantly different from each other. Coefficients without superscript letters are not significantly different from the other coefficients.

These results indicated that except for self-monitoring strategies, all significant differences were found on strategies under the personal processes scale. Both groups of students stated using more frequently self-evaluating, planning, and revising strategies. Mean scores for help-seeking and readers' awareness strategies were low for both groups, and time planning and organising got low scores for the Brazilian students.

Given the significance of the main effect for gender, univariate main effects were examined. Tests of the 12 a priori hypotheses were investigated using Bonferroni adjusted alpha levels of .002 per test (.05/24). Significant statistical differences were found between the two groups in eight out of the 12 strategies, namely one strategy tapping behavioural processes, and under all seven strategies tapping personal processes, overall favouring female students. Effect size values for all the differences found between gender groups were small, $d < 0.20$ (see Table 8).

Pairwise comparisons were computed to examine differences within gender groups - all-male students (Portuguese and Brazilian male) and all-female students (Portuguese and Brazilian female) - on the 12 self-regulated strategies under assessment. Table 9 shows mean strategy scores for all-male and all-female groups. Bonferroni adjusted alpha levels of .001 per test (.05/48) were used to control the overall Type I error rate. Statistically significant differences were found within male groups in five strategies tapping behavioural and personal processes. Overall, Portuguese male students scored significantly higher on self-monitoring, $F(1, 728) = 5.851, p = .001, d = 0.28$; time planning, $F(1, 728) = 23.733, p = .000, d = 0.42$; planning, $F(1, 728) = 12.487, p = .000, d = 0.36$; organising, $F(1, 728) = 37.649, p = .000, d = 0.73$; and recalling/creating mental images, $F(1, 321) = 11.290, p = .000, d = 0.28$. The groups stated using more frequently self-evaluating, environmental structuring, planning, and revising strategies. Help-seeking, readers' awareness, and time planning strategies were the least consistently reported strategies. Brazilian male adolescents also reported using less frequently self-monitoring and organising strategies.

Table 9. Means (and Standard Deviations) Results for Strategy Scores for All-Male and All-Female Groups

	Strategy score			
	All-Male Groups		All-Female Groups	
	Portuguese (<i>n</i> = 165)	Brazilian (<i>n</i> = 158)	Portuguese (<i>n</i> = 207)	Brazilian (<i>n</i> = 202)
Environmental Processes				
Environmental structuring	3.38 (1.10)	3.26 (1.30)	3.68 (.99)	3.47 (1.16)
Help-seeking	2.43 (1.18)	2.35 (1.22)	2.38 (1.05)	2.57 (1.21)
Behavioural Processes				
Self-monitoring	3.23 (1.40) ^a	2.85 (1.32) ^a	3.39 (1.40)	3.12 (1.51)
Self-consequating	3.43 (.99)	3.22 (.99)	3.17 (.98)	3.22 (1.11)
Self-verbalising	3.33 (.73)	3.29 (1.02)	3.52 (.80)	3.42 (.93)
Personal Processes				
Time planning	2.93 (.85) ^a	2.45 (.90) ^a	3.19 (.88) ^b	2.72 (.86) ^b
Self-evaluating	3.62 (.85)	3.66 (1.38)	4.02 (.81)	3.95 (.95)
Planning	3.48 (.65) ^a	3.21 (.83) ^a	3.74 (.62)	3.60 (.83)
Revising	3.42 (1.00)	3.44 (1.27)	3.96 (.85)	4.01 (1.01)
Organising	3.03 (.99) ^a	2.30 (1.02) ^a	3.32 (1.02) ^b	2.59 (1.18) ^b
Reader's awareness	2.56 (1.07)	2.42 (1.16)	2.94 (1.12) ^b	2.57 (1.18) ^b
Recalling/creating images	3.43 (.97) ^a	3.04 (1.12) ^a	4.00 (.87) ^b	3.50 (1.03) ^b

Note: Coefficients in the same row that share a superscript are significantly different from each other. Coefficients without superscript letters are not significantly different from the other coefficients.

All-female comparisons revealed significant differences in four strategies tapping personal processes. Overall, Portuguese female students scored significantly higher time planning, $F(1, 728) = 29.895$, $p = .000$, $d = 0.54$; organising, $F(1, 728) = 28.559$, $p = .000$, $d = 0.66$; reader's awareness, $F(1, 728) = 10.751$, $p = .001$, $d = 0.32$; and recalling/creating mental images, $F(1, 728) = 25.803$, $p = .000$, $d = 0.52$. Within female groups, self-evaluating, planning, and revising were the three most consistently referred strategies. Similar to results comparing all-male groups, female groups reported using less frequently help-seeking and reader's awareness strategies.

Discussion

In the present exploratory study, we investigated ninth-grade students' responses regarding how they initiate and control their school writing tasks in distinct cultural and educational contexts. We also addressed between and within gender differences among students' responses. Based on the research questions posed in the introduction, interpretation of results are presented below.

Question 1: Do ninth-grade students from different cultural and educational contexts report using different strategies to initiate and control their school writing tasks?

Statistically significant differences were found between Portuguese and Brazilian students on six out of the 12 assessed self-regulated strategies for writing. Results support research on the role context variables may play in students' use of strategies for text organisation (Kaplan, Lichtinger & Gorodetsky, 2009). Meaningful differences were found between Portuguese and Brazilian students on strategies to plan their school writings. These results are in line with research suggesting older Portuguese students use planning strategies for text composing (Barbeiro, 2011; Limpo & Alves, 2013a). However, in the current study 58% of the students stated seldom making a written plan of their ideas before writing. This option might be associated with the difficulties students seem to have managing time for writing (Graham & Harris, 2000), which was one of the strategies reported less frequently by both groups. These results highlight the role culture and context may play in self-regulated writing, signing that a more sophisticated question than 'Do students plan?' might be to ask 'When, where, why, and how do students plan?'.

There is not, however, unequivocal interpretations of these findings, especially when examined from a social contextual perspective (Schultz & Fecho, 2000; Zimmerman & Risemberg, 1997). The cross-cultural variations presented in this exploratory study impose considering multiple variables that could have either by themselves or in combination affect findings. Alternative explanations for these findings include differences in school sizes, demographic and socioeconomic differences, to name a few. Results may also reflect differences between educational systems, which uphold similar policies for teaching writing but may have distinct practices for the development of self-regulated strategies for writing in particular. However, as learning to write is 'acquired through culturally specific, formal and informal systems of pedagogy' (Luke, 1988, p.17), such differences might reinforce the idea that self-regulated writing is a cultural and contextual bounded process.

Cross-cultural comparisons indicated variations in the use of the examined self-regulated strategies, but they simultaneously draw attention to several marked similarities.

Findings from the present study suggested ninth-grade students are overall reluctant to seek assistance for writing, and to use strategies to fit writing to potential readers. These last results may support cognitive developmental theories of learning to manage the composing process throughout the lifespan (Bereiter & Scardamalia, 1987; Kellogg, 2008). According to Kellogg (2008), fitting writing to a possible reader is a particular complex task, especially during earlier stages of writing development. The author suggested that by the age of 14 - our participants' mean age - to 16 years, and having spent about ten years of learning how to manage the composing process, adolescents enter an intermediate stage of their writing development of knowledge-transforming. At this stage, the writer might still have too unstable reader representations to be kept on working memory, which impose serious difficulties on the coordination of author, text, and reader representations while composing.

Question 2: What gender differences can be found in the reported use of self-regulated strategies for writing?

Findings provided evidence of differences between gender groups in the reported use of several self-regulated strategies for writing. For these comparisons, gender was used as a variable to divide our sample into two groups of male and female participants, with a data set stratified for age, gender, and country. Although results seemed to confirm expectations regarding girls' more frequent use of these strategies than boys, small effect sizes were found supporting differences between genders. Of interest, findings also seem to suggest that gender differences may not occur in strategies tapping environmental or behavioural processes of self-regulated writing. Female students seemed to report using more consistently all seven personal strategies to initiate and control their school writing tasks than male students.

Research has provided support for the association between specific characteristics of students, and the tendency to report accurately, including students' gender (Pajares, 2002). Examining gender differences in the use of self-regulated learning strategies, researchers typically report results favouring female students (Peterson, 2002; Zimmerman & Martinez-Pons, 1988). However, gender differences may result of other factors such as stereotypical

beliefs students hold about gender, gender tendencies to respond with a distinct frame of mind, and sociocultural and/or educational influences (for a review, see Pajares, 2002).

Question 3: Does gender intersect with cultural contexts in the process of initiating and controlling school writing talks?

Over the last few years, research on gender and educational achievement in general (Hadjar, Krolak-Schwerdt, Priem & Glock, 2014; Lahelma, 2014), and on gender and writing in particular (Jones, 2007, 2011) have undergone a paradigm shift by emphasising the need to consider gender as, rather than a fixed individual variable, a complex and diverse category. A contribution of the current study results from the option of examining gender diversity through a cultural lens. For that, this study attempted to explore single-sex differences in the examined self-regulated strategies for writing.

Results reinforced the idea that cultural contexts may play a role in how students initiate and control their school writing tasks. Restricting data analysis to between gender groups' differences could have led to deceitful interpretations concerning the use of two strategies. First, despite gender differences apparently favouring female adolescents in the use of self-monitoring strategies, data provided evidence of male students positive response to the use of these strategies (mean score greater than 3.0). Nevertheless, all-male group comparisons allowed for a different interpretation of results. Significant differences between Portuguese and Brazilian male groups showed that last group may use less frequently self-monitoring strategies (mean score below 3.0). Second, another possible misleading interpretation of results concerns time-planning strategies, which were found negative for male and female groups, despite the significant differences favouring females. When comparing all-female responses, results supported the idea that Portuguese females, unlike their counterparts, might use with some consistency strategies to manage time for writing. Significant differences found within groups seem to provide an initial evidence of how gender may intersect with context and culture in self-regulated writing, reinforcing the complexity involved in assessing writing development and self-regulation in context.

Assessing self-regulated strategies for writing from a social cognitive perspective

These results impose further discussion on the apparently tangled process of assessing the use of self-regulated strategies for writing, especially when taking a social cognitive perspective. Regarding the three major processes of self-regulated writing, predictably similar to results from cross-cultural differences, differences within male and female groups were found on strategies measuring behavioural processes - self-monitoring (within male only) -, and personal processes - time planning, organising, planning (within male only), reader's awareness (within female only), and recalling/creating mental images for text composing. No differences within genders were found in strategies tapping environmental processes.

These findings may be accounted for at least three reasons. The most straightforward reason might be related to the number of strategies included in each process, which is confined to two strategies assessing environmental processes. A second possibility is that the self-report instrument developed for this study, which is limited to a specific moment in time of students' report, cannot provide evidence of the triadic reciprocal interaction involved in the process of self-regulated writing. Attempts to understand which variables cause a continued use of the writing strategies or change may require, indeed, more complex measures, especially considering the enactive feedback loop, which is suggested to trigger interaction between the processes (Zimmerman & Risemberg, 1997). Another possibility is that some strategies may vary less. Depending either on historical and culturally accepted conventions - such as finding a quiet room to write - , or learning development stages - such as adolescents' willingness to seek help -, environmental strategies might be a more stable category in the process of self-regulated writing. However, personal processes, the category in which most significant differences were found, may be a less stable category, and more vulnerable to contextual and cultural variables.

Limitations and Future Research

The above interpretations should be determined by the fact that they result of an exploratory study aiming to gain insights on the role context and culture may play in

students' strategic decision making to initiate and control school writing tasks. Moreover, being limited to students reported use of the strategies, conclusion regarding their actual use in either Portuguese or Brazilian contexts cannot be made. Surveys and inventories have been one common method for assessing self-regulation and strategy use in different domains (Meijer et al., 2013; Wolters, Benzón & Arroyo-Giner, 2011). These instruments allow researchers to collect large number of data about particular constructs with lower costs in terms of expenses and time. More importantly, self-report instruments may be a key advantage when considering a construct like self-regulated writing from a triadic social contextual perspective, as that of the current research, which incorporates a large number of different types of strategies. Nonetheless, findings from the current study must be supported by subsequent research, which may use the self-report questionnaire here developed for initial measurement of students' use of self-regulated strategies for writing in a particular educational context, along with more complex assessment measures as structured interviews, and observation of writing performance. Furthermore, researchers should investigate whether these findings can be generalised across students with different characteristics, and with different languages of instruction.

This research did not investigate students' use of self-regulated strategies for writing in relation to their writing achievement. Previous research with American students examining secondary school students (year 7 to year 12) use of self-regulated strategies for writing have found that high-achieving writers make greater use of certain strategies. In particular, these students have demonstrated a greater reliance on planning, revising, organising, and help-seeking strategies (Harris & Graham, 2009; Kellogg, 2008). Examining self-regulated writing from a contextual perspective, authors have found Israeli Jewish high-achieving ninth-grade writers make greater use of those same strategies, except for the last, reporting less reliance on social sources of assistance (Kaplan, Lichtinger & Gorodetsky, 2009). Further research is needed to address the question whether the strategies used by Portuguese and/or Brazilian students contribute to their writing achievement, preceding any cross-cultural comparisons on the grounds of students' writing achievement levels.

Conclusions and Implications for Theory and Practice

The findings of the current research provide initial support for the idea that initiating and controlling writing might be a contextually and culturally bounded process. This implies that students may vary in the type of strategies they use to self-regulate their writing, that such variations may emerge among students from different schools within the same educational contexts, amongst students with differing cultural backgrounds within the same language of instruction, and that strategies may vary between, and within gender groups.

Findings from the current study also support theoretical and methodological claims concerning the need to represent gender diversity in writing research. Investigating how gender intersects with cultural contexts seems to question more recurrent options of representing male and female differences as two homogeneous variables. Results from this study highlight the illusive quality of such a stand, stressing the need to look beyond first interpretations based on gender differences.

Current findings should be supported by subsequent research attempting to provide a more comprehensive analysis of cross-cultural variations in self-regulated writing. For example, researches aiming to confirm these findings may need to go beyond the quantitative-qualitative divide (Butler, 2006), and consider specific approaches to measure the writing process in different school contexts, attempting to understand the multidimensional nature of writing.

CHAPTER III

Argumentative Writing by Junior High-School Students: Discourse Knowledge and Writing Performance

**Argumentative Writing by Junior High-School Students:
Discourse Knowledge and Writing Performance**

Abstract

This study examined junior-high school students' knowledge about the process of argumentative writing, and whether such discourse knowledge predicted student's writing performance. Participants were 26 grade 9 students (15 male, 11 female). Students wrote an argumentative text and responded to questions assessing their declarative knowledge about writing in general, and their declarative, procedural and conditional knowledge about argumentative writing in particular. Students' responses describing the argumentative writing process were mainly centred on substantive and production procedures, on abilities associated with writing, and on seeking assistance for text composing. Descriptions were mainly focused on opinion writing, omitting the importance of taking an argumentative position, and using evidence to support argument and counterarguments. A large number of students (35%) failed to consider the need to accommodate their writing to a potential reader. In addition, knowledge of substantive procedures and of reader's fit were significantly correlated with students' writing performance and written plan.

Keywords: argumentative writing; discourse knowledge; writing performance

Introduction

Argumentative writing is a developmental process, in which knowledge of the topic, task, language, and audience play a central role (Bereiter & Scardamalia, 1987). Mastering it is a complex progressive process, which has been related with students' age and schooling (Delphine & Caroline, 2002; Song & Ferretti, 2013). As young as aged four, preschoolers are able to defend personal interests, developing perspective taking and rule-governed behaviour (Bruner, 1990). With schooling, students' ability to elaborate a written argument about a topic, considering differing perspectives and available evidence to support them, becomes a prerequisite for the academic success across different subject areas.

Nevertheless, older college students (Song & Ferretti, 2013), and most twelfth-graders fail to produce elaborate counter-argumentative texts, and to consider a potential reader and alternative perspectives (Ferretti, MacArthur, & Dowdy, 2000; Persky, Daane & Jin, 2003). Despite the controversial findings as to when elaborated argumentative writing is mastered, evidence suggested (Delphine & Caroline, 2002) eleven-year-old students start producing supported texts stating an opinion in favour or against a topic. By the age of 13-14, junior high-school students seem to start acknowledging the importance of considering a potential reader, if yet in a more thematic than argumentative fashion. But what do these students know about the specific processes underlying argumentative writing, at such intermediate stage of text production? And does that knowledge predict students writing performance?

There is limited data on these students' knowledge about the writing process, and about processes and procedures involved in argumentative text composing. The current study investigated ninth-grade students' discourse knowledge about writing in general, and argumentative writing in particular. Moreover, we examined students' knowledge about the need to accommodate argumentative writing to a potential reader. We further investigated if individual differences in knowledge about argumentative writing predicted the quality of students' argumentative texts, and the development of a written plan before writing.

Literature Review

Theoretically, discourse knowledge has been considered an essential cornerstone in writing development (Bereiter & Scardamalia, 1987; Kellogg, 2008). Graham (2006) suggested that it was plausible to anticipate that a) skilled writers are more knowledgeable than less skilled writers; b) discourse knowledge increases with age and schooling; c) individual differences in knowledge predict writing performance; d) teaching genre-specific discourse knowledge may enhance writing performance. A straightforward mean of examining what students know about writing and the composing process is to ask them. Therefore, the approach used in the present study was to interview ninth-grade students, replicating and extending procedures applied in a small number of studies with typically developing writers, reviewed in this section.

Discourse knowledge. Early studies assessing students' discourse knowledge have compared typically developing writers with struggling writers with learning difficulties (LD). Englert, Raphael, Fear, and Anderson (1988) examined elementary students (grades 4-5) metacognitive knowledge about the process of expository writing, and its relationship with students' writing performance. They found high-achieving students were more aware about the process and specific strategies involved in expository writing, and suggested a strong relationship between writing achievement and knowledge about writing strategies. Graham, Schwartz, and MacArthur (1993) interviewed LD and normally achieving students in grades 4, 5, 7, and 8 to assess their knowledge about the writing process. The authors found typically developing writers showed a broader knowledge of writing than did students with LD, with responses from normally achieving students primarily focused on the role of substantive processes involved in writing (planning, revising, organising). Wong, Wong, and Blenkinsop (1989) assessed Canadian students' metacognition about the processes of writing a report and an argumentative text. They found eighth-graders possessed more mature conceptions about writing, particularly of the importance of planning, organising, and considering a potential reader.

More recently, research examining changes in writing knowledge confirmed older students as more knowledgeable about the role of substantive processes in text composing. Examining the contributions of discourse knowledge to predict the writing performance of typically developing elementary-grade students (grades 2, and 4), Olinghouse and Graham (2009) found fourth-graders were more knowledgeable about the substantive procedures involved in writing, verbalising the roles of effort and abilities associated with writing. Lin, Monroe, and Troia (2007) interviewed students from grades 2 to 8 to examine the writing knowledge of typically developing and struggling writers. Consistent with Bereiter and Scardamalia (1987) model of writing development, the authors found a progressive pattern of writing knowledge development, which goes from an initial self-centred stage to a wider, self-regulated and reader's awareness stage. Similar findings were reported by Barbeiro (2011), who asked Portuguese students in grades 3, 4, and 6 to write a text about what happens when they write. Whereas substantive aspects of writing received greater emphasis than production aspects (spelling, penmanship), sixth-graders focused less on the mechanical processes associated with writing. Across grade levels, students showed very limited concern about the reader's reception of their writing, and when made explicit, the focus was solely on formal prerequisites of writing (calligraphy, and word order). In a similar study with ninth-graders, Schoonen and de Gloppe (1996) found proficient writers focused their advice primarily on organisation, while less proficient writers focused more on writing mechanics (spelling, and grammar).

Research investigating the premise that discourse knowledge predicts writing performance is limited. Examining the writing knowledge and performance of fourth-grade students, Saddler and Graham (2007) found that more skilled writers were more knowledgeable about the role of substantive procedures in writing. Writing knowledge was significantly and positively correlated with the quality and length of the texts produced by more skilled writers, but no correlation between knowledge and performance measures was found for less skilled fourth-grade students. In an intervention study with sixth-graders, Fidalgo, Torrance and Garcia (2008) found an additional 31% of variance in writing quality

explained by students' knowledge about writing. Olinghouse and Graham (2009) also found evidence to support discourse knowledge predicts the writing performance of younger second and fourth-grade students. After controlling for seven different variables (e.g., gender, and written plan), an additional 14% of variance in writing quality and length was explained by students' declarative and procedural discourse knowledge.

Discourse knowledge about argumentative writing. A more limited number of studies have assessed students' knowledge about argumentative writing. Lin, More, and Troia (2007) asked elementary and middle-school students what they knew about narrative, persuasive, and expository writing. They reported middle-school students were more able to identify, describe, and discriminate genre-specific characteristics. Klein and Rose (2010) assessed the declarative knowledge and the writing performance of argumentative and explanation essays produced by Canadian students in grades 5 and 6. They found that, after instruction, students were more knowledgeable about both genres than control students, describing more elements to include in argumentative writing. Although they found significant differences in the quality of explanation essays produced by experimental and control groups after instruction, no differences between groups were found for the quality of argumentative essays. Castelló and Monereo (1996) examined eight-grade students' conceptualisation of the writing process, and assessed students' knowledge about the characteristics of argumentative texts before and after metacognitive strategy instruction. The authors found students' limited knowledge about several substantive procedures associated with writing (e.g., planning, and organising), and reported students' minimal concern about a potential reader before and after instruction.

In a more recent study, Gillespie, Olinghouse, and Graham (2013) examined fifth-grade students' knowledge about the writing process, and the characteristic of story, argumentative, and informational report writing. Consistent with findings from Barbeiro (2011), and Lin, More, and Troia (2007), the authors reported fifth-grade students' showed an unsophisticated and limited knowledge about the process of writing. Students' genre-

specific knowledge was also incomplete, and, as expected, they knew more about narrative writing than about argumentative and informational texts.

The findings from these reviewed studies provide evidence of the role writing knowledge plays in the writing development of elementary and younger middle-school students. However, no research was found that focused on argumentative discourse knowledge of older middle-school, and high-school students. Such research is needed to validate its importance for students writing development, and inform instructional practices.

The Present Study

In this study, we investigated ninth-grade students' declarative knowledge about the characteristics of good writing in general, and the extent of students' knowledge about argumentative text composing. We also examined if individual differences in argumentative discourse knowledge predicted students' genre-specific performance. The following research questions framed the present study.

Research question 1. The first research question addressed in this study was, What is ninth-grade students' knowledge of the attributes of good and poor writing? Based on the limited research investigating these students' general knowledge about writing (Schoonen & de Glopper, 1996), and the proposition that discourse knowledge increasingly develops with age and schooling (Graham, 2006a), we anticipated students would show some elaborated knowledge about writing. Namely, we expected students would focus primarily on substantive procedures associated with writing (organising, and planning) than on surface level features of text composing (spelling, and grammar). Moreover, as in similar research here reviewed, we included other categories in the analyses (motivation, abilities, help-seeking). As elementary and middle-school students associated writing more consistently with motivation than with other factors, we anticipated similar results.

Research question 2, and 3. The second question here examined was, What is ninth-grade students' knowledge about the process of argumentative text writing? To address this question, we replicated research examining students' discourse knowledge about argumentative writing (Gillespie, Olinghouse & Graham, 2013; Klein & Rose, 2010; Lin,

Monroe & Troia, 2007). Unlike the reviewed studies, however, we focused solely on students' declarative, procedural, and conditional knowledge about associated genre-specific processes and procedures. In the Portuguese educational context, as in similar contexts, year-9 typically developing writers have had the opportunity to learn about the characteristics of argumentative text writing, as the genre is included in Language Arts national curriculum explicitly from year 7, and often targeted in year 9 national exams to enter secondary school. Therefore, we expected students to be knowledgeable about argumentative writing processes and characteristics.

The third research question, Which changes do ninth-grade students consider making in generating argumentative texts having a potential reader in mind?, assessed students' conditional knowledge about the reader dimension, extending similar studies with younger Portuguese students (Barbeiro, 2011), but focused specifically in students efforts to consider the reader when composing an argumentative text. From a developmental perspective, students would be entering a more mature stage of writing development, a knowledge-transforming stage (Bereiter & Scardamalia, 1987; Kellogg, 2008), in which the reader representation has become richer than in the previous more self-centred stage of knowledge-telling. According to Kellogg (2008) developing writer's audience awareness is a particular complex task during earlier stages of writing skills development. The author suggests that by the age of 14 - our participants' mean age – to 16, and having spent about ten years of learning how to manage the composing process, adolescents enter an intermediate stage of their writing development- knowledge-transforming. At this developmental stage, the writer might still have too unstable reader representations to be kept on working memory, which impose serious difficulties on the coordination of author, text, and reader representations while composing. Therefore, we expected students would be able to include some explicit criteria that would favour reading comprehension, although we made no predictions about the type of criteria (formal or content focused).

Research question 4. Finally, for the last question, Do individual differences in argumentative discourse knowledge predict writing performance?, we replicated previous

research (Olinghouse & Graham, 2009; Saddler & Graham, 2007), but differed from these studies by focusing on older students, and on argumentative discourse knowledge. Specifically, we examined if students' knowledge about argumentative writing and their knowledge of the need to accommodate writing to a potential reader predicted writing quality, and the development of a written plan before writing. From previous research, we expected students' knowledge to be positively correlated with the quality of their writing. Comparing narrative and argumentative writing processes of undergraduate students, Beauvais, Olive, and Passerault (2011) found that the writing quality of argumentative texts depended on specific types of online management of the writing process. They found writing quality positively associated with time spent on planning processes. While several correlation studies have found younger students' pre-planning skills did not predict writing quality (Olinghouse & Graham, 2009; Whitaker, Berninger, Johnston & Swanson, 1994), studies with older students (grade 7 to 9) (Berninger, Whitaker, Feng, Swanson & Abbott, 1996; Limpo & Alves, 2013a) found positive correlations between preplanning and writing quality. Considering these findings, we anticipated students planning development would predict the quality of argumentative texts. We made no predictions, however, regarding positive correlations between students' knowledge and their pre-planning skills.

Method

Setting

Students came from two intact classrooms in a mainstream Portuguese middle-school, part of a public cluster of schools in an urban district in the Lisbon metropolitan area. Over the last two decades, the teaching of writing has followed the shift from product to process oriented approach. Statutory guidelines are set for the teaching of writing, and for the development of argumentative writing skills (Buescu, Morais, Rocha & Magalhães, 2012; Reis et al., 2009). Argumentation is to be gradually developed from the mastery of opinion writing (year 5) to the development of persuasive and argumentative writing skills, which should be systematically taught from year 7 to 9, and developed in years 10 to 12 and beyond. In the final year of middle-school, ninth-graders should be able to use

argumentative schemes to present and discuss different position about controversial issues, and to provide persuasive evidence to corroborate positions.

Before data collection, the students' Language Arts teacher was interviewed to determine how writing was taught in participants' classes. As the school followed a continuous learning system, the teacher had stayed with the same groups of students since year 7. She reported combining a process writing and basic skills instructional approach, which included teaching planning and revising activities using peer support at least every other week. She reported sentence construction, punctuation, and grammar activities were developed more often, on a weekly basis. Although the teacher stated working narrative writing more frequently, she confirmed having gradually taught argumentative writing skills since year 7. Therefore, the type of writing instruction students received provided them with the opportunity to develop declarative and procedural knowledge about the characteristics of argumentative writing.

Before the study started, the required consents were obtained from the Portuguese Ministry of Education and Science, the deontological committee of the researchers' faculty, the Head of the participating school, parents, carers, and students.

Participants

The participants were 26 ninth-grade students ($M_{age} = 14.3$, $SD = .87$; 15 male, 11 female) selected from a larger research project aiming to evaluate the effectiveness of an intervention program to improve ninth-grade students' writing achievement. Participants for the present study were chosen using a stratified random sampling procedure. We limited this assessment process to a smaller representative sample because our knowledge measure takes considerable time to administer and score (see Olinghouse and Graham, 2009, for similar procedures). Initial screening of students' writing skills was made according to the average marks on Portuguese language arts from the previous school year. Marks are given in a scale ranging from 1 (*lowest*) to 5 (*highest*). Taken all participants together, 19% had marks below 3; 46% equal 3; and 35% above 3. No significant differences were found

between students in this and the larger study for gender, age, language arts average marks, argumentative writing quality, and written plan (all $ps > .15$).

Procedures

Writing performance. Two measures of students' argumentative writing performance –quality, and written plan - were assessed in three consecutive weeks at the beginning of the school year (September), and administered in intact classes. Students were asked to write an argumentative essay in response to one of two prompts. Controversial yet familiar topics such as 'How has new technologies changed communication?' were used to control for students interest and knowledge. Students were given 35 minutes to write each essay, and two separate sheets of paper to complete the assignment.

Writing quality was assessed through an analytic scoring method, which involved rating a student's essay on three traits. This analytic scoring was adapted from the American National Assessment of Educational Progress (NAEP, 2010), and from the Portuguese Language Arts Program for the 3rd cycle (years 7-9) (Reis et al., 2009). The six-point scale - 6 (*highest*), 1 (*lowest*) - was used to assess predetermined aspects of students' writing on three traits, namely: a) development of ideas- overall complexity of ideas presented in relation to the writer's purpose and audience (knowledge of the topic, pondering alternative perspectives, and providing evidence considering purpose and reader); b) organising- logical text structure and coherence (presenting ideas and structural components in a clearly logical order); c) language clarity: overall clarity of discourse, and respect for writing conventions (punctuation; grammar; word usage; spelling).

Two ninth-grade teachers who were blind to the purpose of the study were trained to use the six-point scale. They were provided with representative anchor papers from high, middle, and low scores obtained from two ninth-grade classes that did not participate in the study to practice using the scales. Teachers discussed each scoring criteria, independently scored each practice essay, compared scores, and reached a level of agreement through discussion. Inter-rater reliability, calculated by a Person product-moment correlation, averaged .88 (range = .86 - .92). Teachers scored all essays composed by students, and

rated student's performance on each trait. The average of the two raters' scores was used for each scale. Writing quality score reflected the sum of the three averages subtests. The scales were combined into a single score because the measures of the three were correlated (median correlation between scales was .84).

The second writing performance measure assessed the written plan spontaneously produced before argumentative writing. Plans were measured with a scale ranging from 1 (*lowest*) to 5 (*highest*), based on the non-genre-dependent scale developed by Whitaker, Berninger, Johnston, and Swanson (1994). A score of 1 was given to plans that presented first draft writings, only one word or phrase. Scores of 2-4 were given to plans that reflected an increasingly advanced planning (listing words, structural relationships between topics). A score of 5 was given to plans that presented a map or outline identifying a central theme in response to the prompts, with emerging topics logically related. Each time students answered a writing prompt, they were given two sheets to complete it: a blank and a lined paper sheet with the specific writing prompt. No information on if and how to use the first sheet was provided. The first author scored all plans, and a middle-school teacher unfamiliar with the purpose and design of the study independently scored a random sample of 20% of the plans. Inter-rater reliability as assessed by the Pearson product-moment correlation was .91.

Discourse knowledge about writing. Evidence of discourse knowledge about writing in general, and argumentative writing in particular was collected via semi-structured interviews. A modified version of an interview protocol initially designed by Graham, Schwartz & MacArthur (1993) was used. The original version of the interview was translated into Portuguese, and then back-translated into English in order to produce equivalent and culturally appropriate versions of the questions. Ten open-ended questions were adapted to elicit three types of metacognitive knowledge about writing. Because the quality of students' argumentative writing has been found highly correlated to the use of planning and organising strategies (Beauvais, Olive & Passerault, 2011), two questions were included to assess procedural knowledge about planning before and while composing.

The first three questions assessed students' declarative knowledge of the attributes of good and poor writing in general: Suppose you were asked to be the teacher of your class today and one of the students asked you, 'What is good writing?' What would you tell that student? (Q1); When good writers write, what kind of things do they do? (Q2); Why do you think some students have trouble writing? (Q3). The next question assessed students' declarative knowledge of the attributes of argumentative writing in particular: Again suppose you were asked to be the teacher of your class today, only this time one of the students asked you, 'What is good argumentative writing?' What would you tell that student? (Q4). The following five questions assessed students' knowledge on how they go about the process of composing argumentative essays: Teachers often ask students to write an argumentative essay outside of class, as homework for example. Imagine that you had to write an essay about 'Why ban smoking advertising?' What kind of things would you do to help you complete that assignment? (Q5); What kind of things would you do to help you plan before writing that assignment?(Q6); What kind of things would you do to help you plan while writing that assignment?(Q7); Teachers often ask students to change their papers to make them better. If you were asked to change your paper to improve it, what kinds of changes would you make? (Q8); What would you do if you had difficulties completing that assignment? (Q9). The last question assessed students' knowledge about the need to accommodate writing to a potential reader: If you had to prepare that same paper for another student in year 6, what would you do as you wrote your paper? (Q10).

Each interview took up to 20 minutes to complete. Questions were read aloud to students, answers tape-recorded, and subsequently transcribed by the examiner. If students showed difficulties understanding a question, the examiner rephrased it. Students were prompted to add additional information if questions elicited responses such as 'I don't know', or if a general or nonspecific response was given. Follow-up questions such as 'How would you do that?' were used for such purposes.

Interview scores. In scoring the questions, individual responses were divided into idea units, considered as specific, single ideas in a student's response (Olinghouse &

Graham, 2009). To illustrate, 'good writing is writing without spelling mistakes' was scored as one idea unit. In other cases, a student's response was divided into several idea units, such as in 'not making spelling mistakes, I think it is not mixing things up a lot, like organising it well', which was divided into two idea units (1, spelling mistakes; 2, organising). An idea unit was not counted as a new idea if it had been previously included in an idea unit in any of the questions previously solicited, thus ensuring parsimony.

After segmenting responses, each idea unit was categorised by type of response. The scoring system applied was adapted from Graham, Schwartz and MacArthur (1993), which has been used in similar research studies (Gillespie, Olinghouse & Graham, 2013; Olinghouse & Graham, 2009; Saddler & Graham, 2007). To assess students' declarative knowledge about writing in general (Q1-Q3), idea units were coded as production procedures ('writing without spelling mistakes'); substantive procedures ('organising it well'); motivation ('enjoy writing'); abilities ('they have imagination'); help-seeking ('ask opinion from other people'); other related ('may not be paying attention'). To assess students' declarative knowledge about argumentative writing (Q4), idea units were coded as production procedures ('use proper punctuation marks'); substantive procedures ('defend our opinion, and respect the others' opinion'); abilities ('to be imaginative'); other related ('read a lot'). To assess students' knowledge about how to write an argumentative essay (Q5-9), idea units were coded as production procedures ('correct spelling mistakes, and punctuation next'); substantive procedures ('thinking about the pros and the cons'); help-seeking ('would ask the teacher'); other related ('it depends on the time we have'). To assess students' conditional knowledge about the need to accommodate writing having a potential reader in mind (Q10), idea units were coded in two new categories: content focus ('not show such a harsh reality of things'), and language focus ('use the same ideas but simple vocabulary'). These categories were created after the analysis of responses, which were focused on changes either associated with language (vocabulary choice) or with text content (presenting and developing ideas about the topic) having a potential reader in mind. A 'no changes' category was included, as in the original scoring scheme.

As the majority of responses for Q1-9 were coded as substantive, this category was broken down into subcategories: a) information generation ('research it on the internet'); knowledge about content ('write everything I knew about it'); structural components ('write my opinion and also try to write opinions against it'); planning before ('organise my ideas in a separate paper sheet'); planning while writing ('trying to think about what to write next'); organising ('include an introduction, a development, and a conclusion'); revising/evaluating ('reread the text'), other related ('computers only correct spelling mistakes').

The first researcher scored all interviews, and a PhD student independently scored a random sample of 20% of the interviews. The resulting estimates of Cohen's Kappa across coder pairs was .86 (coder pair Kappa estimates for declarative knowledge of writing in general = .77; of argumentative writing = .90; for procedural knowledge = .81; for conditional knowledge = .92).

Results

To assess students' discourse knowledge about writing in general, and about argumentative writing in particular, we calculated means and standard deviations for categories (Table 10), and subcategories (Table 11) for students' responses. Percentages of the type of responses students gave were also calculated. To investigate relationships between discourse knowledge and writing performance, correlations between procedural and conditional knowledge about argumentative writing and writing performance variables were computed.

Research Question 1

Three questions were used to assess students' knowledge about the attributes of good and poor writing in general. Because the same categories were employed across questions, data from these questions was combined for analysis. Six categories accounted for 83% of students' responses. Across questions, 32% of students' responses involved substantive procedures associated with writing. The majority of responses were focused on planning before writing (22%) and organising (22%), followed by revising/evaluating (16%), and information generation (14%). Less focus was given to knowledge about content (8%), and

the reader (8%). Approximately 30% of students' responses defining what good writing is, describing what good writers do, and why some students find it difficult to write were focused on the writer's abilities to compose ('above all, you should be imaginative'; 'they must imagine the story they are writing'). Nineteen percent of students' responses focused on production procedures. Approximately 17% of responses were related to motivational aspects of writing ('they write what they want'; 'it might be lack of interest, they just don't care about if their writing is good or bad').

Research Questions 2 and 3

Q4 asked students to describe what good argumentative writing is. Four categories accounted for 86% of students responses. Students' responses were primarily related to substantive procedures (74%). Responses were centred on structural components (29%), knowledge about content (20%), and organising (20%), followed by planning before writing (11%), and other related (14%). Approximately 15% of students' responses were focused on production procedures associated with writing, and 4% on writers' abilities to compose ('you need to be imaginative').

Five questions assessed students' knowledge regarding how to write an argumentative essay. As the same categories were used across questions, data from these questions was combined for analysis. Six categories accounted for 83% of students' responses. These were primarily related to substantive procedures (73%): revising/evaluating (24%); knowledge about content (19%); planning before writing (16%); information generation (14%). Students' responses were less focused on planning while writing (6%), organising (6%), and on the need to accommodate writing to a potential reader (4%). Approximately 13% of students' responses describing how to write an argumentative essay, and how to resolve associated difficulties were focused on seeking assistance for writing ('ask the teacher or my peer to explain the ideas better', 'try to ask my parents. If in class, I would ask the teacher'). Ten percent of students' responses were related to production procedures.

Table 10. Mean number of responses (and standard deviations) for writing knowledge interview by category

Category	Substantive procedures	Production procedures	Motivation	Abilities	Help-Seeking	Other related
Declarative knowledge of the characteristics of good writing (Q1-3)	1.15 (1.2)	0.85 (.37)	0.46 (.51)	0.88 (.33)	0.04 (.20)	0.12 (.33)
Declarative knowledge of the characteristics of good argumentative writing (Q4)	1.62 (1.2)	0.19 (.40)	0.00 (.00)	0.08 (.27)	0.00 (.00)	0.12 (.33)
Procedural knowledge of how to write an argumentative essay (Q5-9)	3.77 (1.2)	0.54 (.51)	0.00 (.00)	0.12 (.33)	0.62 (.50)	0.15 (.37)
	No changes	Language focus	Content focus			
Conditional knowledge of how to fit argumentative writing to a potential reader(Q10)	0.35 (.48)	0.54 (.51)	0.19 (.40)			

Table 11. Mean number of responses (and standard deviations) for substantive procedures by subcategory

Subcategory	Characteristics of good writing (Q1-3)	Characteristics of good argumentative writing (Q4)	How to write an argumentative essay (Q5-9)
Information generation	0.15 (.37)	0.00 (.00)	0.46 (.51)
Knowledge about content	0.12 (.31)	0.27 (.45)	0.62 (.50)
Structural components	0.00 (.00)	0.38 (.50)	0.27 (.45)
Planning before writing	0.31 (.47)	0.15 (.37)	0.54 (.51)
Planning while writing	0.04 (.20)	0.00 (.00)	0.27 (.45)
Organising	0.31 (.47)	0.27 (.45)	0.27 (.45)
Revising/evaluating	0.19 (.40)	0.00 (.00)	0.88 (.33)
Reader's awareness	0.12 (.33)	0.00 (.00)	0.15 (.37)
Other related	0.00 (.00)	0.15 (.37)	0.15 (.37)

The last question assessed students' knowledge regarding how to fit argumentative writing to a potential reader. Three categories accounted for 88% of students' responses. Approximately 50% of students' responses were related to the need to change vocabulary when writing an essay to a younger student ('use the same ideas but try to use a vocabulary less...I don't know...easier'; 'use easy language, for him to understand the message I was trying to convey'). Twenty percent of students' responses were associated with the need to change the content of the text ('use different and easy examples, to make him think about both sizes'; 'not show the violent side, so that he would not be scared and lose interest in finish reading'). Thirty percent of students' responses expressed no need to fit argumentative writing to a potential reader ('say the same: not to smoke'; 'say the same things as for anybody else').

Research Question 4

Regarding writing performance measures, writing quality scores ranged from 3 (*low*) to 6 (*high*), $M = 4.02$, $SD = .79$. The majority of the students (85%) produced minimal developed or no written plan ($M = 1.23$, $SD = .65$, score range = 1-4). The correlation between writing performance measures, and total number of ideas produced by students for the five genre-specific categories - substantive and production procedures, no changes, language focus, and content focus - accounting for the largest percentage of students' responses for Q4-10 are presented in Table 12.

Table 12. *Correlations between argumentative writing knowledge and writing performance variables*

Variable	1	2	3	4	5	6	7
1. Knowledge: Substantive procedures	-						
2. Knowledge: Production procedures	.14	-					
3. Knowledge: Language focus	-.07	.14	-				
4. Knowledge: Content focus	.35	.07	.13	-			
5. Knowledge: No changes	-.29	-.02	-.38	-.35	-		
6. Written plan	.37 [*]	-.26	.03	.13	-.14	-	
7. Writing quality	.37 [*]	.19	.28 [*]	.43 ^{**}	-.16	.38 [*]	-

^{*} $p < .05$; ^{**} $p < .01$

There was a statistically significant positive correlation between writing performance variables. Discourse knowledge variables shared no variance with each other. These variables were significantly related to the quality of argumentative essays, except for production procedures, and no changes to accommodate writing to a reader. Substantive knowledge was also significantly correlated with written plan.

Discussion

Current findings provide different elements to consider regarding ninth-grade students' discourse knowledge about writing and argumentative text writing. First, and consistent with studies with typically developing younger writers, these students associated the writing process more consistently with substantive procedures than with formal aspects of composing. Students emphasised important aspects of the composing process, as planning and organising, showing a high level of awareness of the operations involved in the process of writing a text. Moreover, when describing what good writers do while composing, they were able to name specific strategies as 'make a general plan about what to write about'; 'read books from different writers to collect more ideas'.

Second, as predicted, these students considered other aspects associated with text composing, as motivation and abilities. However, and contrary to expectations, when describing the attributes of good and poor writing, students were more focused on innate abilities for composing. The most common reason to explain good writing was the ability to be imaginative and creative, as in 'they can imagine new characters, new stories and places in time'; 'they have imagination, it's in their nature'. Good writing in general is, following these students' responses, a question of either having imagination or not. When comparing elementary-school students' knowledge about writing in general, Olinghouse and Graham (2009) suggested that age may predict students' associations between writing performance and abilities. Current findings extend knowledge on how older students conceptualise writing. Results indicated that, unlike younger elementary (Olinghouse & Graham, 2009) and middle-school students (Gillespie, Olinghouse & Graham, 2013; Graham, Schwartz &

MacArthur, 1993), for whom motivation played a more important role explaining good and poor writing, junior high-school students emphasised innate writers' abilities.

As when describing the characteristics of writing in general, when describing the characteristics of argumentative writing (Q4), and explaining how they go about writing an argumentative essay (Q5-9), students' responses were primarily focused on substantive processes. However, students showed a generally unsophisticated knowledge about the characteristics of argumentative writing, considering mainly the importance of providing a personal opinion about a topic. Although students verbalised the need to include opinions for and against a topic, the focus was on expressing their opinion, omitting the importance of taking an argumentative position, and using evidence to support it.

Students' substantive comments on how to write an argumentative essay were considerably focused on revising and evaluating writing. Despite the greater emphasis placed on substantive procedures over form, students accredited considerable value to production procedures, mainly associated with mechanical revision (review spelling mistakes, punctuation, and calligraphy). The emphasis on these types of substantive and production procedures may reflect the writing processes students considered more useful for argumentative writing, or may be a consequence of specific teaching practices. Additional research is needed to understand the factors that foster the development of this knowledge, especially when considering Beauvais, Olive, and Passerault (2011) findings supporting the crucial role of planning strategies in managing the argumentative writing process.

We examined students' discourse knowledge about changes to accommodate argumentative writing to a reader. The participating students' first reaction when prompted to answer this question was of surprise, including initial silence, and long pauses. Students' written texts, regardless of their genre, are more often read and evaluated by teachers. That does not mean, however, that students actually change their writings having the teacher in mind. This proposition seems corroborated by the unexpected high percentage of students (approximately 35%) who expressed no need to do anything special when writing an argumentative assignment for a younger student. Moreover, across interview questions,

students' responses were rarely associated with reader related factors. Responses considering the need to change writing were more consistently focused on language factors, as to simplify vocabulary to support the reader's comprehension. A limited number of students showed a more mature knowledge about accommodating argumentative writing to a potential reader. One student developed his response stating:

I would try to find some way...because they are young, and you need to encourage them to read. I would try to use something funny to promote the text. [how so?].Probably changing presentation, not in paper and... like in children' books: use pictures to make it less boring!

Taken together, these differing levels of complexity of students' discourse knowledge about a potential reader seem to confirm cognitive developmental theories of learning to manage the composing process throughout the lifespan (Bereiter & Scardamalia, 1987; Kellogg, 2008). Future research should be developed to replicate this findings, and to test the effectiveness of explicitly teaching ninth-grade students to accommodate writing to a potential reader.

Theoretically and empirical studies reviewed here supported the proposition that discourse knowledge about different forms of writing plays an important role in the quality of the written texts produced by elementary and younger middle-school students. We investigated whether four types of procedural and conditional knowledge about argumentative writing (substantive, production, no reader focus, language focus, and content focus) made a significant contribution to predict two aspects of ninth-grade students' argumentative writing performance (quality, and written plan). Results support previous studies with younger students, and extend findings on the importance of discourse knowledge in the quality of argumentative texts produced by junior-high school students. We found that knowledge of argumentative writing was related with writing quality. For these typically developing ninth-graders, there was a positive correlation between writing performance measures and knowledge of substantive procedures. We also found a statistically significant correlation between knowledge of the reader (language focus and

content focus) and writing quality. Furthermore, written plan development was related with the quality of the argumentative essays produced by participating students, replicating previous findings with middle-school students (Fidalgo, Torrance, and Garcia, 2008; Limpo & Alves, 2013a), and confirming research regarding the role of planning skills in argumentative text writing (Beauvais, Olive & Passerault, 2011).

Limitations and Implications for Theory and Practice

Several limitations need to be considered when interpreting this study's findings. First, the sample of participating students was small ($N = 26$), inhibiting more informative quantitative analyses (regression analyses) to substantiate models predicting ninth-grade students' discourse knowledge about argumentative writing. Second, contextual variables were not included, namely students' writing outside the classroom, and the role of family factors in students' knowledge about writing in general, and argumentative writing in particular. Future research needs to address these factors, their relation with personal factors, and their relation with ninth-grade students' discourse knowledge and writing performance.

Current findings support the need to promote the development of argumentative writing knowledge among junior high-school students. Enhancing these students specific discourse knowledge, and the genre-specific processes involved in composing argumentative essays may be accomplished in different ways. These include engaging students in authentic writing situations by asking them to write for a specific purpose and audience (Bazerman, 2013; Holliway & McCutchen, 2004), explicitly teaching the characteristics of argumentative writing (Castelló & Monereo, 1996), and combine knowledge and strategy instruction (Harris, Graham & Mason, 2006). In a time of global communication, knowledge, and sources of information are multiple, and constantly changing. Teaching argumentative writing is, for that, a challenge, but vital to promote students' critical thinking and analytical skills, which are essential cornerstones for their professional and personal success.

CHAPTER IV

More Than Meets the Eye: Self-Regulated Strategy Development for Teaching Argumentative Writing

**More Than Meets the Eye:
Self-Regulated Strategy Development for Teaching Argumentative Writing**

Abstract

This multi-method study investigated the impact of an intervention designed to promote ninth-grade students' writing performance, strategy use, and discourse knowledge of argumentative writing. Following the Self-Regulated Strategy Development (SRSD) model, strategies to plan and write argumentative essays were implemented in two whole-class settings. Twenty three students received SRSD instruction combining verbal and visual mnemonics to support learning and recall; twenty five students received SRSD instruction including verbal mnemonics alone. Groups were compared with a control group of 30 students randomly drawn from the remaining four ninth-grade classes receiving standard writing instruction. Results of multivariate analyses of variance (MANOVAs) and follow-up univariate tests supported the incremental effects of combining verbal and visual mnemonics to the SRSD instructional routine, with meaningful effects on students' writing performance and reported use of non-genre-specific personal strategies at posttest. National exams completed 15 weeks after instruction reinforced the effectiveness of the implemented SRSD strategies.

Keywords: argumentative writing/SRSD/intervention/ninth-grade students

Introduction

Arguing about teaching writing effectively, Murray (2004) wrote, “there is no single kind of person to teach, no one reason to write, no one message to deliver, no one way to write, no single standard of good writing” (p. 5). This assumption of “no one way” to write, to teach and assess writing mirrors the intricate nature of teaching writing in schools, considering the writing classroom not as a place where one size fits all (Malpique & Veiga Simão, 2012; Schultz & Fecho, 2000). The argument, however, does not undermine the importance of evaluating best practices for writing instruction, in a time of global communication, when skilful writing is a key instrument for professional and personal success.

Over the last thirty years, researchers have provided evidence for the effectiveness of the Self-Regulated Strategy Development (SRSD) model to teach writing to a wide range of students across different educational contexts (Graham, McKeown, Kiuahara & Harris, 2012; Graham & Perin, 2007). The SRSD model (Harris & Graham, 1996) was initially designed to improve students’ writing performance, knowledge and motivation, and developed to be implemented either with small groups of students or individually, outside whole-class settings (De La Paz, 2001; Graham, Harris & McKeown, 2013). More recently, findings supported its efficacy delivered classwide by general educational teachers to improve the writing performance of primary (Tracy, Reid & Graham, 2009; Harris et al., 2012), and middle-school students (Festas et al, in press).

However, little research has been developed to test the effectiveness of SRSD with older students (Graham, Harris & McKeown, 2013). In the present study, we extended research on SRSD and writing by examining the impact of the model to teach argumentative writing to students in transition to high-school (year 9) implemented in whole-class settings. Furthermore, from the need to investigate which components of SRSD instruction may account for the positive gains in students’ writing performance and knowledge (Graham, Harris & McKeown, 2013), we explored incremental effects of combining verbal and visual mnemonics on the SRSD instructional routine.

Literature Review

Writing has traditionally received less attention of empirical research, especially when compared to reading. Moreover, authors have asserted that learning to read and write may be different between languages, and argue for the need to locate literacy teaching in its proper developmental context (Wood & Connelly, 2009). Thus, research is needed to understand writing processes, how writing is developed, and validate instructional practices in different languages and educational settings.

Assessing, implementing, and interpreting effective writing instruction in whole-class environments, however, is a challenge. There, causal relations may be particularly difficult to confirm due to the multitude of individual, contextual and cultural variables, which may either by themselves or in combination affect outcomes (Rosenfield & Berninger, 2009; Schultz & Fecho, 2000). For that, when discussing the implementation of evidence-based interventions, it has been highlighted the importance of providing support for the effectiveness of an intervention program in real-life settings, as well as its viability, sustainability, and ecological congruence (see Rosenfield & Berninger, 2009 for a review).

Research testing best practices for writing instruction in school settings is said to be expanding (Graham, MacArthur & Fitzgerald, 2013). Over the last decades, several studies have been designed and implemented to test methods, models, and practices to improve students' writing skills. Researchers found strategy instruction to be a particularly effective method to improve the writing skills of all students, with or without learning difficulties (LD) (Deshler et al, 2001; Englert, Raphael, Anderson, Anthony & Stevens, 1991; Graham, MacArthur & Fitzgerald, 2013). As a step-by-step problem solving method, evidence suggests that the explicit teaching and training of writing strategies (e.g., planning, organising, revising) may make the writing process more visible and tangible.

Self-regulated strategy development (SRSD): An integrative approach. Also characterised by explicit teaching and individualised instruction, the SRSD model (Harris & Graham, 1996) was designed to address multiple aspects of writing development, including

cognitive, behavioural, and affective states (Harris et al., 2012). Initially developed as an intervention model for LD students, SRSD promotes the explicit teaching of strategies to plan and/or revise genre-specific writing tasks, combined with the teaching of self-regulatory practices (e.g., goal setting and self-instructions), and faded scaffolding. Six flexible stages are to be developed as part of the implementation process, namely: 1) developing background knowledge, and preskills to use the strategy; 2) discussing significance and benefits of learning the strategy; 3) teacher or peer modelling of the strategy; 4) memorising the steps for the composing strategy through mnemonic instruction; 5) supporting strategy use and writing development through collaborative practice, and peer support; 6) fading assistance while promoting independent practice and mastery of the strategy (Harris & Graham, 1996).

SRSD instruction has been validated in several English-speaking school contexts and findings support its effectiveness to the improvement of a variety of writing skills (Graham, McKeown, Kiuvara & Harris, 2012; Graham & Perin, 2007). In summary, SRSD instruction was found to meaningful effect students' skills for planning and revising (De La Paz & Graham, 2002), overall writing quality, self-efficacy, motivation, discourse knowledge, and word length (Harris, Graham & Mason, 2006). These findings were reported in several intervention studies from primary to middle-school students (Grade 1-6) with effect sizes typically exceeding 1.17 (see Graham, McKeown, Kiuvara & Harris, 2012 for a review). The majority of these research studies, however, have been delivered by tutors or research assistants, outside the regular classroom (Harris et al, 2012). Two investigations (De La Paz & Graham, 2002; Wong, Hoskyn, Jai, Ellis, & Watson, 2008) have examined teacher-implemented SRSD in whole-class settings, involving middle-school students (Grades 7- 8, and Grade 6 respectively). More recently, research extended and reinforced these initial findings in primary school settings (Harris et al., 2012).

Further research on SRSD for writing needs to be developed to extend knowledge on its implementation and sustainability. First, less research has been developed focusing on the effects of teacher-implemented SRSD for older students (year 9 and above). Such

research is needed to test the consistency of SRSD for teaching writing to students in transition to or entering high-school. At that stage of schooling, academic success is highly dependent on students' writing skills, as cross-curricular writing requirements increase. Second, few studies have evaluated the effectiveness of SRSD instruction in non-English speaking regular classrooms (Budde, 2010; Festas et al, in press). This research is central to understand SRSD sustainability and validity across distinct educational contexts and languages of instruction. Third, less is known about specific indicators which may determine or enhance the effectiveness of the SRSD instructional routine (Glaser & Brunstein, 2007; Harris, Graham & Mason, 2006).

When describing the fourth SRSD instructional stage – *memorising the strategy* – Harris and Graham (1996) argue that “a strategy that cannot be recalled cannot be used!” (p. 32). First-letter mnemonic strategies for planning and revising have been designed and used throughout SRSD instruction to stimulate recall, which include a series of decisions or actions to be completed sequentially during a genre-specific writing task. Using graphic organizers and cue cards, the POW and WWW story writing mnemonic strategy combines verbal and visual mnemonics to assist students during the writing process. Often, as in the POW and TREE opinion strategy, an image (e.g., a tree) is offered to explained the steps of the strategies, and included in the handouts provided for implementation. Other times, verbal mnemonics alone are provided to assist instruction, as in PLAN and WRITE strategies designed to help students prepare for national exams. Moreover, the authors propose using verbal and visual mnemonics depending on students' age, apparently suggesting older students may require verbal mnemonics alone for learning and recall (Harris, Graham, Mason & Friedlander, 2008).

Mnemonic strategies: Images and words. Mnemonic strategies usually consisting of either visual images or words have been used throughout times, with different purposes (Greene, 1999). Mnemonics have been defined as “learning strategies that make elements of abstract information more familiar, and encourage students to form meaningful associations to these elements” (Wang & Thomas, 1996, p. 104.). Research found first-letter

mnemonics to be beneficial for teaching students to successfully complete different process-oriented tasks (Hughes, 2011; Reid & Lienemann, 2006). Their continued practice allows students to recall information when facing a task through a self-cueing process (Bellezza, 1981). Research has also found that storing information as images grants larger memory benefits than verbally stored information (Carney & Levin, 2012). Furthermore, evidence suggested that better recall can be expected when information is stored as both images and words, as a result of redundancy in stored material (Carney & Levin, 1994, 2000). There is ample evidence of the benefits of pairing visual and verbal elements in literacy instruction (Paivio, 2007; Sadosky & Paivio, 2001). Theoretical perspectives as multiliteracy (Kellner, 2000), visual literacy (Debes, 1968; Kress & van Leuwen, 1996), multimedia learning (Mayer, 2005), and multiple representations-based instruction (Ainsworth, 1999; Eilam & Poyas, 2008) postulate the validity of integrating visual and verbal teaching strategies across content areas and grades.

This argument finds reasoning in Paivio's dual-coding approach (1986, 2007) of information processing. Positing memory as the engine of cognitive and linguistic evolution, evidence supports the incremental effects of combining verbal and visual materials to reduce memory load, and to boost long-term memories, which constitute knowledge (Paivio, 2007). This "conceptual peg effect" (Paivio, 1986) has also been found in writing research, in studies suggesting the importance of language concreteness to improve comprehension, interest, recall, and writing quality (Hillocks, 1986; Sadosky, Kealy, Goetz & Paivio, 1997).

In a time when different formats and media come to us in fast and complex combinations, literacy research is challenged to provide solid evidence-based instructional practices to be implemented across different educational settings. As word and images associations seem recurrent in SRSD mnemonics, examining possible incremental effects of adding visual elements to support strategy use and maintenance may expand knowledge on the effectiveness of the SRSD instructional package, and substantiate instructional choices and teaching practices with older students.

Overview of the Present Study

This quasi-experimental study was framed in a multidimensional assessment and intervention approach to school writing. In this multimethod research, we focused on investigating the effectiveness of SRSD instruction for argumentative writing implemented by regular teachers in Portuguese whole-class settings. Our first aim was to extend research on SRSD for writing by assessing the impact of this instructional approach on the writing performance, self-regulated strategy use, and discourse knowledge of students in transition to high-school (year 9) in mainstream school settings.

Argumentative writing primary function has been defined as the “formal defence of an outright assertion” (Toulmin, 2003, p.12). Two main goals have been suggested for argumentative writing, namely: a) to discuss an argumentative position reflecting conflicting views; and b) to persuade an audience toward that same position (Ramage, Bean & Johnson, 2004). From that, an argumentative essay should contain the following five components: 1) a formal statement of an argumentative position (a thesis); 2) support from external sources (facts, evidence); 3) internally consistent structure designed to develop the thesis; 4) presentation of counterarguments that could refute the thesis; and 5) a conclusion amplifying and enhancing the thesis (Cioffi, 2005).

We adapted a planning strategy for persuasive writing developed by De La Paz and Graham (1997), STOP - Suspend judgment; Take a side; Organise ideas; Plan more as you write -, and DARE – Develop a position statement; Add supporting ideas; Report and refute counterarguments; End with a strong conclusion . The mnemonics PARA and IDEIA (see Appendix F) were used to help students recall strategy steps, serving also as a reminder to plan before writing, and of the argumentative writing goals and components. The DARE strategy was revised and expanded to encourage students to include supporting evidence when presenting arguments and potential counterarguments. This option stems from theoretical and empirical research highlighting the role of evidence to support argumentative discourse (Ferretti & Lewis, 2013; Newell et al, 2011). As the development and progress of argumentative discourse skills was found to be highly correlated with students' age (Golder

& Coirier, 1994; Song & Ferretti, 2013), the upgrading would also make the strategies more pertinent for ninth-grade students.

The strategy guided students through the process of planning and organising writing content to optimise argumentative writing. Despite planning being considered a critical element in skilled writing (Kellogg, 1996), research has provided evidence on elementary and middle-school students lack of explicit and deliberate planning in advance of writing. For example, De La Paz and Graham (2002) found 80% of middle-school students did not produce any written plans before writing. Sixth-grade Portuguese students were found to do little advance planning for opinion essay writing (Limpo & Alves, 2013a). A subsequent aim for the current study was to assess students' spontaneous planning before and after SRSD instruction.

The second purpose of this investigation was to explore incremental effects of adding visual elements to support strategy use and maintenance on students' writing performance, reported strategy use, and genre-specific discourse knowledge. This study was framed in the following three research questions.

Question 1: Does teacher-implemented whole-class SRSD instruction in argumentative writing meaningfully improves the writing of ninth-grade students in terms of performance and strategy use?

Based on the research previously reviewed, we predicted a significant effect of SRSD instruction in most measures of writing performance. We did not expect significant effects on word length on the grounds of results from similar studies implemented in whole-class settings (Harris et al., 2012). We further anticipated a significant effect would be found on the use of planning strategies, since research has shown that students from grades 2 to 12 increased planning strategies after receiving SRSD instruction (Graham, McKeown, Kiuahara, & Harris, 2012; Graham & Perin, 2007). We also predicted that any positive effects of SRSD instruction would produce meaningful differences in students' reported use of environmental, behavioural, and personal strategies to self-regulate their school writing tasks. These predictions stemmed from Zimmerman and Risemberg's socio-cognitive model of self-

regulated writing (1997). The triadic model of writing enhances the integration of contextual, behavioural, and personal self-regulatory components in the writing process. The authors suggested these three forms of self-regulation interact during writing through a cyclic feedback loop, in which writers self-monitor the effectiveness of specific self-regulatory strategies and self-react, selecting either to continue using their strategies or to change using them if strategies are found to be ineffective. As SRSD instructional routine is developed in tandem with the explicit teaching of several self-regulatory strategies, we expected significant effects in the three major categories of self-regulatory influence.

Question 2: Does combining verbal and visual mnemonics to SRSD instruction produces incremental effects on students' writing performance, strategy use, and discourse knowledge?

As noted earlier, evidence supports the benefits of combining visual and verbal elements for learning and instruction, including in writing. Given the lack of research investigating these benefits in SRSD instruction, and since this was an exploratory question, our hypotheses regarding any incremental effects of adding visual mnemonics in the SRSD instructional routine had only indirect empirical support. From the studies previously reviewed, we anticipated that it would be profitable on students' overall writing quality.

Regarding argumentative discourse knowledge, on the grounds of previous findings showing changes in students' writing knowledge after SRSD instruction (Harris, Graham & Mason, 2006) we expected SRSD students would be more knowledgeable after instruction. We were also interested in understanding incremental effects of combining visual and verbal mnemonics on students' knowledge about argumentative writing.

Question 3: Will students and teacher find SRSD instruction in writing to have acceptable social validity?

Considering again the research reviewed here we anticipated a positive answer to both questions from all involved. The critical importance of such social validity, define as the participants' perceptions of the usefulness of the strategies, ease of implementation, and overall effectiveness, has been examined in many SRSD studies, and highlighted in recent

whole-class implementation (Harris et al., 2012). Such widespread acceptance of SRSD instruction may also provide further evidence of its validity in real classroom settings.

Method

Setting

This quasi-experimental study was developed in a Portuguese middle-school (years 5-9, third track of a four-track system), part of a public cluster of schools located in an urban district in the Lisbon metropolitan area. Writing is systematically used as a learning and assessment tool across all subject areas. Statutory frameworks have been set to offer guidelines related to the teaching of writing, following the shift from product to process writing over the last two decades. Students are tested frequently and receive numeric marks on their writing assignments throughout a school year and on national exams (end of year 4, 6, 9 and 12). The population that the school serves is predominantly white, urban, and middle class.

Before the study started, the required consents were obtained from the Portuguese Ministry of Education and Science, the deontological committee of the authors' faculty, the Head of the participating school, the teachers involved, parents, carers, and participating students.

Participant Selection Procedures

Students. The participants were 135 ninth-grade students enrolled in six ninth-grade classes from a Portuguese middle-school. Initial screening of students' writing skills (ninth-grade population) was made from data collected before the implementation of the SRSD strategies, namely the average marks on Portuguese language arts from the previous school year. Marks are given in a scale ranging from 1 (lowest) to 5 (highest). Taken all participants together, 13% had marks below 3; 46% had marks equal 3; and 41% had marks above 3. From the six ninth-grade classes, two classes ($n = 48$) were randomly assigned to two conditions: dual-coding SRSD (Group 1, $n = 23$), and verbal-coding SRSD (Group 2, $n = 25$). Twenty five students (initially 30, to account for students drop out) were randomly selected from the four remaining classes to participate in the control condition using a stratified

random sampling procedure. From the remaining classes, 6 students below the 3 average marks, 14 students with equal 3 average marks, and 10 students above the 3 average marks were randomly selected. During the 9-month course of the study, five students from the control condition were excluded either for absence in two of the three post or follow-up data collection sessions (4 students), or for voluntary dropout (1 student). Table 13 presents information on the characteristics of the 73 students by condition, and of the overall population of ninth-grade students. T-test results showed no statistically significant differences among students assigned to the three conditions at pretest in terms of chronological age or language arts average marks (all $ps > .32$). Chi-square analyses also revealed no statistically significant differences among conditions in terms of gender (all $ps > .69$). No significant differences were found between the three conditions and the overall school population of ninth-grade students in terms of chronological age, language arts average marks, and gender (all $ps > .33$).

Table 13. *Students characteristics by instructional condition at the start of the study*

Variable	Condition			
	SF	Group 1	Group 2	Control
Age				
<i>M</i>	14.24	14.13	14.24	14.14
<i>SD</i>	.88	.97	.78	.61
Gender				
Female	71	12	11	14
Male	64	11	14	11
Portuguese language arts average score				
<i>M</i>	3.31	3.30	3.23	3.34
<i>SD</i>	.83	.78	.79	.79

Note: SF = Sampling Frame; Group 1 = Dual-coding SRSD; Group 2 = Verbal-coding SRSD.

To assess students' discourse knowledge of argumentative writing a stratified random sample of participants ($n = 26$) was selected from Group 1 ($N = 13$; $M_{age} = 14.1$, $SD = .80$; seven male, six female), and Group 2 ($N = 13$; $M_{age} = 14.5$, $SD = .87$; eight male, five female). We limited this assessment process to a smaller representative sample because our knowledge measure takes considerable time to administer and score (see Olinghouse and Graham, 2009, for similar procedures). T-tests analyses revealed no statistically significant differences among students assigned to the two groups in terms of chronological age or language arts average marks (all $ps > .25$). Chi-square analyses also revealed no

statistically significant differences among conditions in terms of gender ($p = .70$). No significant differences were found between students in this and the two groups in terms of chronological age, language arts average marks, and gender (all $ps > .27$).

Teachers. The three female language arts teachers teaching the six ninth-grade population of students agreed to participate in this study. Several criteria was used to control for teacher effects, isolate the effects of the core variables under study, and limit the influence of teacher effects on impact estimates (Weiss, 2010) namely: 1) teaching experience, all teachers having more than 12 years of teaching experience; 2) certification, all teachers holding credentials in education and language arts teaching; 3) content knowledge, assessed prior data collection via semi-structural interviews to determine how writing would be taught in participants' classes. All teachers reported combining a process writing and basic skills instructional approach. They asserted teaching planning and revising activities, peer support, and self-selection of writing topics at least every other week. The three reported sentence construction, punctuation, and grammar activities were developed more often, on a weekly basis. Teachers confirmed having taught opinion and persuasive writing since year 7. All teachers, however, reported having worked narrative writing more frequently than persuasive/argumentative writing with their students.

As the second major purpose of this investigation was to explore incremental effects of adding visual elements to support strategy use and maintenance, the two classes receiving SRSD instruction- Group 1 and Group 2 - were randomly assigned to the same teacher. This solution (Weiss, 2010) was followed attempting to balance teacher effects across the two groups and isolate the effects of dual-coding SRSD instruction.

Assessment Procedures

One hundred and thirty five students (91% of the ninth-grade population) completed a non-genre-dependent questionnaire (Malpique & Veiga Simão, in press) about the use of several self-regulated strategies for school writing tasks. This baseline assessment provided a contextualised identification of how students initiate and control their writings, yielding substantive information to optimise SRSD instructional procedures.

A multi-method design with repeated measures, with multiple probes during pretest and posttest, and one probe in follow-up, was used to evaluate the effectiveness of instruction. To allow a comparison of data collection and general instructional procedures between groups, Table 14 shows the stages and times of the intervention process by condition. Writing assessments and the self-report questionnaire were administered to the entire ninth-grade population of students by the first author before and after instruction. Semi-structured interviews assessing SRSD students discourse knowledge were administered individually by the first author in a quiet classroom. Interviews were administered two weeks after the other measures to minimise any possible influence of the measures in shaping how students responded.

National exam results were also examined to evaluate the impact of SRSD instruction on students' argumentative writing. This measure was not considered initially when designing the present study because it was not a controllable measure. Year 9 Portuguese language arts national exams include an extensive writing essay prompt, in which students are asked to write for a specific purpose, following a particular mode of discourse, which may be different each school year. At the end of this study's school year, however, this writing prompt asked students to write an essay following an argumentative writing mode. Thus, 15 weeks after instruction, we were able to examine data and reevaluate the impact of SRSD instruction on students' writing quality in national exam situations.

Table 14. *Stages of the intervention process by condition*

Stage/Time	Condition		
	Dual-coding SRSD - Group 1 -	Verbal-coding SRSD - Group 2 -	Control
Preinstruction September	Students were taught the characteristics of argumentative texts. Students were taught terminology for understanding writing prompts.	Students were taught the characteristics of argumentative texts. Students were taught terminology for understanding writing prompts.	Students were taught the characteristics of argumentative texts. Students were taught terminology for understanding writing prompts.
Pretesting September (three consecutive weeks)	Students composed 3 essays (choosing from two to control for knowledge and motivation). The same topics were used in the three conditions, and 35 min. were assigned for composing each essay.	Students composed 3 essays (choosing from two to control for knowledge and motivation). The same topics were used in the three conditions, and 35 min. were assigned for composing each essay.	Students composed 3 essays (choosing from two to control for knowledge and motivation). The same topics were used in the three conditions, and 35 min. were assigned for composing each essay.
Instructional procedures developed during intervention December – March (10 lessons)	<p>Students were taught to independently use the PARA and IDEIA strategies to composed an essay (this includes the 6 stages of SRSD instruction) through verbal and visual mnemonics as follows:</p> <p>a) Students were taught the knowledge and skills to use the PARA and IDEIA strategies (this includes instruction in composing a thesis sentence and introductory paragraph; use of transition words and interesting vocabulary; use of evidence to support arguments and counterarguments; maintaining control of the topic; and procedures for assessing the quality of an essay);</p> <p>b) Students were taught to use self-regulatory procedures – goal setting, self-monitoring, self-instructions - to facilitate the acquisition and the use of the SRSD strategies.</p> <p>c) Students were provided with temporary support to help them initially use the SRSD strategies (including brainstorming sheets, graphic organisers, checklists, and cue cards with verbal and visual mnemonics).</p>	<p>Students were taught to independently use the PARA and IDEIA strategies to composed an essay (this includes the 6 stages of SRSD instruction) through verbal mnemonics alone as follows:</p> <p>a) Students were taught the knowledge and skills to use the PARA and IDEIA strategies (this includes instruction in composing a thesis sentence and introductory paragraph; use of transition words and interesting vocabulary; use of evidence to support arguments and counterarguments; maintaining control of the topic; and procedures for assessing the quality of an essay);</p> <p>b) Students were taught to use self-regulatory procedures – goal setting, self-monitoring, self-instructions - to facilitate the acquisition and the use of the SRSD strategies.</p> <p>c) Students were provided with temporary support to help them initially use the SRSD strategies strategy (including brainstorming sheets, graphic organisers, checklists, and cue cards with verbal mnemonics alone).</p>	<p>Teachers reported having worked argumentative text writing as follows:</p> <p>a) Students reviewed the characteristics of argumentative text writing. Teachers directed the generation and organisation of ideas for writing;</p> <p>b) Students were taught a variety of writing skills (including vocabulary, grammar instruction, planning and revision);</p> <p>c) Argumentative writing was produced as homework activity (every other week; once a month);</p> <p>d) Students (34%) participated in two creative writing workshops.</p>
Posttesting March (three consecutive weeks)	Students composed 3 essays (choosing from two to control for knowledge and motivation). The same topics were used in the three conditions, and 35 min. were allotted for composing each essay.	Students composed 3 essays (choosing from two to control for knowledge and motivation). The same topics were used in the three conditions, and 35 min. were allotted for composing each essay.	Students composed 3 essays (choosing from two to control for knowledge and motivation). The same topics were used in the three conditions, and 35 min. were allotted for composing each essay.
Follow-up June (one week)	A single 35 min. session to plan and composed an essay (12 weeks after intervention).	A single 35 min. session to plan and composed an essay (12 weeks after intervention).	A single 35 min. session to plan and composed an essay (12 weeks after intervention).

Reported use of self-regulated strategies for writing. Twelve self-regulated strategies for writing were assessed with a self-report instrument developed and validated by Malpique and Veiga Simão (in press). Theoretically grounded in Zimmerman and Risemberg's socio-cognitive model for self-regulated writing (1997), the questionnaire was designed to evaluate the frequency with which students use environmental, behavioural, and personal strategies to initiate and control school writing tasks. The first scale - environmental processes - assessed environmental structuring, and help-seeking strategies; the second scale - behavioural processes - assessed self-monitoring, self-consequating, and self-verbalising strategies; the third scale - personal processes - assessed time planning, self-evaluating, recalling/creating mental images, and four cognitive strategies (e.g., planning, revising, organising, and reader's awareness). Before answering the questionnaire, students were asked to report the frequency with which they used the strategies described when facing writing tasks in different subjects across the curriculum. Mean completion time was 15 minutes.

Argumentative writing performance. Students were asked to write an argumentative essay in response to one of two prompts. Each prompt had been previously selected, and judged to be similar in terms of interest and difficulty. Controversial yet familiar topics such as "How has new technologies changed communication?" were used to control for students' interest and knowledge. The administration of the topics was also counterbalanced across students and probes (pretest, posttest, and follow-up), to control for confounding due to differences in students' interest. Students were given 35 minutes to write each essay, and two separate sheets of paper to complete the assignment.

Three measures of writing performance were gathered from students' argumentative writing. A first measure – writing quality – was assessed through an analytic scoring method, which involved rating a student's essay on three traits. The analytic scoring used for this purpose was adapted from the American National Assessment of Educational Progress (NAEP, 2010), and from the Portuguese Language Arts Program for the 3rd cycle (years 7-9) (Reis et al., 2009). The six-point scales - 6 representing the highest, and 1 representing the

lowest - were developed to assess predetermined aspects of students' writing. Two ninth-grade teachers who were blind to the purpose and design of the study were trained to use the rating scales. They were provided with representative anchor papers from high, middle, and low scores obtained from two ninth-grade classes that did not participate in the study to practice using the scales. Teachers were also encouraged to discuss the distinguishing features of each specific scoring criteria. After independently scoring each practice essay, raters compared scores, and reached a level of agreement through discussion. Inter-rater reliability, calculated by a Person product-moment correlation, averaged .88 (range = .86 - .92).

The three traits rated in the analytic scales were a) development of ideas; b) organising; and c) language clarity. The development of ideas scale assessed student's knowledge of the topic, how effectively he/she pondered alternative perspectives, and provided supporting evidence considering purpose and reader. The organising scale assessed how effectively a student developed and presented ideas in a clearly logical order, including introduction, arguments and counterarguments, supporting evidence, and conclusion. The language facility scale assessed overall clarity of discourse, and respect for writing conventions (e.g., punctuation; grammar; word usage; spelling). The two teachers previously trained to use the analytic rating scale scored all essays composed by students in the SRSD groups and control group at pretest, posttest and follow-up, and rated student's performance on each trait. The average of the two raters' scores was used for each scale. The argumentative writing quality score reflected the sum of the three averages subtests. The scales were combined into a single score because the measures of the three were correlated (median correlation between scales was .84).

The second writing performance measure assessed the written plan. For each writing assessment, students were given two sheets to complete it: a blank sheet and a lined paper sheet with specific writing prompts. No information on if and how to use the first sheet was provided. Students planning development was measured with a scale ranging from 1 (lowest) to 5 (highest). The scoring scale was based on the non-genre-dependent scale

developed by Whitaker, Berninger, Johnston, and Swanson (1994). Plans that presented first draft writings or only one word or phrase written received scores of 1. Plans that received a score of 2 to 4 reflected an increasingly advanced planning, from listing words to presenting structural relationships between topics. Plans that received a score of 5 presented a map or outline identifying a central theme in response to the prompts, with emerging topics logically related. The first author scored all plans, and a middle-school teacher unfamiliar with the purpose and design of the study independently scored a random sample of 20% of the plans. Inter-rater reliability as assessed by the Pearson product-moment correlation was .85.

The third writing performance measure assessed essay length. All words that represented a spoken word were counted, regardless of spelling. Student-written responses rather than electronic versions were scored for all measures, length included. Previous studies have argued for the need to eliminate potential influences of surface level features (Harris et al., 2012). As the current study aimed to evaluate the implementation of the SRSD instructional routine in whole-class settings, where writing is more often assessed by teachers – such as this study’s raters – we found using student-written responses would enable to extend findings to more natural settings, maximising the validity of assessing writing performance in mainstream school contexts.

The last assessment measure was Portuguese language arts national exam results. National exam marks are given in a grade ranging from 1 (lowest score) to 5 (highest score) following an analytic scoring method that involves rating students’ performance on three components: reading and writing; language facility; and extensive writing. For the purpose of this study, only students’ marks from the extensive writing component were considered for group comparisons. This component scoring criteria included: a) respect for topic and mode (opinion text following an argumentative discourse mode); b) hierarchical *organisation* of discourse (coherence), including evidence to support ideas; c) cohesive discourse (punctuation, and sentence connectors); d) syntax and morphology; e) vocabulary; and f) spelling (Ministry of Education and Science, 2013).

Six students were excluded from this analysis based on one or more of the following criteria: a) failing in at least three subjects (3); b) failing in Portuguese and Mathematics (2); c) leaving the country (1). Subsequent analysis were based on the data of 67 students, Group 1 (N = 22; $M_{age} = 14.11$, $SD = .81$; eleven male, eleven female); Group 2 (N = 22; $M_{age} = 14.19$, $SD = .92$; thirteen male, nine female); and Control (N = 23; $M_{age} = 14.14$, $SD = .96$; ten male, thirteen female).

Discourse knowledge about argumentative writing. Evidence of discourse knowledge about argumentative writing was collected via semi-structured interviews. A modified version of an interview protocol initially designed by Graham, Schwartz & MacArthur (1993) was used. The original version of the interview was translated into Portuguese, and then back-translated into English in order to produce equivalent and culturally appropriate versions of the questions. From the eight non-genre dependent questions, four open-ended questions were adapted to elicit three types of metacognitive knowledge about argumentative writing: a) declarative knowledge, regarding student's knowledge of what good argumentative writing is; b) procedural knowledge, concerning student's knowledge of how they go about the process of composing argumentative essays; c) conditional knowledge, regarding student's knowledge of how and if to employ certain procedures to accommodate writing to a potential reader (Graham, Schwartz & MacArthur, 1993; Raphael, Englert & Kirschner, 1989). Because the quality of students argumentative writing has been found highly correlated to the use of planning and organising strategies (Beauvais, Olive & Passerault, 2011), two questions assessing student's procedural knowledge about planning before and while composing were included.

The interview contained six questions. The first question assessed student's declarative knowledge about argumentative writing (Question 1: Suppose you were asked to be the teacher of your class today and one of the students asked you – What is a good argumentative essay? What would you tell that student?). The next four questions assessed student's procedural knowledge (Question 2: Teachers often ask students to write an essay outside of class, as homework for example. Imagine that you had to write an argumentative

essay about “Why ban smoking advertising?” What kind of things would you do to help you complete that assignment?); planning before writing (Question 3: What kind of things would you do to help you plan before writing that assignment?); planning while writing (Question 4: What kind of things would you do to help you plan while writing that assignment?); and revising/editing (Question 5: Teachers often ask students to change their papers to make them better. If you were asked to change your paper to improve it, what kinds of changes would you make?). The last question assessed student’s conditional knowledge regarding the need to accommodate writing having a potential reader in mind (Question 6: Imagine your teacher asked you to prepare that paper for a sixth-grade student. What kind of things would you do as you wrote your paper?). After SRSD implementation, a seventh question was included to assess social validity of the instruction (Do you think learning PARA and IDEIA strategies has helped you improve argumentative essay writing? If so, in which ways?).

Each interview took up to 25 minutes to complete. All questions were read aloud to students, answers tape-recorded, and subsequently transcribed by the examiner. Questions were rephrased if the student had difficulty understanding it. Students were prompted to add additional information if questions elicited responses such as “I don’t know”, or if a general or nonspecific response was given. Follow-up questions such as “How would you do that?” were used for such purposes.

Individual questions were scored by dividing student’s responses into idea units. Idea units were considered as specific, single ideas in a student’s response (Olinghouse & Graham, 2009), as in “you need to present your arguments”. In other cases, a student’s response was divided into several idea units, as in “we have to present our arguments considering the person who is going to read it”, which was divided into two idea units, namely: a) knowledge of the task; b) efforts to change writing having a potential reader in mind. Four questions assessed specific kinds of procedural knowledge (e.g., Questions 2-5). Therefore, an idea unit was not counted as a new idea if it had been previously included in an idea unit in any of the questions previously solicited, thus ensuring parsimony. For

questions 1-5, each single idea was categorised as production procedures (e.g., “make no spelling mistakes”); substantive procedures (e.g., “plan ideas before writing”, “organise ideas”); help-seeking (e.g., “ask my teacher”); other related (statements related to a given question, which could not be classified in one of the other categories). For question 6, each unique idea was placed into one of the following categories: language focus (e.g., “use simple language”); content focus (e.g., “try to show a less violent perspective of the subject”); no changes (e.g., “I would do the same”).

The scoring systems here applied were adapted from Graham, Schwartz and MacArthur (1993). These systems have been used in several studies investigating differences between proficient and struggling writers (grades 2 to 8) (Gillespie, Olinghouse & Graham, 2013; Lin, Monroe & Troia, 2007; Olinghouse & Graham, 2009; Saddler & Graham, 2007), and in instructional studies (Harris, Graham & Mason, 2006). Because two questions were added to the modified version of the interview protocol, categories were reviewed to include planning before writing, and planning while writing. To assess student’s conditional knowledge regarding the need to accommodate writing to a potential reader, two new categories were created, language focus and content focus. Social validity data collected at posttest (Question 7) were examined through inductive content analysis. The first author scored all interviews, and a PhD student independently scored a random sample of 20% of the interviews. The resulting estimates of Cohen’s Kappa across coder pairs was .87 (coder pair Kappa estimates for declarative knowledge of argumentative writing = .92; for procedural knowledge = .91; for conditional knowledge = .88; for social validity = .93).

Teachers assessment and preparation. Before the study started, the teacher assigned to Group 1 and Group 2 was taught how to implement SRSD instruction. Teacher preparation included a three hours workshop on theoretical and empirical research on writing, and four individual meetings with the first author (16 hours total). An overview on how to implement SRSD strategies to develop students’ writing skills, knowledge, and motivation was presented, including: a) describing and discussing the validity of the planning and writing strategy; b) activating background knowledge on the characteristics of

argumentative writing; c) providing mentor texts to guide students' understanding of genre-specific characteristics; d) reviewing students' initial writing abilities; e) modelling the planning and writing strategies; f) insuring writing activities and prompts conveyed year 9 national curriculum guidelines; g) implementing collaborative practice (including peer support); h) providing individual feedback; i) assisting students when using materials, as self-monitoring checklists; j) fading support during independent practice; and k) mastery criteria (for similar procedures see De La Paz & Graham, 2002). Moreover, the value of both instructional conditions was made equally relevant to insure the teacher would not be predisposed to one condition over the other.

The two teachers assigned to the remaining four classes were interviewed during the implementation of the SRSD strategies by the first author on a weekly basis to assess how writing instruction and argumentative writing instruction were being developed in the control condition.

General Instructional Procedures

Over the course of 12 weeks, students in both SRSD conditions developed mastery of the target strategies, knowledge, and skills for planning and argumentative writing (see Table 14). Average instruction was 1.5 hours a week. During the instructional period, students wrote an equal number of essays in response to the same prompts: four essays collaborative, one as a whole-class activity, the following three with peer support; an average of two in independent practice. For writing practice, students were not initially allotted as specific time to plan and write. However, during the *support it* stage, students found it difficult to manage time for planning and writing, failing to finish the writing assignment during class time (usually 45 minutes). The first author discussed with the teacher the need to explicitly teach students how to manage time for writing. Therefore, in the last five lessons of writing with support and independently students were given specific time for planning (10 minutes), composing (20 minutes) and revising (5 minutes). Because this was a final year of middle-school, with national exams in perspective, managing time for writing was of pivotal importance.

Intervention: Self-regulated strategy development for writing. The SRSD instructional model for writing was implemented in six recursive stages. Each stage of the model involved one or more instructional sessions. The first stage of instruction – *develop background knowledge* – was implemented during the first two lessons. Instructional procedures were kept similar in both SRSD conditions, and the same materials (e.g., mentor texts) and activities (whole-class and peer group) were used to support instruction. At this stage, students were given 35 minutes to write an argumentative essay, which was used later for self-monitoring purposes.

In the second stage of instruction, *discuss it*, students were tested to determine whether they remembered what both mnemonics stood for, and why they were important. This practice was included in the beginning of each lesson for both conditions, as a warm-up activity, until mnemonics were memorised. For Group 1, visual and verbal mnemonics were used to support presentation and discussion. For Group 2, verbal mnemonics alone were used for these purposes.

During the third stage of instruction, *model it*, the teacher modelled the process of using the PARA and IDEIA strategies following a writing prompt (e.g., *as smoke free legislation produced a good impact in the way we live?*). The teacher modelled how to plan an argumentative text using PARA, while “talking-out-loud”. Because the teacher felt students would be more involved in the process if they were given a part in it, students helped the teacher generating ideas for and against the topic, acting as information sources. The teacher also felt this would be the best way to optimise whole-class behaviour, and classroom management. Self-instructions were modelled, including goal setting, problem solving, self-evaluation, and self-reinforcement. This stage was followed by several days of guided instruction, where the teacher helped students using the strategies. A second essay was produced through collaborative practice, and the students were trained to use self-instructions in the composing process, as well as to systematically monitor their work using self-monitoring checklists, and cue-cards to help recall.

In the following three weeks, the support it stage, students worked in pairs to use the strategies, and content learning. Instruction and writing prompts during implementation were always delivered within the Portuguese language arts curriculum and contents. By doing so, SRSD instruction was also used as a tool to promote understanding, learning, and retaining new content and skills (Graham, Harris & McKeown, 2013). Individual feedback was provided on a weekly basis focused on: a) using a strong introductory sentence to interest the reader; b) organising the text coherently and cohesively, by establishing relationships between introductory and concluding paragraphs, as well as in between paragraphs; c) using strong reasons and evidence to support arguments for, and questioning counterarguments reasons and supporting evidence; d) using mature vocabulary, including transition words; e) reviewing punctuation, and language usage. For that, the teacher would give students her personal opinion as a reader regarding the strengths and weaknesses of each student's writings (e.g., your argument against it was really powerful and well supported!), followed by whole-class discussion of best practices.

In both SRSD conditions, students began to work independently - independent performance. In this final stage, the teacher faded assistance and shifted responsibility of using the strategies to the students. Guidance and supporting materials were gradually reduced and students were responsible for independently setting goals, developing essay plans, and subsequently writing their essays from different prompts. Independent performance lasted approximately four sessions. Students in both SRSD conditions verbally rehearsed the steps for PARA and IDEIA (memorise it) throughout the 12-week instruction period.

Treatment-integrity procedures. The following procedures were implemented to ensure instructional routines occurred as planned. First, the teacher received an instructor's manual with scripted lesson plans and other instructional material to guide practice (e.g., cue-cards, mnemonics sheets, graphic-organisers, and checklists). Instructional material was different for each condition (see Table 14). Second, a checklist for each lesson providing step-by-step directions was provided. Third, the first author observed all lessons receiving SRSD

instruction throughout the implementation process, and intervention effects on both SRSD conditions were monitored weekly. Fourth, teacher preference on how to develop specific procedures (e.g., modelling) and materials (e.g., mentor texts) were considered to increase teacher fidelity and sustainability of the intervention. Fifth, SRSD instruction was also adapted to convey students' differences and needs. For example, the teacher failed to provide individual feedback in one condition, and was asked to follow the same pattern of individual support the next lesson.

Results

To test the hypotheses concerning the effects of SRSD instruction on students' writing performance, self-regulated strategy use, and writing knowledge, a series of multivariate analyses of variance (MANOVAs) with repeated measures were conducted. The independent variable was condition, and the repeated measure was time of testing. For writing performance, time of testing included three levels: pretest, posttest, and follow-up. For the reported use self-regulated strategies, and writing knowledge, time of testing included two levels: pretest and posttest. Univariate normality of observations on each variable was examined through Shapiro-Wilk testing (Stevens, 2002) to detect multivariate normality assumption. A nonsignificant Shapiro-Wilk test and Box's M test revealed that MANOVA's assumptions of normality and homogeneity of variance and covariance matrices were met ($p > .05$).

Self-Regulated Strategy Use

A repeated-measures MANOVA was used to evaluate the relationship between conditions and the reported use of 12 self-regulated strategies for writing to determine whether scores differed significantly at posttest. Results indicated a statistically significant multivariate main effect for condition, $F(24,118) = 1.15$, $p = .004$, Wilk's lambda = .48, $\eta_p^2 = .30$, and time of testing, $F(12,59) = 7.09$, $p = .000$, Wilk's lambda = .41, $\eta_p^2 = .59$. Findings also showed there was a significant multivariate interaction effect across time of testing and group, $F(24,118) = 1.66$, $p = .040$, Wilk's lambda = .039, $\eta_p^2 = .25$, indicating that depending on time of testing, there were differences in the reported use of the strategies between

groups. Mean scores and standard deviations for each of the 12 strategies by time of testing and condition are presented in Table 15. Results from the initial contextual screening ($n = 135$ ninth-grade students, sample frame) showed self-evaluating, recalling/creating mental images, and revising were the three most frequently reported strategies. Self-monitoring, help-seeking and reader's awareness were the less reported strategies used in the process of initiating and controlling school writing tasks. At pretest, there were no statistically significant differences between conditions on any of the 12 self-regulated strategies tested.

Given the significance of the overall test, univariate main effects were examined. Tests of simple main effects for the interaction revealed there was a statistically significant difference in the reported use of planning strategies at posttest, $F(2,140) = 8.12$, $MSE = 2.98$, $p = .000$. A follow-up posttest analysis indicated that, after instruction, Group 1 reported using more frequently planning strategies than Control, $p = .000$, $d = 1.27$, and Group 2, $p = .004$, $d = .84$. Tests of simple main effects for the interaction revealed there was a statistically significant difference in the reported use of organising strategies at posttest, $F(2,140) = 10.26$, $MSE = 9.617$, $p = .000$. A follow-up posttest analysis indicated that immediately after instruction, SRSD students reported using more frequently strategies to organise writing than control students, [$p = .000$, $d = 1.20$ (dual-coding and control), $p = .003$, $d = .79$ (verbal-coding and control)]. Tests of simple main effects for the interaction revealed there was a statistically significant difference in the reported use of reader's awareness strategies at posttest, $F(2,140) = 5.80$, $MSE = 7.18$, $p = .004$. At posttest, Group 1 reported using more frequently strategies to accommodate writing to a potential reader than Control, $p = .001$, $d = 1.03$.

Table 15. Means (and standard deviations) results for strategy scores by condition, and time of testing

Variable	Strategy Score						
	Pretest			Posttest			
	SF	Group 1	Group 2	Control	Group 1	Group 2	Control
Environmental Processes							
Environmental structuring	3.59 (1.06)	3.99 (.94)	3.47 (.91)	3.64 (1.00)	3.77 (1.03)	3.08 (1.02)	3.37 (.82)
Help-seeking	2.47 (1.21)	2.33 (1.17)	2.46 (1.30)	2.32 (1.09)	3.15 (1.23)	3.08 (1.28)	2.28 (.80)
Behavioural Processes							
Self-monitoring	2.17 (.99)	2.22 (.84)	2.09 (.98)	2.19 (1.14)	2.49 (.89)	2.07 (.76)	2.12 (.81)
Self-consequating	3.31 (1.00)	3.14 (1.12)	3.61 (.87)	3.35 (1.06)	3.32 (1.06)	3.60 (.73)	3.39 (1.07)
Self-verbalising	3.23 (.93)	3.49 (.86)	3.37 (.80)	3.47 (.65)	3.49 (.73)	3.25 (.81)	3.35 (.97)
Personal Processes							
Time planning	3.13 (.87)	3.19 (.57)	3.11 (.74)	3.23 (.87)	2.93 (.79)	2.99 (.85)	3.11 (.85)
Self-evaluating	3.98 (.79)	4.07 (.75)	3.88 (.75)	4.12 (.77)	4.28 (.75)	3.96 (.77)	4.00 (.77)
Planning	3.74 (.60)	3.76 (.65)	3.82 (.59)	3.59 (.58)	4.30 (.58) ^{ab}	4.02 (.73) ^b	3.63 (.46) ^a
Revising	3.78 (.94)	3.30 (1.32)	3.21 (1.22)	3.42 (1.15)	4.01 (.60)	3.52 (.99)	3.86 (1.04)
Organising	3.11 (1.01)	3.48 (.88)	3.10 (.84)	3.04 (1.21)	4.41 (.63) ^a	4.02 (.73) ^a	3.18 (1.30) ^a
Reader awareness	2.87 (1.13)	2.99 (1.28)	2.95 (1.06)	2.75 (1.19)	3.78 (1.17) ^a	3.12 (1.10)	2.69 (.94) ^a
Recalling/creating images	3.85 (.93)	3.44 (.94)	3.51 (1.14)	3.33 (1.25)	4.06 (.91)	3.52 (1.14)	3.73 (.70)

Note: SF = Sampling Frame; Group 1 = Dual-coding SRSD; Group 2 = Verbal-coding SRSD.

Coefficients in the same row that share a superscript are significantly different from each other. Coefficients without superscript letters are not significantly different from the other coefficients.

* $p \leq .05$, ** $p \leq .01$.

Writing Performance

A repeated-measures MANOVA was used to evaluate the relationship between conditions and the six measures of writing performance to determine whether scores differed significantly at posttest and follow-up. Results showed a significant multivariate main effect for group, $F(12,130) = 9.66, p = .000$, Wilk's lambda = .28, $\eta_p^2 = .47$, and time of testing, $F(12,59) = 12.32, p = .000$, Wilk's lambda = .28, $\eta_p^2 = .71$. There was also a significant multivariate interaction effect across time of testing and group, $F(24,118) = 6.27, p = .000$, Wilk's lambda = .19, $\eta_p^2 = .56$, indicating that depending on time of testing, there were differences between groups in writing performance variables. Given the significance of the overall test, univariate main effects for each of the writing performance measures were examined. Means and standard deviations for each writing performance variable by time of testing, and condition are presented in Table 16, as well as corresponding effect sizes.

Writing quality. Results showed a statistically significant main effect for condition, $F(2,70) = 10.53, p = .000$, time of testing, $F(2,70) = 12.70, p = .000$, as well as for the interaction between time of testing and condition, $F(4,140) = 16.57, p = .000$. Tests of simple main effects for the interaction revealed that there was a statistically significant difference in the quality of argumentative writing at posttest, $F(2,70) = 17.31, MSE = 10.55, p = .000$, and follow-up, $F(2,70) = 16.27, MSE = 12.55, p = .000$, but not at pretest. Following posttest analysis showed students in both SRSD conditions wrote qualitatively better argumentative essays than did students in the control condition. There were also statistically significant differences between SRSD-instructed students at posttest, results revealing Group 1 wrote qualitatively better essays than Group 2. These results were replicated at follow-up. It should be added that the quality of argumentative essays produced by all conditions showed some decline from posttest to follow-up (see Table 16).

Table 16. Means (and standard deviations) for writing performance measures by condition, and time of testing

Variable	Condition			<i>d</i>
	Group 1	Group 2	Control	
Writing Quality				
Pretest	3.99 (.79)	3.85 (.61)	3.96 (.84)	
Posttest	5.05 (.97)	4.14 (.63)	3.76 (.71)	Group 1 > Control** = 1.52 Group 2 > Control* = .56 Group 1 > Group 2** = 1.11
Follow-up	4.95 (.94)	4.13 (.71)	3.50 (.95)	Group 1 > Control** = 1.52 Group 2 > Control* = .75 Group 1 > Group 2** = .97
Developing Ideas				
Pretest	4.40 (.93)	4.02 (.69)	4.10 (.91)	
Posttest	5.21 (.99)	4.33 (.57)	4.14 (.75)	Group 1 > Control** = 1.20 Group 2 > Control = NS Group 1 > Group 2** = 1.36
Follow-up	5.19 (.98)	4.34 (.79)	3.91 (.95)	Group 1 > Control** = 1.31 Group 2 > Control = NS Group 1 > Group 2** = .94
Organising				
Pretest	3.85 (.73)	3.69 (.62)	3.81 (.84)	
Posttest	5.15(.96)	4.22 (.60)	3.90 (.55)	Group 1 > Control** = 1.60 Group 2 > Control* = .55 Group 1 > Group 2** = 1.16
Follow-up	5.23 (.89)	4.34(.79)	3.76 (1.08)	Group 1 > Control** = 1.49 Group 2 > Control* = .61 Group 1 > Group 2** = 1.05
Language Facility				
Pretest	4.02 (.80)	3.82 (.50)	3.89 (.80)	
Posttest	4.62 (1.00)	3.88 (.59)	3.77 (.71)	Group 1 > Control** = .97 Group 2 > Control = NS Group 1 > Group 2* = .90
Follow-up	4.42 (1.11)	3.69 (.73)	3.34 (.98)	Group 1 > Control** = .62 Group 2 > Control = NS Group 1 > Group 2* = .77
Planning				
Pretest	1.23 (.67)	1.14 (.32)	1.09 (.29)	
Posttest	3.87 (1.30)	2.13 (1.27)	1.40 (.71)	Group 1 > Control** = 2.42 Group 2 > Control* = .70 Group 1 > Group 2** = 1.39
Follow-up	3.66 (1.25)	2.08 (1.46)	1.12 (.60)	Group 1 > Control** = 2.59 Group 2 > Control** = .86 Group 1 > Group 2** = 1.25
Length				
Pretest	178.32 (67.83)	161.95 (46.08)	149.37 (45.06)	Group 1 > Control* = .83 Group 2 > Control = NS Group 1 > Group 2 = NS
Posttest	184.44 (40.37)	155.22(50.66)	148.49(69.89)	Group 1 > Control* = .80 Group 2 > Control = NS Group 1 > Group 2 = NS
Follow-up	191.81 (62.58)	181.04 (63.31)	120.26 (59.52)	Group 1 > Control** = 1.31 Group 2 > Control** = 1.32 Group 1 > Group 2 = NS

Note: Group 1 = Dual-coding SRSD; Group 2 = Verbal-coding SRSD.

* $p \leq .05$, ** $p \leq .01$.

Developing ideas. Results showed a statistically significant main effect for condition, $F(2,70) = 9.91, p = .000$, time of testing, $F(2,70) = 9.60, p = .000$, as well as for the interaction between time of testing and condition, $F(4,140) = 5.24, p = .001$. Tests of simple main effects for the interaction revealed that there was a statistically significant difference in developing ideas at posttest, $F(2,70) = 12.39, MSE = 7.74, p = .002$, and follow-up, $F(2,70) = 12.05, MSE = 10.03, p = .000$, but not at pretest. After instruction and 12 weeks later, Group 1 developed ideas qualitatively better than Group 2 and Control. Moreover, no statistically significant differences were found between the last two groups in this measure (see Table 16).

Organising. Results showed a statistically significant main effect for condition, $F(2,70) = 20.67, p = .000$, time of testing, $F(2,70) = 19.94, p = .000$, as well as for the interaction between time of testing and condition, $F(4,140) = 24.03, p = .000$. Tests of simple main effects for the interaction revealed that there was a statistically significant difference in organising scores at posttest, $F(2,70) = 35.27, MSE = 18.54, p = .000$, and follow-up, $F(2,70) = 26.85, MSE = 23.58, p = .000$, but not at pretest. Following posttest analysis showed students in both SRSD conditions wrote qualitatively better organised essays than did students in the control condition. There were also statistically significant differences at posttest between SRSD conditions, results indicating Group 1 produced qualitatively better organised essays than Group 2. These results were replicated at maintenance. It should be added that the argumentative essays produced by SRSD students in both conditions showed some improvement in organising from posttest to maintenance (see Table 16).

Language facility. Results showed a significant main effect for condition, $F(2,70) = 6.14, p = .003$, time of testing, $F(2,70) = 5.60, p = .005$, as well as for interaction between condition and time of testing, $F(4,140) = 6.29, p = .000$. Tests of simple main effects for the interaction showed that there was a statistically significant difference in students' language facility at posttest, $F(2,70) = 8.28.05, MSE = 5.507, p = .001$, and follow-up, $F(2,70) = 8.01, MSE = 7.23, p = .001$. Analyses indicated that immediately following instruction and 12 weeks later Group 1 wrote papers that were judged to show better overall clarity of

discourse, and respect for writing conventions than Group 2 and Control. No statistically significant differences between the latter conditions were found in this measure (see Table 16).

Planning. Results revealed a statistically significant main effect for condition, $F(2,70) = 37.72, p = .000$, time of testing, $F(2,70) = 56.22, p = .000$, as well as for the interaction between time of testing and condition, $F(4,140) = 17.71, p = .000$. Tests of simple main effects for the interaction showed that there was a statistically significant difference in students' planning scores at posttest, $F(2,70) = 30.15, MSE = 38.18, p = .000$, and follow-up, $F(2,70) = 28.97, MSE = 39.37, p = .000$, but not at pretest. Following posttest analysis showed students in both SRSD conditions did more advanced planning than did students in the control condition. There were also statistically significant differences between SRSD conditions, results revealing that Group 1 produced better developed plans. These results were replicated at follow-up (see Table 16).

Length. Results showed no statistically significant main effect for time of testing, but revealed a statistically significant main effect for group, $F(2,70) = 10.92, p = .000$, as well as a significant interaction effect, $F(4,140) = 5.07, p = .001$. Tests of simple main effects for the interaction revealed that there was a statistically significant difference in students' essay length at pretest, $F(2,70) = 5.01, MSE = 14376.49, p = .009$, posttest, $F(2,70) = 5.01, MSE = 12879.45, p = .019$, and follow-up, $F(2,70) = 16.07, MSE = 61400.34, p = .000$. A posttest analysis indicated that Group 1 wrote longer papers than Control across time. At follow-up, both SRSD conditions wrote longer papers than students in the control condition. No statistically significant differences between SRSD conditions were found in this measure (see Table 16).

National exams. One-way analysis of variance (ANOVA) was computed to examine possible differences in students' argumentative writing scores from language arts national exams. Results showed statistically significant differences between SRSD students and control, $F(2,68) = 3.53, p = .035$. Post-hoc comparisons using Tukey's HSD test indicated that Group 1 got higher marks than Control, $M = 3.50, SD = .80$ vs. $M = 2.88, SD = .17, p =$

.015, $d = 1.07$. Statistically significant differences were also found between Group 2 ($M = 3.36$, $SD = .79$) and Control at the .10 level, $p = .055$, $d = .84$. No statistically significant differences were found between SRSD conditions.

Writing Knowledge

Table 17 presents means and standard deviations for scores on the argumentative writing knowledge interview by measure, time of testing, and condition. Production procedures, substantive procedures, and other related scores included all the unique responses assessing students' declarative knowledge about argumentative writing (Question 1). Production procedures, substantive procedures, help-seeking strategies, and other related categories involved all unique responses assessing students' procedural knowledge about argumentative writing (Questions 2-5). No-changes, language focus, and content focus were the number of unique ideas assessing students' conditional knowledge of argumentative writing (Question 6). Together, these seven major categories accounted for 86% of the unique responses produced by students when responding to the six genre-specific discourse knowledge questions. As the questions did not address the same issue, three separate multivariate analyses of variance (MANOVAs) with repeated measures were conducted to evaluate the relationship between the two SRSD instructional conditions and each type of metacognitive knowledge of argumentative writing at posttest. This option was also considered because each type of knowledge employed different scoring categories. Although the same three categories - production procedures, substantive procedures, and other related - were included in declarative and procedural knowledge, the latter also included help-seeking strategies. Conditional knowledge included specific scoring categories. At pretest, there were no statistically significant differences between conditions regarding the variables testing declarative knowledge (all $ps > .46$), procedural knowledge (all $ps > .11$), and conditional knowledge (all $ps > .12$).

Table 17. Means (and standard deviations) for argumentative discourse knowledge measures by condition, and time of testing

Measure and condition	Declarative knowledge of the characteristics of good argumentative writing (Question 1)		Procedural knowledge of how to write an argumentative essay (Questions 2-5)	
	Pretest	Posttest	Pretest	Posttest
Production Procedures				
Dual-coding SRSD	.15 (.38)	.00 (.00)	.46 (.52)	.54 (.52)
Verbal-coding SRSD	.23 (.44)	.08 (.27)	.54 (.52)	.46 (.52)
Substantive Procedures				
Dual-coding SRSD	1.38 (1.12)	1.89 (.95)	3.85 (1.06)	6.00 (.91)
Verbal-coding SRSD	1.08 (.95)	1.89 (.63)	2.77 (1.01)	4.62 (1.19)
Help-seeking				
Dual-coding SRSD	-	-	.08 (.27)	.15 (.37)
Verbal-coding SRSD	-	-	.08 (.27)	.23 (.44)
Other Related				
Dual-coding SRSD	.15 (.35)	.00 (.00)	.15 (.38)	.08 (.27)
Verbal-coding SRSD	.08 (.27)	.00 (.00)	.15 (.38)	.08 (.27)
Conditional knowledge of how to fit argumentative writing to a potential reader (Question 6)				
Measure and condition	Pretest	Posttest		
No Changes				
Dual-coding SRSD	.23 (.44)	.08 (.27)		
Verbal-coding SRSD	.26 (.52)	.09 (.38)		
Language Focus				
Dual-coding SRSD	.59 (.48)	.99 (.27)		
Verbal-coding SRSD	.58 (.51)	.79 (.48)		
Content Focus				
Dual-coding SRSD	.23 (.44)	.41 (.50)		
Verbal-coding SRSD	.15 (.38)	.39 (.43)		

Declarative knowledge. Results showed the multivariate condition effect and the multivariate interaction effect were not statistically significant. However, F ratio for the multivariate main effect for time of testing was significant, $F(3,22) = 2.54$, $p = .021$, Wilk's lambda = .74, $\eta_p^2 = .26$. Univariate main effects were examined to identify significant differences for each variable measuring student's declarative knowledge at posttest. At posttest, SRSD students indicated more substantive procedures involved in the process of argumentative writing, $F(1,24) = 4.55$, $p = .008$, $\eta_p^2 = .15$. When students were asked to indicate the attributes of a good argumentative essay at posttest, they primarily answered the question by describing substantive processes (98%) such as organising ideas, arguing for and against a topic, and planning. No significant statistical differences were found between SRSD conditions on declarative knowledge of argumentative writing.

Procedural knowledge. Results showed the multivariate condition effect and the multivariate interaction effect were not statistically significant. Nevertheless, F ratio for the multivariate main effect for time of testing was significant, $F(4,21) = 15.41$, $p = .000$, Wilk's

lambda = .25, $\eta_p^2 = .75$. Univariate main effects were examined to identify significant differences for each variable measuring student's procedural knowledge at posttest. When inquiring students about the type of things they would do to help them write and plan an argumentative essay at posttest, a single category, substantive procedures, dominated student's responses. At pretest, 66% of students' ideas described substantive procedures such as planning before and while writing, organising ideas, and information generation. Statistically significant difference were found for the effect of time of testing on substantive processes, $F(1,24) = 52.67, p = .000, \eta_p^2 = .69$, indicating that at posttest SRSD students provided more substantive procedures (87%) to explain how they composed argumentative essays. No significant statistical differences were found between SRSD conditions on procedural knowledge of argumentative writing.

Conditional knowledge. Results revealed the multivariate condition effect and the multivariate interaction effect were not statistically significant. However, multivariate time of testing effect was statistically significant, $F(3,22) = 6.69, p = .002$, Wilk's lambda = .52, $\eta_p^2 = .48$. Univariate main effects were examined to identify significant differences for each variable measuring student's conditional knowledge at posttest. When asked what kind of changes in argumentative writing would they make having a younger reader in mind, students mentioned making more changes to fit writing to a potential reader at posttest, $F(1,25) = 7.50, p = .005, \eta_p^2 = .23$. At posttest, students also mentioned making more changes at the language level, such as changing vocabulary and using more simple words, $F(1,25) = 4.74, p = .006, \eta_p^2 = .22$. Moreover, at posttest, students more recurrently considered making content focus changes such as supporting text with pictures to match knowledge and skills of a younger reader, $F(1,25) = 3.98, p = .006, \eta_p^2 = .14$.

Social Validity

Student's perceptions about the effects of learning the strategies on writing performance were analysed. Their responses were highly positive about the procedures they were taught. Five categories accounted for 85% of students' responses about the positive effect on their argumentative writing: 1) organising ideas (81%), as in "it helped me structure

my text; 2) planning (50%), as in “I didn’t usually plan and this helped a lot. Because just using them we are developing our ideas. After finishing our plan, it helps us write the text because we have that plan to support writing”; 3) transforming ideas into written language (42%), as in “before learning the strategies, ideas would come to my mind and I would just write them, and texts were not that good. Now, as I write, and because I tell myself what I am going to write first, my texts are better”; 4) recalling ideas (23%), as in “we don’t forget. We have that organisation, we can change it but it’s there. It’s like having less to worry about. It’s more about focusing in writing, we don’t have to... worry about forgetting ideas”; 5) and managing time for writing (19%), as in “now, I write faster”. After generating the five coding categories, we searched for meaningful differences between students in the two SRSD conditions through independent-samples t-test. There were no statistical differences between the two groups on any of the five categories assessed (all $ps > .12$)

The implemented SRSD strategies were also viewed positively by the teacher who listed several reasons to confirm its validity including: a) most students changed their writing behaviour, because before learning the strategies they did not stop to plan writing, and thus texts and ideas lacked coherence and organisation; b) it helped good, average and struggling writers to plan their texts and improve argumentative writing; c) although it took students time, extra-work, and effort to reach independent practice, the majority of the students felt more confident when facing an argumentative writing task; d) language arts test results improved after implementation of the strategies; e) students became more aware of accommodating their writing to a potential reader. When asked if she perceived any differences between SRSD conditions during instruction, the teacher stated mainly two differences: memorising the strategies and motivation. The teacher stated that it took Group 1 about two lessons to understand the strategies and remember the mnemonics, while it took longer for Group 2 to do so. Classroom observation notes confirmed the teacher’s statements. Group 1 found it more difficult to memorise the second part of the strategies (IDEIA), and were only able to name both strategies steps in the fourth lesson. The teacher also perceived these students to be less motivated when presented to the strategies.

Discussion

In the current study, we examined SRSD instruction for argumentative writing among ninth-grade students and explored differential effects when visual and verbal mnemonics were included in the SRSD instructional routine. We also addressed students and teacher's perceptions on the social validity of the implemented SRSD strategies. No pre-existing differences between groups regarding the dependent variables under study supported the following interpretations of results.

The Impact of Teacher-Implemented SRSD Instruction with Ninth-Grade Students in Whole-Class Settings: Research Question 1

The genre-specific intervention applied in this study taught students strategies for planning and writing an argumentative text. Students were also taught the knowledge, skills, and several self-regulated procedures needed to initiate and control argumentative writing tasks effectively. We anticipated that such instruction would have a meaningful impact on writing performance. We also expected a salutary impact on students' reported use of self-regulated strategies for general school writing tasks, since SRSD instruction includes the explicit teaching of several self-regulatory strategies that may be transferred to other uninstructed genres (Harris, Graham & Mason, 2006).

As predicted, teacher implemented whole-class SRSD instruction enhanced the writing performance of this study's ninth-grade participants. Argumentative texts written by students in both SRSD conditions evidenced greater improvement than those of students in the control condition immediately and 12 weeks after instruction on overall writing quality (effect sizes ranging from .56 to 1.52); organisation and coherence of text structure (effect sizes ranging from .55 to 1.60); and planning development (all effect sizes greater than .70). These results replicate findings from similar studies with younger middle-school students in whole-class settings (De La Paz & Graham, 2002). A subsequent aim was to examine students deliberate planning after SRSD implementation. Before SRSD instruction, 82% of the students in both SRSD and control conditions did not generate any written plans in advance of writing. Immediately after intervention and 12 weeks later, written plans were

more common for both SRSD groups of students. Significant differences were found between SRSD conditions favouring the dual-coding group of students. The plans of these students tended to be more elaborate, including organised hierarchical elements about the topic. These differences were sustained after instruction and 12 weeks later, with effect sizes greater than 1.20 at both times of testing. Regarding essay length, neither SRSD intervention resulted in a reliable increase in the number of words written by students receiving dual-coding or verbal mnemonics alone to support instruction. Previous research with middle-school students (De La Paz & Graham, 2002) had found SRSD-instructed students wrote longer papers immediately after instruction, and one month later. Results from the present study extend findings from several SRSD studies with primary grade students, which have been mixed (Harris et al., 2012). Results from Portuguese language arts national exams confirmed expectations. Fifteen weeks after instruction, SRSD students wrote papers that were judged to be of higher quality than students in the control condition (effect sizes exceeding .87).

Concerning the use of self-regulated strategies for non-genre-specific writing, results provided evidence of significant changes after SRSD instruction in the use of three out of seven strategies tapping personal processes. Differences between SRSD students and control students were found in the reported use of organising, planning, and readers' awareness strategies (effect sizes exceeding .80). Contrary to our initial premise, no meaningful differences were found between students in the reported use of strategies tapping environmental or behavioural processes. These findings may be explained by at least two reasons: 1) the assessment instrument included a larger number of personal self-regulated strategies for writing, thus enhancing the probabilities of finding more significant differences in that category; 2) environmental and behavioural strategies may be more stable categories in the process of self-regulated writing. This study's findings and interpretation of results are consistent with research (Malpique & Veiga Simão, in press) exploring cross-cultural variations in environmental, behavioural and personal self-regulated

strategies for writing, in which the majority of the differences between Portuguese and Brazilian students (88%) were found tapping personal strategies for text composing.

The Incremental Effects of Visual Mnemonics on SRSD Instructional Routine: Research Question 2

Despite the statistically significant differences between SRSD students and control students previously described and discussed, students in Group 2 did not exhibit the same advantages over students in the control condition than students in Group 1. Differences between SRSD conditions were found in all measures of writing performance, with the exception of essay length. These findings suggest adding visual mnemonics to the SRSD instructional routine may be advantageous to improve students' writing performance for two main reasons. First, dual-coding students wrote papers that were judged to be of higher quality than students in the verbal-coding condition. They developed their ideas more effectively, presented more coherent and organised texts, and showed more clarity of discourse and respect for writing conventions. All of these differences were large at posttest and follow-up (effect sizes exceeding .77). Second, Group 1 created more written plans (91% at posttest, and 87% at follow-up) than Group 2 (48% at posttest, 40% at follow-up), with effect sizes higher than 1.24. The plans of the first were also better developed, with 67% of the students creating plans that received a score of 4 or 5 at posttest and follow-up. In contrast, only 35% of Group 2 students received equal scores. Significant differences were also found regarding the reported use of planning strategies for non-genre-specific writing, favouring Group 1. Based on these findings, students receiving dual-coding SRSD instruction made greater gains in writing performance than their counterparts.

However, the addition of visual mnemonics to the SRSD routine did not seem to bring advantages on students' discourse knowledge about argumentative writing. After instruction, students from both SRSD conditions attributed more substantive procedures to describe good argumentative writing, such as organisation and planning. When asked about the type of things they would do to help them write and plan their papers, students also placed their focus primarily on substantive procedures, with more students doing so at posttest. In

addition, students' conditional knowledge about changing their texts considering a potential reader was also statistically significant at posttest. Before SRSD instruction, 65% of the students considered changing their texts when asked to write for a younger student. Such changes would be more on language than on text content (54% and 19% respectively). After instruction, 88% of the students acknowledged the need to change their writing, still placing their attention primarily on language simplification (81%) but with a larger number of students expressing the need to make also changes on text content to fit the reader's knowledge and skills (38%). These findings seem to confirm and extend knowledge on the effectiveness of SRSD instruction to improve students argumentative discourse knowledge. Students' genre-specific knowledge may improve independently of including visual mnemonics in the SRSD instructional routine.

Social Validity of SRSD Instruction: Research Question 3

Results were positive in terms of social validity for both students and teacher. Ninety-six percent of the students reported their argumentative essay writing improved. One student thought that learning the strategies had not improved his writing performance, which was already good, but stated his peer was writing much better. The teacher recommended implementing the strategies with other students. Moreover, the Head of the school in which this study was developed showed interest in providing in-service professional development in SRSD instruction. For that, in the following school year 48 primary and middle-school teachers (years 1-9) from five schools belonging to the same public cluster enrolled in a 25 hours in-service training course in teaching writing and SRSD instruction, a course which was developed by our research team.

Conclusion

The findings of this study have several important educational implications. First, unlike most SRSD intervention studies (Ferretti & Lewis, 2013) this study was developed under the conditions of everyday classroom instruction and writing assessment. By doing so, it extends findings (De La Paz & Graham, 2002; Harris et al., 2012) about the effectiveness of implementing SRSD instruction delivered by regular classroom teachers in whole-class

settings, and in non-English speaking whole classroom environments (Festas et al, in press). Second, these findings extend knowledge on the effectiveness of SRSD with older ninth-grade students. Research shows older students with or without specific learning difficulties struggle with writing (Graham & Perin, 2007). In Portugal, data collected nationwide on secondary students' academic achievement suggested writing difficulties across subject areas (Malpique & Veiga Simão, 2012; Sousa, Ferreira, Romão, Pereira & Lourenço, 2013). As skillful writing becomes gradually the primary mean for assessing progress, evidence-based instruction must be validated to respond to these students needs. Third, and because of that, in the current study SRSD instruction was implemented following the Portuguese language arts curriculum, with instructional activities designed to empower students to write content-area arguments. A major finding of the present study was national exam results from participating students, which reinforce the validity of SRSD instruction in real-life situations.

Fourth, results suggested positive gains of adding visual mnemonics to the SRSD routine with older students. Additional research is needed to replicate these findings. Research on the role of working memory in writing (Kellogg, 1996, 2008) provided evidence of the high demands placed on working memory while monitoring the process of text composing. During the process, providing fast and effortless access to knowledge stored in long-term memory may reduce the load placed on working memory. In the context of teaching SRSD for writing, and in a world more often controlled by a visual culture, such goal may be achieved through the use of visual and verbal mnemonics to act as mediators between the learning stimuli and the strategies to be remembered, and later used by the learner. Taking the current study's findings, practitioners and researches may make more informed and evidence-based choices when designing and implementing SRSD instruction.

Several limitations in the current study need to be noted, as well as future research directions. First, the data came from a single school, despite the fact that the main results confirmed the literature reviewed. Second, no short-term memory tests were conducted to measure individual differences, which could provide stronger evidence of the role visual-coding may play in circumventing students' working memory capacity limits. However, by

providing long-term maintenance data (follow-up and national exam results), an initial claim may be made regarding the more stable effects produced by dual-coding SRSD instruction. Future research should focus on examining individual differences which may corroborate these findings.

This study adds to a growing body of research providing evidence of the effectiveness of teacher-implemented SRSD instruction in whole-class settings. It provides an extensive examination of its impact in ninth-grade students' writing performance, self-regulated strategy use, and genre-specific discourse knowledge. Moreover, it explores incremental effects of using verbal and visual mnemonics in the SRSD routine. There is not, unarguably, one way of teaching writing. However, knowledge about best teaching practices, positively plural, should include SRSD validity as an evidence-based instructional practice for writing in mainstream school contexts.

General Discussion

Writing is a craft before it is an art; writing may appear magic, but it is our responsibility to take our students backstage to watch the pigeons being tucked up the magician's sleeve.

Donald M. Murray (2004, p. 4)

General Discussion

Writing is virtually integrated in all our daily activities, as it is one of the most powerful tools used to communicate and perpetuate knowledge, ideas, traditions and emotions. Despite that, writing has historically received less attention of empirical research, especially when compared to reading (Myhill & Fisher, 2010). Moreover, as the current models of writing as a process were primarily based on research conducted under the scope of English-speaking contexts of learning (Wood & Connelly, 2009), there is still a long path into understanding how the writing processes work, and how writing is developed and taught in different languages and educational settings.

This investigation aimed to extend knowledge on the effectiveness of an evidence-based model to teach writing – the Self-Regulated Strategy Development (SRSD) model (Harris & Graham, 1996) – when implemented by regular classrooms teachers in whole-class Portuguese-speaking environments. For that, a multidimensional perspective of writing was considered, acknowledging the need to assess the context as a first step on the process of adapting EBPs for learning and teaching writing. Hence, our inquiry frame included two interrelated projects – a backup project and a base project – to provide us with insights from different levels involved in the process of promoting junior high-school students self-regulation of argumentative writing, and empowering these students with knowledge and strategies to boost writing achievement.

In a first step, we purposed to assess the context before intervention by examining how ninth-grade students initiated and controlled their school writing tasks in Portuguese-speaking educational settings- our backup project. For that, we developed and validated a self-report instrument which was administered in different schools in Portugal and in Brazil (Study 1). Findings from cross-cultural comparisons (Study 2) suggested self-regulated writing may be a culturally and contextualised bounded process, for statistically significant differences between Portuguese and Brazilian students were found in several of the 12 strategies assessed. Simultaneously, these findings suggested a pattern regarding these

students' strategic options facing general school writing tasks. Namely, ninth-grade students seem to be overall discouraged to seek assistance for writing, and to change their writings having a potential reader in mind. Moreover, these students reported seldom producing a written plan before writing, confirming findings with younger middle-school students (De La Paz & Graham, 2002; Limpo & Alves, 2013a). Furthermore, the option of exploring single-sex cohorts allowed us to look at how gender may interact with culture and context, compelling us to reinterpret previous straightforward comparisons between groups. Indeed, all-male and all-female comparisons provided us with more information to analyse findings, and understand how ninth-grade students may act in the process of self-regulate their writings. We find that by taking such cross-cultural perspective on assessing context before intervention allowed us with a more nuanced information to adapt SRSD instruction to Portuguese ninth-grade students overall tendency to self-regulated writing.

In a second step, we aimed to understand the effectiveness of implementing SRSD strategies for argumentative text writing in whole-class Portuguese settings- our base project. We used a repeated measures design with different measures at pretested, posttest, and follow-up to gather information from different levels of the intervention process. Initially, the option of assessing students' metacognitive knowledge of writing and argumentative writing via semi-structured interviews - Study 3 - provided us with crucial information to adapt SRSD instruction to students' needs. Results from this study confirmed several findings from our backup project regarding ninth-grade students' strategic options to regulate writing. First, students' unwillingness to produce a written plan before writing. Second, students' lack of disposition to make deep changes in their texts when considering a younger reader. Nevertheless, students recurrently pinpointed more substantive procedures (e.g., planning, revising, organising) than production procedures (e.g., spelling mistakes) when describing argumentative writing and explaining how they go about producing an argumentative text. Hence, these findings confirm Kellogg's (2008) benchmarking timeline of developing writing skills, suggesting ninth-grade students to be in a transition stage as they start coordinating

author and text representations in the process of text composing (*knowledge-transforming* stage).

Finally, findings from our core research - Study 4 - supported the effectiveness of the teacher-implemented SRSD strategies in whole-class Portuguese settings. Overall, both groups receiving SRSD instruction profit from learning the implemented strategies. Positive effects of SRSD instruction were found on all writing performance variables (except for length), on knowledge regarding argumentative writing, and on several non-genre-specific strategies tapping personal processes involved in the process of self-regulated writing. Nonetheless, dual-coding mnemonics were found to enhance effects of SRSD instruction in most writing performance variables immediately and 12 weeks after instruction. These preliminary results may support multimedia research (Mayer, 2005), suggesting the importance of providing students with different ways and opportunities to see how they can use learning strategies, including strategies for text composing. More research is needed to replicate these findings, aiming to understand the role images may play in helping students comprehend and retain information when learning and applying SRSD strategies for writing.

Further methodological options were taken to increase the impact of the intervention on student's development of self-regulated strategies for text composing and writing achievement, as well as on teachers' practices for writing instruction. First, SRSD instruction and writing prompts during implementation were always delivered within the Portuguese language arts curriculum program and contents. As an example, during SRSD's *support it* and following *independent performance* stages, students would read a passage from the epic poem by Luís de Camões, *The Lusiads*, and asked to write an argumentative essay from the following prompt: "This passage² advocates love, stronger than conventions. Write an essay in which you argue for or against the character's [Inês] death sentence". By doing so, SRSD instruction was also used as a tool to promote understanding, learning, and retaining new content and skills (Graham, Harris & McKeown, 2013).

²Passage from the episode of Inês de Castro (Canto III). In this lyric-tragic episode, Inês faces capital punishment for her unconditional love for Pedro, the Kings' son.

Second, results from year 9 national exams were collected and analysed to understand the reliability of SRSD effects in real-life situations. This measure was not initially considered when designing this investigation since we could not anticipate the content and writing tasks of these examinations. Opportunely, year 9 national exams completed three weeks after the last data collection included an extensive writing prompt in which students were asked to compose an essay following an argumentative mode. Hence, 15 weeks after SRSD instruction results from these exams suggested SRSD groups were able to overall write better argumentative texts than students in the control group.

Third, after the final stage of data collection (follow-up), the first author offered a workshop to all ninth-grade classes involved in the base-project. Our goal was to provide the opportunity for students and teachers to have an idea of the overall effectiveness of the intervention developed, and simultaneously discuss with all participants how to use the adapted SRSD strategies for argumentative text writing. Finally, the Head of the school invited us to develop an in-service teacher training course (25 hours) in teaching writing and SRSD instruction. Hence, in the first term of the following school year, 48 primary and middle-school teachers (years 1-9) from five schools belonging to the same public cluster enrolled in a course developed by our research team. During the course, theoretical and empirical research on writing, writing development, and self-regulated learning was reviewed. Teachers were also compelled to discuss writing as a process and the need to explicitly teach students how to regulate the composing process. More specifically, the effectiveness of strategy instruction was highlighted. From that, the SRSD model (Harris & Graham, 1996) was presented and its theoretical cornerstones and stages for implementation reviewed and discussed. Finally, through collaborative practice, teachers planned the implementation of SRSD to teach their students to plan and/or revise genre-specific texts, following SRSD guidelines for application (Harris, Graham, Mason & Friedlander, 2008). We find this final step of this investigation was particularly valuable, as it provided us with pivotal information on teachers' practices for writing instruction, as well as their perceptions on writing and on the need to implement EBPs for writing instruction.

Conclusions and Future Research

In this final conclusion, we address three different concerns regarding the development of theoretical and empirical research on writing and self-regulated writing. First, further research is needed to understand how high-school students regulate their writing, in particular argumentative text composing (Perin, 2013). The high-stakes nature of secondary school course grades may impose serious demands on students' abilities to self-regulate the process of translating knowledge, feelings and ideas into written language. Moreover, as a mode of action, argumentation is a core vehicle for reasoning and decision making (Ferretti & Lewis, 2013; Toulmin, 2003). As 21st-century knowledge and evidence rapidly and constantly changes, educational debates (NGSS, 2012; OECD, 2011) have been focusing on the need to empower students into developing argumentative writing skills, as a way to help them face uncertainty in a proactive fashion. Thus, providing these students with opportunities to learn empirically supported strategies to regulate the process of argumentative text composing becomes critical.

Consequently, a second concern regards the need to develop research to understand how writing is being taught in high-school settings, and its implications for teacher training. In the USA context, researchers (Kiuahara, Graham & Hawken, 2009) found that the majority of the participating teachers (language arts, science, and social studies) seldom applied evidence-based instruction for writing, and adaptations for struggling writers. Moreover, as a group, teachers' perceptions were not positive about the quality of college and university preparation they received for teaching writing. Research is needed to replicate these findings, including in Portuguese-speaking educational contexts to understand if and how teachers are trained to teach writing, their perceptions about the importance of writing and of writing instruction, and finally their writing practices. Such research will provide crucial information to support any future initiatives to reform the teaching of writing in Portuguese schools.

Finally, the inquiry frame for the current investigation was grounded on a multidimensional perspective of writing for the adaptation of evidence-based models for writing instruction. Such perspective signs the need to take a multilevel and multimethod

approach to assess, implement analyse and interpret EBPs for writing across different educational contexts and languages of instruction. Cross-cultural research in writing and especially in self-regulated writing is very limited (Fayol, Alamargot & Berninger, 2012; Myhill, Fisher, Jones, Line & Hicks, 2008). Moreover, adaptation of evidence-based interventions for writing, which may become more common options since the fast sharing and tracking of information through the worldwide web, needs to be further considered and discussed. From that, clear-cut guidelines should be provided for how to plan and manage cross-cultural adaptations, and to what extent fidelity to the original model should be maintained (Rosenfield & Berninger, 2009; Soydan & Palinkas, 2014).

All writing, as all paths, has an end. Coming into this challenge as a teacher, this investigation was for me an invaluable learning and developmental process, in which I became a more informed practitioner and researcher. Indeed, this research path was for me a beginning in the process of understanding the challenging task of promoting students' self-regulation of writing. Thus, what writing next?

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For decades, I blew deadlines, refused to let go of manuscripts, and wasted countless hours and reams of paper over drafts that were never good enough. Now, at 52, I am trying to learn to tell myself “It’s good enough,” to hit the send button and move on to the next story. It’s not easy. To a perfectionist, “good enough” sounds more like an epithet. But lowering my standards is the only way I can achieve my writing dreams of productivity and publication. My writing will probably never be perfect, but perhaps if I’m lucky it will be good enough.

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Appendix A

Authorization from the Ministry of Education to Implement Questionnaires in Schools

Exmo(a)s. Sr(a)s.

O pedido de autorização do inquérito n.º 0145400006, com a designação *Questionário de Estratégias de Auto Regulação para Tarefas de Escrita Escolares (QEARTTE)*, registado em 07-10-2011, foi aprovado.

Avaliação do inquérito:

Exmo(a) Senhor(a) Dr(a) Anabela de Abreu dos Santos Malpique
Venho por este meio informar que o pedido de realização de inquérito em meio escolar é autorizado uma vez que, submetido a análise, cumpre os requisitos de qualidade técnica e metodológica para tal devendo, no entanto, ter em atenção as observações aduzidas.
Com os melhores cumprimentos
Isabel Oliveira
Directora de Serviços de Inovação Educativa
DGIDC

Observações:

- a) Deverá ser obtida a autorização expressa dos encarregados de educação dos alunos com menos de 18 anos a inquirir .
- b) Deverá ser obtido o consentimento informado dos alunos maiores de 18 anos a inquirir .

Pode consultar na Internet toda a informação referente a este pedido no endereço <http://mime.gepe.min-edu.pt>.
Para tal terá de se autenticar fornecendo os dados de acesso da entidade.

Appendix B

**Self-Regulated Strategies for School Writing Tasks (SRSSWT)/
Questionário de Estratégias de Autorregulação para Tarefas de Escrita
Escolares (QEARTEE)
Study 1 and Study 2**

Items in Scales³

Environmental Processes

Str. # 1. Environmental structuring

- a. I look for a place where I feel well to write.
Procuro um lugar onde me sinto bem a escrever.
 - b. I look for a place I consider more appropriate to write.
Procuro um local para escrever que considero mais apropriado.
 - c. I try to write in quiet places.
Procuro escrever em locais calmos.
-

Str. # 2. Help seeking

- a. I try to have people around me to ask for more ideas when I write.
Quando escrevo, procuro ter gente à minha volta para poder pedir mais ideias.
 - b. I ask others for help if I need to do a writing task.
Para realizar uma tarefa de escrita, peço ajuda a outras pessoas, se necessário.
-

Behavioural Processes

Str. # 3. Self-monitoring

- a. I keep track of the time I need to complete my writing task.
Para realizar a minha tarefa de escrita, tomo nota do tempo necessário para a completar.
 - b. I write a list of everything I should do to complete my writing task.
Para realizar a minha tarefa de escrita, escrevo uma lista de tudo o que devo fazer para a completar.
 - c. I have a notebook where I register the writing tasks I should do .
Tenho um bloco de notas onde registo as tarefas de escrita que devo realizar.
-

Str. # 4. Self-consequating

- a. I take a break when I finish a writing task .
Quando termino uma tarefa de escrita, faço uma pausa.
 - b. I look for a way to reward myself when I finish my writing task.
Quando termino a minha tarefa de escrita, procuro uma forma de me recompensar.
 - c. I do something that requires less effort when I finish a writing task.
Quando termino uma tarefa de escrita, faço algo que me exija menos esforço.
-

Str. # 5. Self-verbalising

- a. I say the teacher's instructions in my own words in order to do a writing task.
Para realizar uma tarefa de escrita, digo as instruções do professor, utilizando as minhas próprias palavras.
 - b. I tell myself the words I will write as I write the text.
Enquanto escrevo, digo para mim próprio/a as palavras que vou escrever.
-

Personal Processes

Str. # 6. Time planning

- a. I establish a specific time to do a writing task.
Defino um tempo específico para elaborar uma tarefa de escrita.
 - b. I organize my time for each writing task I have to do.
Organizo o meu tempo por cada tarefa de escrita que tenho de cumprir.
 - c. I am aware of the time I have to do my writing task / write my essay .
Estou atento ao tempo que tenho para elaborar a minha tarefa de escrita/escrever o meu texto.
-

³Malpique, A., & Veiga Simão, A.M. (in press). Assessing self-regulated strategies for school writing: Cross-cultural validation of a triadic measure. *Journal of Psychoeducational Assessment*, doi: 10.1177/0734282914547873

Str. # 7. Self-evaluating

- a. I think about whether what I wrote is correct after finishing my text.
Quando termino de escrever o meu texto, penso se está correto o que escrevi.
- b. I think about whether my text is well written after finishing it.
Quando termino de escrever o meu texto, penso se está bem escrito.
- c. I think about whether I did my best after finishing my text.
Quando termino de escrever o meu texto, penso se fiz o meu melhor.

Str. # 8. Planning

- a. I think about several ideas related to the theme that was proposed before I start writing.
Antes de começar a escrever, penso em várias ideias sobre o tema proposto.
- b. I decide which ideas I want to develop before I start writing.
Antes de começar a escrever, decido quais as ideias principais que pretendo desenvolver.
- c. I register my ideas about the theme in written form before I start writing.
Antes de começar a escrever, registo, por escrito, as minhas ideias sobre o tema proposto.
- d. I continue to develop my initial ideas as I write.
Enquanto escrevo, continuo a desenvolver as minhas ideias iniciais.
- e. I think about what I will write further on as I write my text.
Enquanto escrevo o meu texto, penso no que vou escrever mais adiante.

Str. # 9. Revising

- a. I change my text if I am not satisfied with what I wrote .
Modifico o meu texto se não estou satisfeito/a com o que escrevi.
- b. I improve my text by changing some parts (add, remove and rearrange).
Melhero o meu texto modificando algumas partes (acrescentar, retirar e reorganizar).

Str. # 10. Organising

- a. I write an introduction to present the topic.
Escrevo uma introdução para apresentar o tema.
- b. I write a conclusion by summarizing the main ideas.
Escrevo uma conclusão, fazendo um resumo das ideias principais.

Str. # 11. Reader's awareness

- a. I imagine who might read my text before I start writing.
Antes de começar a escrever, imagino quem poderá ler o meu texto.
- b. I ensure that the text I write is suited for whoever might read it.
Verifico se o texto que escrevo se adequa a quem o poderá ler.
- c. As I write my text, I change it according to who might read it.
Enquanto escrevo, modifico o meu texto pensando em quem o poderá ler.

Str. # 12. Recalling/creating mental images

- a. I feel the emotions which I am writing about as I write.
Enquanto escrevo, sinto as emoções sobre as quais estou a escrever.
 - b. I imagine the scenes I am writing about as I write.
Enquanto escrevo, imagino as cenas sobre as quais estou a escrever.
 - c. I visualize the ideas which I am writing about as I write.
Enquanto escrevo, "vejo" as ideias sobre as quais estou a escrever.
-

³Malpique, A., & Veiga Simão, A.M. (in press). Assessing self-regulated strategies for school writing: Cross-cultural validation of a triadic measure. *Journal of Psychoeducational Assessment*, doi: 10.1177/0734282914547873

Appendix C

Argumentative Writing Quality: A Six-Point Scale

Study 3 and Study 4

Argumentative Writing Quality: A Six-Point Scale⁴

Score 6: Responses in this range demonstrate effective skill in responding to the argumentative writing task. It presents a cogent, well-articulated examination of the topic considering the writer's purpose, audience and mode. Arguments and counterarguments are cohesively and coherently presented, with evidence of controlled and effective textual organisation. It demonstrates facility in respecting conventions of standard written Portuguese. In this range, the student is able to:

Developing Ideas

- Formulate a clear position that acknowledges multiple significant aspects about the topic (for/against/neutral).
- Validate and question arguments and counterarguments with clear and strong persuasive reasons to support them.
- Provide persuasive evidence to support arguments and counterarguments.

Organising

- Identify and introduce the topic relevant to the assigned task, examining it insightfully.
- Develop and organize arguments and counterarguments always in a logic and articulated fashion.
- Provide a coherent conclusion summarising with clarity the writer's ideas and position about the topic.

Language Facility

- Consistently provide relationships among ideas with effective transitions (e.g., connectors).
- Use effective vocabulary, well structured sentences and sentence variety.
- Demonstrate superior facility in respecting conventions of standard written Portuguese (e.g., grammar, punctuation, mechanics) but may have minor errors.

Score 5: Responses in this range demonstrate competent skill in responding to the argumentative writing task. It presents a generally well-articulated examination of the topic considering the writer's purpose, audience and mode. Arguments and counterarguments are globally cohesively and coherently presented. Elements are usually well controlled and textual organisation is clear. It generally demonstrates facility in respecting conventions of standard written Portuguese. In this range, the student is able to:

Developing Ideas

- Formulate a position about the topic (for/against/neutral) but may not fully address some of the complexities of the issue.
- Provide arguments and counterarguments with usually persuasive reasons to support them.
- Provide evidence to support arguments and counterarguments.

Organising

- Identify and introduce the topic relevant to the assigned task, and skillfully examine it.
- Develop and organize arguments and counterarguments usually in a logic and articulated fashion.
- Provide a coherent conclusion summarising with some clarity the writer's ideas and position about the topic.

Language Facility

- Provide usually skillfully relationships among ideas using transitions words (e.g., connectors).
- Use appropriate vocabulary, well structured sentences and sentence variety.
- Demonstrate facility in respecting conventions of standard written Portuguese (e.g., grammar, punctuation, and mechanics). May have a few distracting errors but the meaning is clear.

⁴ Malpique, A., & Veiga Simão, A. M.. Developed for Study 3 and Study 4. Adapted from the American National Assessment of Educational Progress (NAEP, 2010), and from the Portuguese Language Arts Program for the 3rd cycle (years 7-9) (Reis et al., 2009).

Score 4: Responses in this range demonstrate adequate skill in responding to the argumentative writing task. It presents an adequate examination of the topic considering the writer’s purpose, audience and mode. It presents relevant arguments and counterarguments, but may also discuss some extraneous points. Elements are usually controlled and textual organisation is sufficient. It demonstrates sufficient respect for the conventions of standard written Portuguese. In this range, the student is able to:

Developing Ideas	Organising	Language Facility
<ul style="list-style-type: none"> • Take a position with ideas usually focused on the topic. • Provide arguments and counterarguments with usually persuasive reasons to support them, but their development may be somewhat uneven. • Provide evidence to support arguments and counterarguments, but their relevance may not always be clear. 	<ul style="list-style-type: none"> • Identify and introduce the topic relevant to the assigned task and adequately examine it. • Develop and organize arguments and counterarguments adequately. Relationships among ideas are mostly clear. • Provide a conclusion summarising some of the writer’s ideas about the topic. 	<ul style="list-style-type: none"> • Provide relationships among ideas using transitions words (e.g., connectors). • Use appropriate vocabulary, usually well structured sentences, and sentence variety. • Demonstrate sufficient respect for the conventions of standard written Portuguese (e.g., grammar, punctuation, and mechanics). May have some errors, but the meaning is clear.

Score 3: Responses in this range demonstrate developing skill in responding to the argumentative writing task. It presents some competence in examining the topic considering the writer’s purpose, audience and mode. It presents some arguments but they are obviously flawed. Uses a simple organisational structure. It demonstrates some problems respecting the conventions of standard written Portuguese. In this range, the student is able to:

Developing Ideas	Organising	Language Facility
<ul style="list-style-type: none"> • Take a position but addressing only some of the aspects of the topic. • Provide arguments supporting the writer’s position, but with little understanding of other perspectives. • Provide mostly tangential or irrelevant reasons and evidence to support arguments. 	<ul style="list-style-type: none"> • Identify and introduce the topic relevant to the assigned task examining some of its aspects. • Develop argumentation with some competence, but with sometimes unclear relationship among ideas. • Provide a conclusion summarising part of the writer’s ideas about the topic, but they may not be clearly relevant, or they may be confusing. 	<ul style="list-style-type: none"> • Provide little relationships among ideas using transitions words (e.g., connectors). • Use correct vocabulary, a little sentence variety, and sentence structure usually correct. • Demonstrate some problems respecting the conventions of standard written Portuguese (e.g., grammar, punctuation, and mechanics). May have some distracting errors that may occasionally impede understanding.

⁴ Malpique, A., & Veiga Simão, A. M.. Developed for Study 3 and Study 4. Adapted from the American National Assessment of Educational Progress (NAEP, 2010), and from the Portuguese Language Arts Program for the 3rd cycle (years 7-9) (Reis et al., 2009).

Score 2: Responses in this range demonstrate marginal skill in responding to the argumentative writing task. It presents little competence examining the topic, and provides weak support for the writer's purpose, audience and mode. It presents a straightforward opinion about the topic. Shows an attempt to organise thoughts by grouping ideas. It demonstrates problems respecting the conventions of standard written Portuguese. In this range, the student is able to:

Developing Ideas

- Take a position but provide just a few reasons to support it.
- Some ideas may not be clearly focused on the topic, with minimal evidence of relevant approaches to the development of ideas.
- Provide brief, general, or inadequate evidence (if any) to support a mainly personal opinion about the topic.

Organising

- Identify the topic but if any introduction is made examines only part of its aspects.
- Shows an attempt to organise thoughts by grouping ideas, but organization is often illogical and unclear.
- May not provide a conclusion summarising the writer's ideas about the topic, but if so ideas may not be clearly focused on the topic.

Language Facility

- Rarely provide relationships among ideas using transitions words (e.g., connectors).
- Make rarely specific word choices, with sentence structure sometimes correct, but with little sentence variety.
- Demonstrate problems respecting the conventions of standard written Portuguese (e.g., grammar, punctuation, and mechanics). It shows many distracting errors that impede understanding.

Score 1: Responses in this range demonstrate little or no skill in responding to the argumentative writing task. The topic is not examined, and provides almost no support for the writer's purpose, audience and mode. Shows no evidence of relevant approaches to organisation. It demonstrates serious problems respecting the conventions of standard written Portuguese. In this range, the student is able to:

Developing Ideas

- State a position but provide no reasons to support it.
- Provide ideas which may not be clearly focused on the topic, with no evidence of relevant approaches to the development of ideas.
- Provide general examples (if any) to support a personal opinion about the topic.

Organising

- Identify the topic along the response, not providing an introduction to present it and examine it.
- Shows no evidence of relevant approaches to organization, grouping ideas in an illogical and unclear fashion.
- May not provide a conclusion, but if so ideas are not focused on the topic.

Language Facility

- Provide no relationships among ideas.
- Make often unclear and inappropriate word choices, with sentence structure often incorrect, and little sentence variety.
- Demonstrate serious problems respecting the conventions of standard written Portuguese (e.g., grammar, punctuation, and mechanics). It shows many errors that impede understanding.

Score 0 = Off topic (e.g., provides no evidence of an attempt to respond to the assigned topic)/Too brief to score/Not written in Portuguese/ Illegible/ Nonverbal

⁴ Malpique, A., & Veiga Simão, A. M.. Developed for Study 3 and Study 4. Adapted from the American National Assessment of Educational Progress (NAEP, 2010), and from the Portuguese Language Arts Program for the 3rd cycle (years 7-9) (Reis et al., 2009).

Appendix D

Discourse Knowledge: Semi-structure interview

Study 3 and Study 4

Discourse Knowledge: Semi-structure interview⁵

Question 1: Suppose you were asked to be the teacher of your class today and one of the students asked you, ‘What is good writing?’ What would you tell that student?

Imagina que um professor te pedia para seres tu a ensinar uma das suas aulas. Um dos estudantes perguntava-te “Professor, o que é escrever bem?” – Qual seria a tua resposta?

Question 2: When good writers write, what kind of things do they do? Quando os bons escritores estão a escrever, que tipo de coisas fazem?

Question 3: Why do you think some students have trouble writing? Porque pensas que alguns alunos têm dificuldades quando escrevem?

Question 4: Again suppose you were asked to be the teacher of your class today, only this time one of the students asked you, ‘What is good argumentative writing?’ What would you tell that student? Imagina agora que um professor te pedia para seres tu a ensinar uma aula, mas desta vez um dos estudantes perguntava-te “ Professor, o que é escrever um bom texto argumentativo?” – Qual seria a tua resposta?

Question 5: Teachers often ask students to write an argumentative essay outside of class, as homework for example. Imagine that you had to write an essay about ‘Why ban smoking advertising?’ What kind of things would you do to help you complete that assignment? Por vezes, os professores pedem aos alunos para escrever um texto depois da aula. Imagina que tinhas que escrever um texto argumentativo sobre “A propaganda de cigarros deve ser proibida?”. O que farias para completar essa tarefa?

Question 6: What kind of things would you do to help you plan before writing that assignment? O que farias para planificar esse texto antes de começares a escrever?

Question 7: What kind of things would you do to help you plan while writing that assignment? O que farias para planificar esse texto enquanto o escrevias?

⁵ Malpique, A., & Veiga Simão, A. M.. Developed for Study 3 and Study 4. Adapted from Graham, Schwartz and MacArthur (1993).

Question 8: Teachers often ask students to change their papers to make them better. If you were asked to change your paper to improve it, what kinds of changes would you make? *Os professores pedem algumas vezes aos alunos para fazerem alterações ao texto, para melhorar o texto. Que tipo de alterações farias?*

Question 9: What would you do if you had difficulties completing that assignment? O *que farias se tivesses dificuldades durante essa tarefa?*

Question 10: If you had to prepare that same paper for another student in year 6, what would you do as you wrote your paper? *Se o professor te pedisse para escreveres esse texto para um outro aluno do 6º ano, imagina, o que farias enquanto escrevias o teu texto?*

Question 11 (at posttest only): Do you think learning PARA and IDEIA strategies has helped you improve your argumentative essay writing? If so, in which ways?). *Pensas que ter aprendido as estratégias PARA & IDEIA te ajudou a escrever melhor um texto argumentativo? De que forma?*

⁵ Malpique, A., & Veiga Simão, A. M.. Developed for Study 3 and Study 4. Adapted from Graham, Schwartz and MacArthur (1993).

Appendix E

Discourse Knowledge: Semi-structure Interview-Categories and Definitions

Study 3 and Study 4

Discourse Knowledge: Semi-structure Interview-Categories and Definitions⁶

Scoring Categories for Semi-Structured Interview - Questions 1 through 11	
Category	Definition and example
1. Environmental Setting	Statements referring to student's efforts to select, organize, and create effective writing settings. (e.g., "Find a quiet place")
2. Help Seeking	Statements referring to student's social sources of writing knowledge and skills to improve text writing (e.g., "Ask my mother")
3. Production Procedures	Statements referring to the written product (e.g., "Write it with little spelling mistakes")
4. Substantive Procedures	Statements referring to the processes of argumentative text writing (planning, translating, transcribing, and revising/evaluating)
A. Knowledge of Task	Statements indicating knowledge about argumentative text writing (e.g., "State my opinion about the topic")
B. Knowledge of Topic	Statements indicating prior knowledge about assignment content (e.g., "Smoking advertising is prohibit in many countries")
C. Information Generation	Statements indicating efforts to secure content for the writing task (e.g., "Go to the internet to get more information")
D. Organizing	Statements indicating efforts to arrange and/or rearrange writing (e.g., "Write an introduction", "Change part of the text")
E. Goal Setting	Statements referring to the establishment of writing goals and sub-goals (e.g., "First, I would think about how I wanted to start.")
F. Planning before writing	Statements indicating efforts to plan before writing (e.g., "Before starting, I would write my ideas in a paper", "Before starting, I would brainstorm ideas about the topic")
G. Planning during writing	Statements indicating efforts to plan while composing (e.g., "While writing, I would think about what I wanted to say latter")
H. Translating	Statements indicating efforts to transform ideas into written language (like language bursts e.g., "ok...I would start to state I absolutely hate... well not like that...")
I. Transcribing	Statements referring to cognitive and physical acts of forming written representations of text (e.g., "I would think about how to spell that word").
J. Revising/Evaluating	Statements refereeing to the processes involved in revising and evaluating (e.g., "I would read my paper and change what was wrong")
5. Motivation and interest	Statements referring to motivation and interest for writing (e.g., "I would give up")
6. Abilities	Statement referring to competence or innate abilities (e.g., "Because they are smart")
7. Fit writing to the reader	Statements indicating efforts to change writing to the readers profile (e.g., "I would change my writing")
A. Language focus	Statements indicating efforts to change language - vocabulary and basic language mechanics - to the readers profile (e.g., "I would put it into different words")
B. Content focus	Statements indicating efforts to change content/ideas to the readers profile (e.g., "I would change my ideas")
C. No Changes	Statements indicating no changes to accommodate writing to a potential reader (e.g., "I would say the same thing")
8. Other	Statements clearly related to the question under consideration, but that cannot be classified in one of the other categories.
9. Unrelated other	Statements unrelated to the question under consideration.
10. Validation of strategies*	Statements referring to perceptions regarding the impact of the learned strategies to compose argumentative essays

⁶ Malpique, A., & Veiga Simão, A. M.. Developed for Study 3 and Study 4. Adapted from Graham, Schwartz and MacArthur (1993).

Appendix F

PARA & IDEIA - Mnemonic Charts

Study 4

Verbal mnemonic⁷

Visual mnemonic

PARA - STOP



Pensa no tema: considera diferentes ideias sobre o tema e regista-as.

Think about the topic: consider different ideas about it and register them.



Avalia ideias: ideias a favor e ideias contra. *Evaluate ideas: ideas for and against.*



Reorganiza ideias: escolhe as que vais usar e numera-as pela ordem em que as pensas colocar no texto. *Reorganise ideas: pick those you want to use, and number them according to the order you wish to present them in the text.*



Atualiza o plano enquanto escreves com... *Update your plan while you write with...*

IDEIA – IDEA



Introduz o tema. *Introduce the topic.*



Defende argumentos a favor, com razões justificativas. *Defend arguments for, with reasons to support it.*



E apresenta contra-argumentos, com razões justificativas. *And present counterarguments, with reasons to support it.*



Inclui exemplos justificativos. *Include supporting evidence.*



Acaba com uma conclusão. *Finish with a conclusion.*



⁷ Malpique, A., & Veiga Simão, A. M.. Developed for Study 4. Adapted from De La Paz and Graham (1997), revised and expanded.

