University of Essex

Contributions of type of instruction, individual differences in cognitive ability and age to the development of explicit and implicit knowledge of L2 English articles: A study with Russian learners of English

Irina Tomak

A thesis submitted for the degree of Doctor of Philosophy in Applied Linguistics

Department of Language and Linguistics

University of Essex, United Kingdom

March, 2019

Table of Contents

ABSTRACT xx

CHAPTER 1 INTRODUCTION AND BACKGROUND 1

1.1. Explicit and Implicit Knowledge and Learning 4

1.2. Explicit and Implicit Instruction 8

1.2.1 Deductive and Inductive Instructional Approaches 10

1.3. Learning difficulty in SLA 12

1.3.1. Learning difficulty of English articles 17

1.3.2. The English Article System 18

1.3.3. Empirical research into second language acquisition of English articles 22

1.3.4. Empirical research into instructed second language acquisition of English articles 24

1.4. Learner Factors that Influence L2 Acquisition 27

1.4.1. Early conceptualization and measurements of aptitude 27

1.4.2. Recent conceptualizations and measurements of aptitude 29

1.4.3. Working memory capacity 36

1.4.3.1. Measures of working memory 39

1.4.3.2. The relationship between working memory and L2 learning 40

1.4.4. Age-related differences 42

1.4.5. L2 learner metacognition and cognitive processes 45

1.5. Summary and Research Issues 47

1.5.1 Research Questions and Hypotheses 52

CHAPTER TWO RESEARCH DESIGN AND GENERAL METHODOLOGY 57

2.1. Design of the study 57

2.2. Context........................57

2.3. Participants........................61

2.4. Targeted structure 62

2.5. Instruments........................63

2.5.1. General L2 proficiency test 64

2.5.2. Language Aptitude Test 64

2.5.3 Working Memory Test........................69

2.5.4. Measures of Implicit and Explicit Knowledge........................70

2.5.4.1. Elicited imitation test *(*EI) 73

2.5.4.2. The oral production test (OP) 77

2.5.4.3. Gap-fill test........................79

2.5.4.4 Metalinguistic knowledge test........................81

2.5.5. Instruction satisfaction questionnaire........................84

2.6. Teaching materials........................85

2.7. Instructional Intervention........................90

2.8. Pilot studies........................95

2.8.1. Participants........................95

2.8.2. Target structure........................96

2.8.3. General procedure 96

2.8.4. Pilot study 1 97

2.8.4.1. Preliminary analyses 97

2.8.4.2. Learners’ performance on the measures of explicit knowledge 98

2.8.4.3. Concluding remarks 103

2.8.5. Pilot study 2 104

2.8.5.1. Preliminary analyses 104

2.8.5.2. Learners` performance on the measures 105

2.8.5.3. Instructional treatment 107

2.8.5.4. Concluding remarks 108

2.9. Main study procedure 108

CHAPTER 3 INVESTIGATING EXPLICIT AND IMPLICIT KNOWLEDGE OF DIFFERENT ARTICLE USES BY INSTRUCTED L2 LEARNERS OF ENGLISH 114

3.1. Abstract 114

3.2. Introduction 114

3.3. Background 116

3.3.1. Validity research on measures of explicit and implicit knowledge 116

3.3.2. Measures of awareness 120

3.3.3. Studies measuring L2 explicit and implicit knowledge of grammatical structures 121

3.4. Research issues 125

3.5. Methodology 125

3.5.1. Participants 126

3.5.2. Targeted uses of L2 English articles 126

3.5.3. Instruments and procedure 127

3.5.3.1 Test of explicit knowledge....................128

3.5.3.2. Tests of implicit knowledge 128

3.5.3.3. Gap-fill test 130

3.6. Preliminary analyses 130

3.7. Results....................131

3.7.1. Construct validity of the tests....................131

3.7.2. The status of the gap-fill test 135

3.7.3. Explicit and implicit difficulty of targeted article uses 140

3.8. Discussion....................144

3.8.1. Measuring explicit and implicit L2 knowledge....................144

3.8.2. L2 learners` explicit and implicit knowledge....................146

3.8.3. Explicit and implicit knowledge of different article uses....................147

3.9. Conclusion 150

3.10. Limitations and suggestions for further research....................151

CHAPTER 4 THE ROLE OF LANGUAGE LEARNING APTITUDE AND TYPE OF INSTRUCTION IN THE DEVELOPMENT OF EXPLICIT AND IMPLICIT KNOWLEDGE OF L2 ENGLISH ARTICLES 153

4.1. Abstract....................153

4.2. Introduction....................154

4.3. Background....................154

4.3.1. Explicit and implicit knowledge and learning....................154

4.3.2. Explicit and implicit instruction 156

4.3.3. Individual differences in cognitive ability: language learning aptitude and working memory 158

4.3.4. Aptitude-treatment interaction research 160

4.4. Research Issues 162

4.5. Methodology 163

4.5.1. Participants 163

4.5.2. Target structure 164

4.5.3. Instructional treatment 164

4.5.4. Instruments and procedure 166

4.5.4.1. L2 English proficiency. 167

4.5.4.2. Language learning aptitude. 167

4.5.4.3. Working memory. 167

4.5.4.4. Tests of explicit and implicit L2 knowledge. 167

4.6. Preliminary analyses 169

4.7. Results 170

4.7.1. The effect of deductive, guided inductive and incidental instruction on explicit and implicit L2 knowledge 170

4.7.2. Aptitude-treatment interaction in terms of gains in explicit and implicit L2 knowledge 174

4.8. Discussion 184

4.8.1. General instructional effects 184

4.8.2. Development of explicit knowledge of L2 articles 184

4.8.3. Development of implicit knowledge of L2 articles..186

4.9. Conclusion 188

4.10. Limitations and suggestions for future research 189

CHAPTER FIVE EVALUATING THE CONTRIBUTIONS OF AGE, TYPE OF INSTRUCTION AND INDIVIDUAL DIFFERENCES IN COGNITIVE ABILITY: DEVELOPMENT OF EXPLICIT AND IMPLICIT KNOWLEDGE OF L2 ENGLISH ARTICLES 191

5.1. Abstract 191

5.2. Introduction..192

5.3. Background 193

5.3.1. Explicit and implicit knowledge and learning...193

5.3.2. Previous research on age effects in instructed L2 learning 194

5.3.3. Individual differences in cognitive ability: foreign language learning aptitude and working memory 197

5.4. Research issues 199

5.5. Methodology 200

5.5.1. Participants 200

5.5.2. Target structure...201

5.5.3. Instructional treatment..201

5.5.4. Instruments and procedure 203

5.5.4.1. L2 English proficiency. 203

5.5.4.2. Language learning aptitude......203

5.5.4.4. Working memory......203

5.5.4.5. Tests of explicit and implicit L2 knowledge. 204

5.6. Preliminary analyses 206

5.7. Results......206

5.7.1. Age and instruction 206

5.7.2. Age and individual differences......216

5.8. Discussion......224

5.8.1. Development of explicit and implicit L2 knowledge of articles......224

5.8.2. Effects of instruction 224

5.8.3. Effects of age......225

5.8.4. Age and individual differences in cognitive ability 226

5.9. Conclusion 229

5.10. Limitations and suggestions for future research 230

CHAPTER SIX LEARNERS` PERCEPTIONS AND BELIEFS ABOUT DEDUCTIVE, INDUCTIVE AND INCIDENTAL INSTRUCTION......231

6.1. Previous research on the effects of learner perceptions and beliefs on L2 learning......231

6.2. Research issues 233

6.3. Participants and instruments 234

6.4. Results......234

6.4.1. Type of instruction, age and learner satisfaction with instruction 234

6.4.2. Type of instruction, age, instruction satisfaction and the development of explicit and implicit knowledge 237

6.4.3. Qualitative results of positive and negative perceptions of different types of instruction 241

6.4.3.1. Teacher`s encouragement/support 241

6.4.3.2. The structure and content of classes 241

6.5. Summary of main findings and conclusion....243

CHAPTER SEVEN GENERAL DISCUSSION AND CONCLUSION....245

7.1. The measures of explicit and implicit knowledge 246

7.2. Explicit and implicit knowledge of individual article uses....247

7.3. Contributions of different types of instruction....251

7.4. The relationship between age and type of instruction....255

7.5. Contributions of age, type of instruction and cognitive abilities to the development of explicit knowledge 256

7.6. Contributions of age, type of instruction and cognitive abilities to the development of implicit knowledge....258

7.7. Contributions of learners` perceptions and beliefs to the development of explicit and implicit knowledge....261

7.8. Overall conclusion 262

7.9. Limitations of the study and suggestions for further research 263

REFERENCES 267

APPENDICES 293

Appendix A. Background information questionnaire 293

APPENDIX B. Elicited imitation test 294

APPENDIX C. Oral production test 300

APPENDIX D. Gap-fill test 302

APPENDIX E. Metalinguistic knowledge test 308

APPENDIX F. Backward digit span test 314

APPENDIX G. Instruction satisfaction questionnaire 315

APPENDIX H. Teaching Materials 317

APPENDIX I. Targeted article uses 340

APPENDIX J. Correlations between LLAMA subtests 341

List of Tables

Table 1.1 Taxonomy of variables impacting implicit and explicit learning difficulty 16

Table 1.2 Referential uses and generic uses of the definite article...19

Table 1.3 Uses of the zero article 20

Table 1.4 Definiteness and specificity: contexts of use...21

Table 2.1 Summary characteristics of participants (N total = 115)..62

Table 2.2 Targeted article uses 63

Table 2.4 Participants` responses to selected questions 75

Table 2.5 Obligatory occasions of nine article uses 78

Table 2.6 Teaching sessions, associated texts and article uses, and topics covered as a part of the instructional intervention..85

Table 2.7 Teaching sequences for the use A/an + first mention (core text: "Healthy Henry and Susanne Stressed")..94

Table 2.8 Article uses targeted in the pilot studies..96

Table 2.9 Reliability analysis 98

Table 2.10 Descriptive statistics for the measures (N=32)..98

Table 2.11 Correlations: sentence correction, sentence explanation, rule illustration subtests, MLK total and a gap-fill test (N=32)..99

Table 2.12 Correlation: proficiency, gap-fill test, sentence correction, sentence explanation, rule illustration and MLK total (N=32) 100

Table 2.13 Descriptive statistics for source attributions and confidence ratings (N of items = 40) 101

Table 2.14 Correlations: gap-fill test, source attributions and confidence ratings (N of items = 40)......102

Table 2.15 Mean correct scores and standard deviations across the measures (N=20)..............105

Table 2.16 Descriptive statistics for language aptitude (N=20) 105

Table 2.17 Correlation: proficiency, aptitude, WM and implicit measures (N=20) 106

Table 2.18 Administration of instruments......109

Table 2.19 Article uses: order of teaching......110

Table 3.1 Targeted article uses 127

Table 3.2 Internal consistency (Crobach`s α) for tests of explicit and implicit knowledge (N=115) 131

Table 3.3 Descriptive statistics for the measures of explicit and implicit knowledge of English articles (N=115)......131

Table 3.4 Pearson correlation matrix for L2 learners` performance on the sub-tests (N=115)...132

Table 3.5 Principal component analysis......134

Table 3.6 Rotated 2-component matrix for the measures (N=115)......134

Table 3.7 Descriptive statistics for source attributions (frequency of use) and confidence ratings by item (N of items = 36) 136

Table 3.8 Pearson correlation matrix for source attributions and confidence ratings (N of items = 36)......136

Table 3.9 Distribution of source attributions and confidence ratings per targeted article uses by item (N of uses = 9) 139

Table 3.10 Difficulty ranking (descending order) and descriptive statistics for the error explanation and rule illustration sub-tests by targeted article uses by item (N of uses = 9) 141

Table 3.11 Difficulty ranking (descending order) and descriptive statistics for the gap-fill test by targeted article uses by item (N of uses = 9) 142

Table 3.12 Difficulty ranking (descending order) and descriptive statistics for the EI test by targeted article uses by item (N of uses = 9) 143

Table 3.13 Correlations (Spearman`s rho): difficulty rankings for the error correction and rule-illustration sub-tests, the gap-fill test and the EI test...144

Table 4.1 L2 learners' proficiency level by treatment group (N=115) 163

Table 4.2 Descriptive statistics for language learning aptitude and WM – whole sample (N=115) 175

Table 4.3 Correlations: Proficiency, aptitude, WM, explicit and implicit L2 knowledge gain scores – whole sample (N=115) 176

Table 4.4 Correlations by treatment group: Proficiency, aptitude, WM, explicit and implicit L2 knowledge gain scores..177

Table 4.5 Regression model summary: MLK test – whole sample (N=115) 178

Table 4.6 Regression model summary: MLK test – incidental group (N=39) 179

Table 4.7 Regression model summary: Gap-fill test – whole sample (N=115) 179

Table 4.8 Regression model summary: Gap-fill test – incidental group (N=39) 180

Table 4.9 Regression model summary: Oral measures – whole sample (N=115).......................181

Table 4.10 Correlations: Aptitude subtests and oral measures – whole sample (N=115)...........181

Table 4.11 Regression model summary (LLAMA subtests): Oral measures – whole sample (N=115) 182

Table 4.12 Regression model summary: Oral measures – deductive group (N=38)...................182

Table 4.13 Regression model summary: Oral measures – guided inductive group (N=38) 183

Table 4.14 Regression model summary: Oral measures – incidental group (N=39)...................183

Table 5.1 Descriptive statistics for the performance of each instructional group on the MLK test at pre-test, post-test and delayed post-test (N total = 115). 206

Table 5.2 Descriptive statistics for the performance of each instructional group on the Gap-fill test at pre-test, post-test and delayed post-test (N total = 115)...207

Table 5.3 Descriptive statistics for the performance of each instructional group on the Oral measures at pre-test, post-test and delayed post-test (N total =115). 208

Table 5.4 Results of one-way ANOVAs on pre-test scores and post-hoc pairwise comparisons (N=115) 209

Table 5.5 Ancova post-hoc pairwise comparisons for instruction (N=115)................................215

Table 5.6 Descriptive statistics for language aptitude and WM by age group (N total = 115) ...216

Table 5.7 Correlations by age group: Proficiency, aptitude, WM, explicit and implicit L2 knowledge gain scores (N total = 115) 217

Table 5.8 Regression model summary: MLK test: immediate gains – younger learners (N=55) 219

Table 5.9 Regression model summary: MLK test: delayed gains – younger learners (N=55) ...219

Table 5.10 Regression model summary: Gap-fill test – younger learners (N=55)......................220

Table 5.11 Regression model summary: Gap-fill test – older learners (N=60) 220

Table 5.12 Regression model summary: Oral measures – younger learners (N=55).................221

Table 5.13 Regression model summary: Oral measures – older learners (N=60).......................221

Table 5.14 Correlations: Aptitude subtests and oral measures – younger learners (N=55) 222

Table 5.15 Regression model summary (LLAMA subtests): Oral measures – younger learners (N=55) 223

Table 6.1 Descriptive statistics for instruction satisfaction by age group (N = 115). 235

Table 6.2 Descriptive statistics for instruction satisfaction by instruction group (N = 115).......235

Table 6.3 Correlations: instruction satisfaction scores, explicit and implicit L2 knowledge gain scores – whole sample (N=115) 237

Table 6.4 Correlations by age group: instruction satisfaction, explicit and implicit L2 knowledge gain scores (N total = 115) 238

Table 6.5 Correlations by instruction group: instruction satisfaction, explicit and implicit L2 knowledge gain scores (N= 115) 239

List of Figures

Figure 1.1 Revised model of working memory (Baddeley, 2000) 38

Figure 2.1 LLAMA_B 66

Figure 2.2 LLAMA_D..67

Figure 2.3 LLAMA_E 68

Figure 2.4 LLAMA_F 68

Figure 2.5 Timeline and the key stages of the main study 113

Figure 4.1 Learners` performance on the Metalinguistic knowledge (MLK) test at pre-test, post-test and delayed post-test..170

Figure 4.2 Learners` performance on the Gap-fill test at pre-test, post-test and delayed post-test 171

Figure 4.3 Learners` performance on Oral measures at pre-test, post-test and delayed post-test 172

Figure 5.1 L2 learners` performance on the MLK test at pre-test, post-test and delayed post-test 211

Figure 5.2 L2 learners` performance on the Gap-fill test at pre-test, post-test and delayed post-test..212

Figure 5.3 L2 learners` performance on the Oral measures at pre-test, post-test and delayed post-test..213

List of Abbreviations

ATI Aptitude-Treatment-Interaction

CANAL-F Cognitive Ability for Novelty in Acquisition of Language—Foreign

CFA Confirmatory Factor Analysis

BDS Backward Digit Span test

DLAB Defense Language Aptitude Battery

EI Elicited imitation test

EILTS The International English Language Testing System

FFI Form-Focused Instruction

FoF Focus-on-Form

FonFS Focus-on-Forms

GJT Grammaticality Judgement Test

Hi-LAB High-level Language Aptitude Battery model

L1 First Language

L2 Second Language

LTM Long Term Memory

MLAT Modern Language Aptitude Test

MLK Metalinguistic knowledge test

OP Oral production test

PCA Principal Component Analysis

PLAB Pimsleur Modern Language Aptitude Battery

PPP Presentation-Practice-Production

PSTM Phonological short-term memory

QPT Quick Placement Test

SD standard deviation

SLA Second Language Acquisition

TGT Timed Grammaticality Judgement Test

WM Working Memory

UGJT Untimed Grammaticality Judgement Test

ACKNOWLEDGEMENTS

I would like to express my most profound gratitude to my supervisor Dr Karen Roehr-Brackin, who is an immensely inspirational researcher and a scientist. You have guided me in the transition from a language teacher to a researcher and unfailingly supported me in this challenging journey. You consistently allowed this thesis to be my own work but steered me in the right direction whenever you felt I was off the track. I am indebted to you for your encouragement and support in the preparation and presentation of my research at conferences at University of Essex, University of Cambridge, Newcastle University and at the international TDL conference in Munich. You have my utmost gratitude for your valuable contribution and feedback on every line of this thesis. Your elegant, precise and beautifully-worded comments transformed my vague ideas and intuitive feelings in words, paragraphs, sections and chapters which form this thesis. Karen, thank you for supporting me so patiently during my difficult times!

Similar profound gratitude goes to the members of my supervisory panel Prof Monica Schmid and Dr Adela Gánem-Gutiérrez who helped me to face the challenges of my bumpy PhD journey by willingly sharing their expertise, encouraging my academic endeavours and having faith in me and my work.

I am also appreciative to the Second Language Research Group in the Department of Language and Linguistics at University of Essex for their feedback on the teaching materials, instruments, analyses and the interpretation of the results of the present study. Thank you all very much!

On a personal level, I would like to express my heartfelt gratitude to my life-couch, my inspiration, my strictest and my most loving teacher and supporter, my mother: because I owe it all to you. Your emotional generosity and your encouragement have become the strongholds of my often troubled and uneasy mind. You constantly reminded me to continue with my academic journey in the most challenging times. You suffered hours of telephone conversations filled with strong emotions and doubts on my side. You unfailingly managed to lift my spirits, talk common sense into me and foster my emotional and mental resilience. I have always looked for sanctuary in your unconditional love, patience and care, and you have always given it to me. I would not have completed my PhD study without you, thank you mum!

I am indebted to my forever enthusiastic and interested late grandmother Irina: she always encouraged my ambition to pursue a PhD. She inspired my love to education and constant questioning, she believed in dreaming big, raising above circumstances and keeping hard work going despite challenges life constantly throws at us. I miss your amazing mental stamina, discipline of mind and heart and also just your general determination to succeed.

Finally, but by no means least, thanks go to Shaun for your almost unbelievable support and love. You suffered this journey with me and often took a full blast of my disillusionment, emotional and physical struggles and collapsing nerves. Thank you for being by my side through my darkest moments!

Contributions of type of instruction, individual differences in cognitive ability and age to the development of explicit and implicit knowledge of L2 English articles: A study with Russian learners of English

ABSTRACT

This thesis examines the role of type of instruction, individual differences in aptitude and working memory (WM), and age in the development of explicit and implicit knowledge of second language (L2) articles. One hundred and fifteen Russian learners were randomly assigned to one of three instructional conditions: a deductive and a guided inductive condition instantiated explicit, form-focused instruction, and an incidental condition instantiated implicit, meaning-focused instruction. Participants completed a specially designed suite of tests measuring their implicit and explicit knowledge as well as the LLAMA aptitude battery and a backward digit span test.

With regard to the role of instruction, aptitude and WM, it was found that the two types of explicit instruction led to larger gains in explicit knowledge than implicit instruction. The guided inductive approach was the most effective for the development of implicit knowledge. Aptitude and WM were relevant for the acquisition of implicit knowledge in the deductive and incidental conditions, but not in the guided inductive condition. This indicates that either type of explicit instruction levels out individual differences in the development of explicit knowledge, whereas the finding that in the development of implicit knowledge only guided inductive instruction results in a levelling effect may suggest that its reflection of a developmental path from exemplar to schema is beneficial to all learners.

In relation to explicit and implicit knowledge of individual article uses, the results show that the different uses varied in their explicit vs. implicit learning difficulty, with certain uses standing

out as “hard” or “easy” in terms of the specific type of knowledge (explicit vs. implicit) involved. This suggests that different article uses behave like a range of L2 constructions, with some uses being less amenable to explicit instruction than others.

Results pertaining to the contributions of age, type of instruction and individual differences indicate that the two types of explicit instruction were equally effective for the development of explicit and implicit knowledge for younger and older teenage learners. Aptitude marginally predicted gains in implicit knowledge in younger teenage learners only. Thus, explicit form-focused instruction seemingly trumped age effects and levelled out individual differences in the development of explicit knowledge.

CHAPTER 1 INTRODUCTION AND BACKGROUND

Imagine: a 15-year old girl is standing in the middle of the classroom in Granby High school in Norfolk, Virginia. She is an exchange student from Russia. She has just been asked what a typical day in the life of a Russian teenager looks like, but she is unable to say a word. Her mind is rushing as she is trying to remember the text from Streetwise Intermediate, the student book that she uses at school. Finally, she manages to recall the first sentences of the text that she learnt by heart in preparation for her oral achievement exam. She knows she needs to draw on the text to talk because this is one of her first times speaking English in front of native speakers. If she does not follow the text, she will not be able to say much. The girl is making a lot of mistakes. She can hear some of them as she is trying to monitor her speech. It is effortful, but she is trying very hard to continue.

This is how more than 15 years ago I experienced one of the most embarrassing but at the same time one of the most enlightening moments in my life. Once I finished talking I returned to my seat and started reflecting upon why I could not produce a coherent and grammatically correct account of the topic that I believed to be very easy. As it turned out, this moment of realisation that my ability to speak freely was constrained and that my attempts to consciously control my speech impeded my speaking ability has changed my whole life to the point that I have decided to become a student of this realisation. This is how my scientific interest in applied linguistics was born. At that time, I did not know that instructed second language (L2) learners develop two types of knowledge: explicit conscious knowledge that I tried to use to moderate my production and correct my mistakes, and implicit knowledge that I was clearly lacking since my prior experience of using language in spontaneous communication had been very limited.

Later in life when I started teaching foreign languages I wondered why students who acquire a language in similar instructional settings achieve different results with some students being more successful in their language learning than others. What factors could explain the differences in individual language achievement? I speculated drawing on my intuitive knowledge of learning and teaching experience but had no clear answers. What is more, I could see that some of the linguistic forms in a foreign language were easier to acquire than others and that challenging grammatical forms required more instruction and more practice and production activities. Upon reflection I realised that some of these forms that my students find hard to master either were or in certain cases still are the source of my own difficulties in language. So, what makes some structures easier to learn than others? What factors influence the process of acquisition? What can I as a teacher do to guide the learning process? For all these questions I had only intuitive answers.

Overall, my cumulative linguistic experience from a position of an instructed L2 learner and a teacher has influenced and shaped my scientific interest and played a part in the evolution of my understanding of the question pertaining to the factors impacting on the acquisition of a foreign language. The present study was set with an aim to address it by a) examining the effectiveness of explicit and implicit instruction for the development of explicit and implicit knowledge, b) selecting a grammatical structure of high learning difficulty; c) recruiting teenage learners acquiring English in an instructed setting characterised by limited exposure to native or near-native input, d) investigating contributions of individual differences in cognitive ability to learner development, e) exploring effects of age along with interactions between age, instruction and cognitive ability, and f) examining the role played by learner perceptions and beliefs about instruction.

This thesis is organized as follows. Chapter 1 introduces the main variables of implicit and explicit knowledge, implicit and explicit instructional approaches, the English article system and factors assumed to explicate interindividual variation in L2 learning outcomes. It also and provides definitions for each concept as well as associated theoretical background and relevant L2 research.

Chapter 2 presents the research design and general methodology, namely participants and data collection, instruments aimed at measuring explicit and implicit knowledge of English article uses, the measures of language proficiency, language aptitude, and working memory capacity as well as a detailed description of three different types of instructional interventions and associates with them teaching materials.

Chapter 3 examines L2 learners` explicit and implicit knowledge of the targeted article uses by employing a specially designed suite of tests aimed at providing reliable measurements of the two types of knowledge as well as self-reported measures of awareness, i.e. source attributions and confidence ratings.

Chapter 4 addresses the effectiveness of the explicit form-focused type of instruction and the implicit meaning-focused type for the development of explicit and implicit knowledge of L2 English articles and evaluates the contributions of individual differences in aptitude and working memory to the gains made by L2 learners.

Chapter 5 investigates whether younger and older teenage L2 learners who have been exposed to different instructional approaches differ in their explicit and implicit knowledge of L2 English articles; and explores the predictive value of language learning aptitude and working memory capacity for younger and older teenage learners` development of explicit and implicit knowledge of L2 English articles.

Chapter 6 examines the contributions of learner perception and beliefs to the development of explicit and implicit knowledge of L2 English articles

Finally, Chapter 7 provides a summary of the main findings of the study and relates them to findings of previous research, outlines its limitations, and concludes with suggestions for further research.

1.1. Explicit and Implicit Knowledge and Learning

The constructs of explicit and implicit knowledge have generated a long-standing interest in the field of second language acquisition (SLA), fuelling extensive empirical investigations into the contributions of the two types of knowledge to second language (L2) development (Vafaee et. al, 2017; Rebuschat, 2013; R. Ellis et al., 2009; N. Ellis, 2015). It has been argued that L2 learning draws on both explicit and implicit learning mechanisms which typically result in the development of explicit and implicit knowledge of the target language respectively (Williams, 2009; N. Ellis, 2005, 2015). Explicit knowledge is understood as conscious linguistic knowledge that can be called up on demand and articulated in a verbal statement (N. Ellis, 2005; Bowles, 2011; R. Ellis, 2004). R. Ellis (2004, pp. 244-245) defines explicit knowledge as "the declarative and often anomalous knowledge of the phonological, lexical, grammatical, pragmatic, and sociocritical features of an L2 together with the metalanguage for labelling this knowledge". It is typically accessed through controlled processing when L2 learners experience some kind of linguistic difficulty in the use of the L2 (Roehr-Brackin, 2015; R. Ellis, 2004, 2005).

Explicit learning applies to learning scenarios where learners consciously and deliberately attempt to acquire language material or engage in linguistic problem solving and active hypothesis testing (Dörnyei, 2009; N. Ellis, 2015). Whilst explicit learning is a fast and efficient process allowing for successful learning from minimal input, it is a highly resource intensive process drawing on attentional resources for the processing and maintenance of information in working memory and thus cognitively taxing (Rodríguez Silva & Roehr-Brackin, 2016; Roehr-Brackin, 2015). Explicit knowledge is thought to facilitate the process of L2 acquisition by speeding the process of form-meaning mapping, contributing to linguistic problem solving, or may be drawn upon in controlled production, which through usage may result in the development of more automatized knowledge (N. Ellis, 2011; Gutiérrez, 2013). Explicit knowledge can be subdivided into metalinguistic knowledge and metalanguage (Roehr, 2008). Metalinguistic knowledge refers to learners' ability to correct, describe, and explain L2 errors (Roehr, 2008). Metalanguage is the language used to describe language in technical or semitechnical terms and is learnt through instruction or observation (R. Ellis, 2008).

Implicit knowledge, on the other hand, is tacit and intuitive knowledge of language, inaccessible to conscious inspection and non-verbalizable. It underlies communicative ability in spontaneous comprehension and production and is typically regarded as the primary goal of L2 learning (R. Ellis, 2005). N. Ellis (2015, p. 3) defines implicit learning as the "acquisition of knowledge about the underlying structure of a complex stimulus environment by a process which takes place naturally, simply and without conscious operations". Implicit learning is based on chunk learning where learners internalise words and sounds on the basis of how frequently they encounter them in the input. These are then used to derive constructional schemas (R. Ellis, 2015). Implicit learning draws on similarity-based processing, which is flexible, dynamic and susceptible to contextual variation (Diesendruck, 2005). It is a relatively slow process requiring ample input exposure over time to be effective. Implicit learning results in implicit knowledge, which is accessed effortlessly and with ease.

The question of what the nature of the relationship is between explicit and implicit knowledge – namely whether and to what extent explicit knowledge can enhance the development of implicit L2 knowledge - has become one of the central issues in the field of SLA. This is known as the interface debate and has given rise to three different positions, namely the non-interface position (Hulstijn, 2002; Krashen, 1982; Paradis, 1994, 2009), the strong interface position (DeKeyser, 1998; 2003; Sharwood-Smith, 1981), and the weak interface position (N. Ellis, 2005; 2011)

The non-interface position, most notably advocated by such researchers as Krashen (1981, 1982, 1985), Paradis (1994, 2009) and Hulstjin, (2002, 2005), holds that explicit and implicit knowledge are two distinct constructs represented separately in different parts of the brain and are accessed by different processes, which consequently does not allow one type of knowledge to convert directly into the other and influence it. Krashen (1981) advocated this position by distinguishing between acquisition and learning. He contended that conscious learning of L2 and subconscious acquisition of L2 result in explicit and implicit knowledge respectively with no interface between them. He rejects the possibility of explicit knowledge aiding acquisition of implicit knowledge by arguing that the role of explicit knowledge is limited in the sense that it only acts as monitor of L2 performance to ensure that the output produced by L2 learners is correct.

The strong interface position is in direct contrast with the non-interface position. It postulates that although explicit and implicit knowledge are distinct, explicit knowledge can be converted into implicit knowledge through sufficient practice and rehearsal (DeKeyser, 1998, 2003; Ellis et al. 2009). This position informs the traditional classroom approach of present-practise-produce (PPP). According to this view, L2 learners are able to first learn a pedagogical grammar rule as explicit knowledge and then through sufficient practice convert the acquired explicit knowledge to implicit knowledge by a process known as proceduralisation (Ellis et al., 2009). Nonetheless, as argued by Suzuki and DeKeyser (2015, 2017) deliberate practice may lead to the development of automatized explicit knowledge in the first place that should be distinguished from implicit knowledge. While both implicit knowledge and explicit automatized knowledge allow rapid access to linguistic knowledge, they can be dissociated by learner attention to linguistic forms. Drawing on automatized explicit knowledge involves awareness about linguistic forms even if their access to them is rapid and automatic. By contrast, when using implicit knowledge, no consciousness about linguistic forms is involved. Importantly, automatized explicit knowledge developed through practice has been found to facilitate the development of implicit knowledge by allowing learners to process language input more effectively and to use relevant grammatical forms more accurately (Suzuki & DeKeyser, 2017).

The weak interface position takes a compromise view. It states that explicit knowledge can indirectly facilitate the acquisition of implicit knowledge by providing L2 learners with explicit knowledge of rules which has top-down influences on perception (N. Ellis, 2005; 2011). In other words, equipping L2 learners with pedagogical rules can guide acquisition of implicit knowledge by focusing L2 learners` attention on relevant aspects of input. In this context explicit knowledge through grammar instruction functions as an awareness raising device in that it makes non-salient linguistic forms more noticeable for L2 learners (N. Ellis, 2011). Importantly, repeated practice of such structures in communication facilitates the development of learner implicit knowledge. In addition, implicit knowledge may also help develop explicit knowledge (R. Ellis, 2004, 2005; R. Ellis et al., 2009; Zhang, 2015) if L2 learners embark upon critical evaluation of their language use with the aim of arriving at metalinguistic realisation of patterns governing their output.

Overall, it can be noticed that in all interface positions the constructs of explicit and implicit knowledge are treated as relatively separate entities; however it is the question of interplay between them that is addressed differently by each position. The non-interface position rejects the possibility of explicit knowledge converting into implicit through practice, which is in sharp contrast with the strong interface position which posits that explicit knowledge can be converted into implicit knowledge through extensive practice. The weak interface position recognizes the facilitative role played by explicit knowledge that aids acquisition of implicit knowledge by focusing L2 learners’ attention on relevant grammar points.

Understanding the relationship between implicit and explicit knowledge as well as practical implications rendered by the interface positions has important implications for the design and implementation of instructional interventions. Nonetheless, one should bear in mind that knowledge, learning and instruction are related but distinct constructs. There is no certainty that explicit instruction will result exclusively in explicit learning and knowledge, or that implicit instruction will result in implicit learning and knowledge. It seems plausible that both explicit and implicit learning and knowledge will occur, although at varying degrees, depending on the type of instruction learners experience and learner-specific variables (Roehr-Brackin, 2018). However, explicit instruction is more likely to lead to explicit learning and knowledge, while implicit instruction is more likely to lead to implicit learning and knowledge.

1.2. Explicit and Implicit Instruction

After decades of research spurred by the debate pertaining to relevance and effectiveness of instruction in L2 learning, the field of SLA has accrued substantial evidence on the facilitative effect of L2 instruction for L2 development which was found to speed up the rates of L2 acquisition and increase the ultimate level of attainment (see meta-analyses by Norris & Ortega, 2001; Spada & Tomita, 2010; Goo, Granena, Yilmaz & Novella, 2015). Furthermore, cumulative findings of meta-analytic research have provided converging evidence for the edge of explicit instruction over implicit type, with the former bringing about larger and more durable gains.

Explicit instruction is understood as any instructional activity that provides L2 learners with relevant metalinguistic descriptions and explanations of the targeted linguistic features or directly asks learners to attend to the linguistic features which are the target of instruction with the aim of arriving at metalinguistic generalizations on their own (Norris & Ortega, 2001). By contrast, implicit instruction exposes learners to linguistic instances in meaningful input but does not provide them with metalinguistic descriptions and explanations or encourage them to attend to linguistic forms to infer metalinguistic generalizations (Norris & Ortega, 2001).

In practice, explicit vs. implicit instruction is operationalized in terms of form-focused vs. meaning-focused instruction. R. Ellis (2015) defines form-focused instruction (FFI) as "any instruction that directs or attracts learners` attention to linguistic form with the view to assisting learning" (p. 417). In this sense, FFI is used to refer to more traditional approaches to teaching grammar that isolate individual linguistic structures from the context, a so-called focus-on-forms (FonFS) as well as more communicatively oriented practices focusing L2 learners' attention on forms or properties of target structures in a meaningful context (FonF). In the former both teacher and learners attend to pre-selected forms that are to be learned and the teacher focuses learner attention on them. In this sense the process of language learning is viewed as the accumulation of knowledge about distinct morphosyntactic structures (Roehr-Brackin, 2018). Unlike FonFS, FonF is embedded in communicative-oriented and content-based teaching contexts (R. Ellis & Loewen, 2007; De la Fuente, 2006) which direct learner attention to relevant aspects of input.

Meaning-focused instruction aims to develop communicative competence and highlights the importance of understanding and conveying meaning in comprehension and production, rather than linguistic accuracy. It holds that substantial exposure to input and meaningful use of the L2 in context results in incidental acquisition of the L2 (Norris and Ortega 2001). A meaning-focused instructional approach is widely applied in contemporary content-based English as a second language instruction and immersion programme (R. Ellis, 2001). This approach is primarily concerned with getting the L2 learner to concentrate on understanding the conveyed message and excludes attention to the formal elements of the target language. However, according to de Graaff & Housen (2009) even though a meaning-focused approach aids the development of receptive L2 ability it does not always result in a comparable improvement in productive skills. They also indicate that a focus on communicative content alone detracts attention from lexis and grammar at the cost of linguistic accuracy.

1.2.1 Deductive and Inductive Instructional Approaches

Explicit form-focused instruction encompasses a variety of techniques which may be broadly sub-categorised in either inductive or deductive approaches. The deductive approach refers to the style of teaching which provides L2 learners with explicit information about specific grammatical features through metalinguistic explanations supported with relevant examples (R. Ellis, 2010). It is essentially based on a "top down" principle where language learning moves from general (the rule) to more specific information (examples in a drill) (Heron & Tomasello, 1992). In language teaching deductive reasoning is realized in a PPP sequence (Presentation-Practice-Production). L2 learners are presented with metalinguistic explanations either orally by the teacher or in written form in a text book. The introduction of metalinguistic explanations is subsequently followed by activities prompting L2 learners to practise targeted structures in various kinds of form-focused oral and written exercises, for example drills and translation into and out of the target language. Upon completion of the controlled practice stage, L2 learners are required to produce targeted constructions in free production activities like oral interviews, discussions featuring targeted structures or various writing activities. Throughout the stages of controlled practice and free production L2 learners are supplied with the teacher`s corrective feedback drawing their attention to relevant pedagogical rules underpinning targeted structures. The deductive approach is assumed to facilitate the process of L2 acquisition by directing L2 learners` attention to relevant aspects of the L2 form as it appears in subsequent input (Cerezo et al., 2016) and by allowing learners to practise relevant linguistic forms in communication. The latter leads to more automatic and rapid access to linguistic knowledge.

In contrast to the deductive approach, the inductive approach moves from providing L2 learners with specific examples of targeted features in a relevant context to generalization where students are encouraged to work out the rules or patterns by themselves or with the teacher's guidance (R. Ellis, 2010). Thus, an inductive approach allows for a higher level of learner autonomy. Typically, under an inductive instructional approach L2 learners are first exposed to a series of examples of a certain grammatical structure in different contexts and then guided towards identifying a pattern and arriving at metalinguistic generalizations of targeted rules or concepts. Elicitation of rules is followed by controlled practice stage, where learners apply derived rules in various types of written and communicatively-oriented oral activities to gain understanding of how they are realised in language use. Finally, learners produce acquired structures in a free production stage.

Although recent meta-analytic research provided strong support for the larger and more durable gains produced by explicit, form-focused instruction compared to an implicit meaning-focused type (Goo, Granena, Yilmaz, & Novella, 2015; Spada & Tomita, 2010; Norris & Ortega, 2001), the conducted meta-analytic studies subsumed deductive and inductive approaches under explicit instruction, and thus there is no clarity as to which type of explicit instruction is more effective for L2 learners` linguistic development. Empirical investigations examining the effectiveness of deductive and inductive instructional approaches have provided somewhat inconclusive results. Some studies found an edge for deductive instruction (e.g., Erlam, 2003; AbuSeileek, 2009) while others found no differential effects of deductive and inductive instruction (e.g., Rosa & O’Neill, 1999; Hwu & Sun, 2012), and others an edge for inductive instruction (Herron & Tomasello, 1992; Cerezo et al, 2016; Haight et al., 2007).

Nonetheless, while there is yet no consensus as to what type of explicit form-focused instruction is more beneficial for L2 learning, explicit instruction taken as a whole is assumed to facilitate acquisition of grammar points characterised by high learning difficulty and low perceptual salience, which otherwise often go unnoticed by instructed L2 learners, with English articles being one of them (Akakura, 2012; Muranoi, 2001; Hu 2011).

1.3. Learning difficulty in SLA

In SLA learning difficulty of grammatical structures is defined as “the mental ease or difficulty with which linguistic items are learned, processed or verbalized in the processes of language acquisition and use” (Bulté & Housen, 2012, p. 23). The concept of learning difficulty can be approached from objective and subjective perspectives (Housen & Simoens, 2016; DeKeyser, 2003). Objective or feature-related learning difficulty is understood as inherent difficulty of different linguistic structures that are more cognitively demanding for all learners irrespective of their individual learner characteristics (Housen & Simoens, 2016). Subjective or learner-related perspective refers to learning difficulty which arises from “the encounter of language features with the language learner`s individual capacities and abilities” (Housen & Simoens, 2016, p.167). This is in concordance with the understanding of subjective learning difficulty proposed by DeKeyser (2003), who referred to it as a ratio of linguistic difficulty inherent in linguistic structures to L2 learners` ability to cope with them. Language features which are difficult for some learners may be less difficult for others. Among learner-related factors that mediate L2 difficulty are individual differences in cognitive ability, learners` first language (L1) (and its correspondence to the L2), knowledge of previously learned languages, overall L2 proficiency, and some socioaffective and personality factors such as motivation, anxiety, and extraversion for example (Housen & Simoens, 2016).

DeKeyser (2005) suggests that three factors are involved in determining difficulty of grammatical structures: complexity of form, complexity of meaning and the complexity of form-meaning mappings. Furthermore, he claims that the difficulty of grasping the form-meaning relationship while processing a sentence in the L2 should also be taken into consideration. The latter is influenced by the transparency of form-meaning relationships to a learner attending to language for meaning, that is, the degree of importance of a linguistic form for the meaning it expresses. To specify, certain morphemes may be the only clue to the meaning they convey or may be largely or completely redundant in terms of semantics. The meaning can contribute to difficulty for the reasons of novelty, abstractness, or both. Such elements of grammar as articles, classifiers, grammatical gender, and verbal aspect are notoriously difficulty for acquisition in those learners whose first languages do not instantiate such elements or have a very different system for expressing them. Such forms typically resist instructional intervention since they express highly abstract notions that are hard to infer implicitly or explicitly from the input. Difficulty of form arises from the issue of complexity. The latter is reflected in the number of choices learners need to make to select the right morphemes and allomorphs to express the meanings along with putting them in the right place. The problems L2 learners experience with L2 morphology even after the years of exposure to the target language is a well-documented phenomenon.

The lack of transparency in the link between form and meaning can also contribute to grammatical difficulty because of communicative redundancy, optionality and opacity. The form is deemed redundant if its meaning is conveyed by at least one other element of the sentence. Examples of optionality are null subject in Spanish or Italian and case marking in Korean. Opacity refers to cases when different forms stand for the same meaning, and the same form stands for different meanings. Example of opacity is English -s which marks the third person singular of a verb, the genitive of a noun, and the plural form. Frequency is named as one of important factors contributing to ease or difficulty in learning form-meaning mappings. The relevance of frequency is determined by the transparency of the mapping in the sense that minimum exposure is needed for successful acquisition of transparent mappings and maximal exposure is insufficient for acquisition of obscure mappings (DeKeyser, 2005).

More recent conceptualisation of learning difficulty has gone beyond listing grammatical rules or linguistic features that influence learning difficulty and has focused on the development of definition of learning difficulty by means of theoretical analysis, empirical investigation or both (Roehr-Brackin, 2018). Collins, Trofimovich, Cardoso & Horst (2009) discuss learning difficulty from various perspectives: the acquisition perspective, the linguistic perspective, the pedagogical perspective and the psycholinguistic perspective. A similar categorisation has been put forward by Spada & Tomita (2010) who approached learning difficulty from positions of psycholinguistics, linguistics and pedagogy. With regards to the acquisition perspective, a grammar structure that is acquired early is easier to learn, whereas a grammar structure that is acquired late is more difficult to learn. In accordance with the linguistic perspective, L2 constructions are compared with their equivalents in learner L1. Marked structures are predicted to be more difficult to learn than unmarked structures. Likewise, complex structures requiring more transformations are assumed to be more difficult to learn in comparison with less complex structures which do not require the same amount of transformations. Although linguistic perspective allows for precise predictions to be made and tested, existing empirical evidence does not always support the predictions (Roehr-Brackin, 2018). With respect to the pedagogical perspective, more complex pedagogical rules lead to greater difficulty compared to less complex pedagogical rules. Nonetheless, easy rules are not necessarily easy to implement and acquire. Moreover, this perspective is more relevant for explicit instructional conditions relying on provision of metalinguistic description and cannot be applied to implicit learning contexts. Finally, the psycholinguistic perspective focuses on learner-L2 input interactions, where learners' knowledge is considered to arise from their experience of language use. Those structures that can be accessed with greater ease in the input appear to be less difficult than structures which are more difficult to access in the input. Among factors that influence learner access to structures are transparency of form-meaning mappings, perceptual salience, communicative redundancy and selective attention (Collins et al., 2009).

Recent developments in research on learning difficulty examine characteristics which may impact on learning difficulty in terms of explicit and implicit knowledge (Roehr & Gánem-Gutiérrez, 2009; R. Ellis, 2006; Housen, Pierrard & Van Daele, 2005). According to R. Ellis (2006) the learning difficulty of L2 structures as implicit knowledge is influenced by five characteristics: frequency of input (more frequently occurring structures are easier to learn), salience (more salient features are easier to learn), functional value (a non-redundant structure mapping onto a clear and distinct function is the easier to learn), regularity (a more regular structure is easier to learn than an irregular structure) and processability (a structure easier for processing is easier to learn). The learning difficulty of L2 structures as explicit knowledge is discussed in terms of explicit grammar rules. He proposes two critical criteria of difficulty as explicit knowledge of different grammar points, namely conceptual complexity and technicality of metalanguage. Conceptual clarity refers to the distinction between structures that are formally or functionally simple. For example, articles are formally simple since the article system is made up of three forms (*a*/*an* and *the*) but functionally they are very complex since they perform a number of different functions relating to the category of noun they determine, the situational context, and the discourse context. With respect to metalanguage, it was proposed that rules involving more extensive and technical language will be more difficult to learn.

Drawing on the criteria assumed to determine explicit and implicit learning difficulty of L2 structures proposed by R. Ellis, Roehr & Gánem-Gutiérrez (2009) developed a taxonomy that enabled predictions of explicit and implicit learning difficulty to be made by means of expert judgements. The resulting taxonomy included nine criteria which are presented in Table 1.1, together with their definitions and predicted influence on learning difficulty of structures.

Table 1.1 Taxonomy of variables impacting implicit and explicit learning difficulty

Variable	Operational definition	Learning difficulty
Frequency	How frequently an L2 construction occurs in the input.	High frequency decreases implicit learning difficulty.
Perceptual salience	How easily an L2 construction can be perceived auditorily in spoken input.	High perceptual salience decreases implicit learning difficulty.
Communicative redundancy	How much an L2 construction contributes to the communicative intent of a message.	High communicative redundancy increases implicit learning difficulty.
Opacity of form-meaning mapping: One form, x meanings	To what extent an L2 form maps onto a single or multiply meanings/functions	High opacity increases implicit learning difficulty.
Opacity of meaning-form mapping: One meaning, x forms	To what extent an L2 meaning/function maps onto a single or multiply forms	High opacity increases implicit learning difficulty.
Schematicity	The extent to which a linguistic construction is schematic or specific; and whether the metalinguistic description covers a schematic or a specific linguistic construction.	High schematicity decreases implicit and explicit learning difficulty.
Conceptual complexity	The number of elements that need taken into account in a metalinguistic description, i.e. the number of categories and relations between categories included in the description.	High conceptual complexity increases explicit learning difficulty.
Technicality of metalanguage	The relative familiarity and abstractness of the metalanguage used in the metalinguistic description.	High technicality of metalanguage increases explicit learning difficulty.
Truth value	The extent to which a metalinguistic description applies without exception.	High truth value decreases explicit learning difficulty.

(Adapted from Roehr & Gànem-Gutiérrez, 2009, p.88)

As shown in Table 1.1, the variables of frequency, perceptual salience, communicative redundancy, opacity of form-meaning mapping (one form, x meanings), opacity of meaning-form mapping (one meaning, x forms) impact on implicit learning difficulty. The variable of schematicity influences both implicit and explicit learning difficulty. The variables of conceptual complexity, technicality of metalanguage and truth value affect explicit learning difficulty.

1.3.1. Learning difficulty of English articles

As mentioned above English articles belong to non-salient grammatical features which are very difficult to infer both explicitly and implicitly from the input. A large body of empirical investigations (e.g. Ionin, Ko & Wexler, 2004; Master, 2002; Akakura, 2012; Lopez, 2017) focusing on the linguistic properties of the English article system have attested its difficulty and attempted to explicate why persistent errors in article use are reported even amongst highly proficient L2 learners.

Master (2002) stresses that the difficulty encountered by L2 learners in the process of article acquisition can be accounted for by three key factors. First, articles belong to the most frequent function words in English which in the situation of an extended stretch of discourse, makes explicit rule application extremely challenging. Secondly, function words are less salient in the input which makes it difficult for L2 learners to notice and discern them. Thirdly, the article system is characterised by a high degree of opacity where two different forms (the definite and the indefinite article) express the same meaning (generic), and the same form conveys different meanings (see Section 1.4.2). High opacity is assumed to be particularly challenging for less proficient L2 learners, who tend to rely on a one-form-one-meaning mapping in their L2. Thus, essentially, Master is referring to both objective and subjective difficulty experienced by L2 learners in the process of article acquisition. While English articles are more cognitively demanding for all language learners given their objective feature-related difficulty (e.g. low salience, opacity of form-function mappings), learners with a lower level of L2 proficiency are more likely to find acquisition of English articles more challenging compared to higher-proficiency learners.

Furthermore, according to DeKeyser (2005), the difficulty L2 learners experience while discerning articles from the input could be explained by the fact that they belong to complicated elements of grammar, as they express “highly abstract notions that are extremely hard to infer, implicitly or explicitly, from the input” (p.5). Similarly, N. Ellis (2005) argues that English articles are non-salient or fragile features that are not easily perceived by L2 learners of English when exposed to language alone. As a rule, non-salient features often go unnoticed at the stage of input. Additionally, a number of studies highlighted higher subjective learning difficulty of English articles experienced by those L2 learners whose first languages do not have the equivalent article system compared to learners whose L1s instantiate an English-like article system (e.g. Ionin & Montrul, 2010; Ionin, Zubizaretta & Bautista Maldonado, 2008)

1.3.2. The English Article System

In linguistics, an article can be defined as a determiner used with a noun to indicate the kind of reference made by the noun and is used to refer to linguistic or situational context. The English article system has two major types: the indefinite and the definite article. The former type embraces both forms *a* and *an*; a is used before a word that begins with a consonant sound (e.g. a cat, a house etc.) and an is used before a word that begins with a vowel sound (e.g. an apple, an earring). Orthographically, the definite article is realised through *the* only (Leech and Svartvik, 1994). However, there is a phonological distinction between *the* preceding a consonant where it is pronounced as a dental fricative voiced consonant sound plus schwa vowel (weak vowel) (e.g. the man, the boys etc.), and *the* preceding a vowel where it is pronounced as a dental fricative voiced consonant sound plus front long vowel /i:/ (e.g. the aunts, the uncles etc.). In certain cases, a noun does not require the use of an article, the zero article. The syntax of English requires articles to agree with nouns in terms of number and countability. The indefinite article can only be used with singular countable nouns (e.g. a coat, a boy) or uncountable nouns which in certain cases are treated as countable nouns (e.g. a coffee = a cup of coffee). The definite article can be used with both singular and plural countable nouns (e.g. the dog, the dogs) and uncountable nouns (e.g. the money, the coffee). The zero article is used with plural countable nouns (e.g. girls, toys) and uncountable nouns (e.g. music, art).

The definite article is the most basic indicator of definiteness used to demonstrate that the noun refers to a particular example of something and that the writer/speaker and the reader/listener are both able to identify the referent (Richards & Platt, 1992). It is compatible with all types of common nouns: with singular and plural countable nouns and uncountable nouns (e.g. book/books/ information).

The use of the definite article can be broadly subdivided into referential and generic uses (Yoo, 2009). The referential use applies to linguistical contexts where both the writer/speaker and the reader/listener share the knowledge of what is being referred to; the generic use refers to the whole class of entities and not representatives of the class (Master, 2002). The referential use can be further subdivided into several categories (Yoo, 2009): anaphoric (i.e. second mention), associative, situational, cataphoric (i.e. post-modified noun phrases and *of* phrases) and unique reference uses (Lyons, 1999; Chesterman, 1991; Hawkins, 1978; Quirk et al., 1985; Yoo, 2009). Table 1.2 gives an overview of the referential uses and generic uses with relevant examples.

Table 1.2 Referential uses and generic uses of the definite article

Uses	Examples
Referential	
1. Anaphoric use	My neighbours bought a new house. *The house* is very cosy.
2. Associative use	They have just returned from Spain. *The hotel* was very

	expensive
3. Situational use	Turn off *the light* please!
4. Cataphoric use	*The beginning* of the film was dull.
5. Unique reference use	What time does *the last train* to London depart?
Generic	*The Rhinoceros* is on the verge of extinction

By contrast, the indefinite article *a* or *an* is used to refer to something in general (generic) or to something not having been identified by the writer/speaker (nonspecific). Examples 1 and 2 illustrate generic and nonspecific uses of the indefinite article.

Example 1: Generic use

A whale is a mammal

Example 2: Nonspecific use

My neighbours bought a new car

To convey indefinite meaning, plural and uncountable nouns require the use of zero article. Master (2003) and Chesterman (1991, 2005) suggest that there are two usages of the zero article: zero article and null article. The zero article conveys the indefinite reference and is used with plural countable and uncountable nouns, whereas the null article denotes strong definiteness and is typically used with singular proper nouns (e.g. Spain, London). Master (2002) has put forward several contexts which require the use of the zero article. These contexts are shown in Table 1.3.

Table 1.3 Uses of the zero article

Uses of the zero article	Examples
First mention	*People* like to gossip

General characteristics	Warm *air* holds more *moisture*
Existential there	There is *water* in your boat
Defining postmodification	*Vegetables* from small farms are fresher
Partitive of phrases	She drinks *gallons* of water
Intentional vagueness	*Research* on pollution is underfunded

The use of the definite and the indefinite article is often discussed in relation to not only definiteness, but also specificity. The definitions offered below are from Ionin et al. (2004, p. 5), based on Heim (1991) and Fodor & Sag (1982). Here, definiteness depends on the shared knowledge between the speaker and listener and specificity depends only on the speaker knowledge.

Definiteness and Specificity: Informal definitions

If a Determiner Phrase (DP) of the form [D NP] is …

a. [+definite], then the speaker and hearer presuppose the existence of a unique individual in the set denoted by the NP.

b. [+specific], then the speaker intends to refer to a unique individual in the set denoted by the NP and considers this individual to possess some noteworthy property.

Table 1.4 shows four contexts arising from the distinction between definiteness and specificity (from Lyons, 1999, p.167).

Table 1.4 Definiteness and specificity: contexts of use

Context type	Example
[+definite, +specific]	Joan wants to present the prize to the winner – but he doesn't want

	to receive it from her.
[+definite, −specific]	Joan wants to present the prize to the winner – so she'll have to wait around until the race finishes.
[−definite, +specific]	Peter intends to marry a merchant banker – even though he doesn't get on with her at all.
[−definite, −specific]	Peter intends to marry a merchant banker – though he hasn't met one yet.

English, as with many other western European languages, encodes definiteness morphologically in its article system, but not specificity. The definite article can be used in contexts satisfying the uniqueness presupposition [+definite] (when the speaker and the listener share the knowledge); the indefinite article is used in [-definite] context, regardless of whether it is [+specific] or [-specific].

As suggested by the review, the English article system is a complex subject that involves properties of syntax (e.g. determiner, number, countability), semantics (e.g. definiteness and specificity), and context of discourse (e.g. first mention, subsequent mention, situational use). High learning difficulty of the article system is influenced by an interplay of various properties of objective feature-related factors as well as learner-related factors, which makes acquisition of articles not easily attainable for L2 learners.

1.3.3. Empirical research into second language acquisition of English articles

The past decades have seen much work on the L2 acquisition of articles (Hawkins et al., 2006; Ionin, Ko & Wexler, 2004; Master, 2002, Akakura, 2012; Sun, 2016; Muranoi, 2000). A series of highly influential studies of English articles acquisition (Ionin, Ko & Wexler, 2004; Ionin, Zubizaretta & Bautista Maldonado, 2008) have attested that L2 learners misuse and/or omit articles not randomly, but that their choices seem to be influenced by semantic universals provided by the Universal Grammar. The Universal Grammar account holds that languages instantiating article systems can be distinguished on the basis of either definiteness (English, French, etc.) or specificity (Samoan). This is the Article Choice Parameter, which plays a significant role in determining L2-article choice (Ionin et al. 2004). The Fluctuation Hypothesis associated with the Article Choice Parameter states that L2 learners of English whose L1s do not incorporate an article-like system will sometimes distinguish between articles on the basis of definiteness (correct for English) and sometimes specificity (incorrect for English, correct for Samoan) (Ionin et al., 2004). Where learners are uncertain, the input should be sufficient to eventually lead them to the appropriate parameter setting (Ionin et al., 2008). In accordance with the original prediction learners will misuse articles to a greater extent in contexts that are [+definite, −specific] and [−definite, +specific] (see Table 1.4). The assumptions of the Fluctuation Hypothesis were tested empirically with intermediate-level Russian and Korean learners of English, whose L1s do not instantiate an article system (Ionin et al., 2004). The results indicated that article misuse errors mirrored the patterns predicted by the FH, i.e. L2 learners overused definite articles for [+specific] context where the target was *a* and indefinite articles in [+definite] context where the target was *the*. This proposal was supported by subsequent research that demonstrated that L2 learners whose L1s do not have an article system in place fluctuate between the two settings of the parameter (Ionin, Zubizarreta & Bautista Maldonado, 2008).

Studies which compared article use among L2 learners with various L1s generally conclude that speakers of languages with no article system in place omit and misuse articles in obligatory contexts to a greater extent in comparison with speakers whose L1s instantiate an article system (Ionin et al., 2008; Zdorenko & Paradis, 2008). Ionin et al. (2008) tested the usage of English articles in a study with L1 Spanish and L1 Russian adult learners of English. Results of the study demonstrated that Spanish L1 speakers used definite and indefinite articles in appropriate contexts whereas Russian L1 speakers experienced considerable difficulties with both articles. Ionin et al. (2008) came to the conclusion that Spanish speakers transferred their L1 parameter values to the L2 whereas the Russian speakers, for whom transfer was impossible, accessed semantic universals and fluctuated between definiteness and specificity.

1.3.4. Empirical research into instructed second language acquisition of English articles

To date only two published studies have attempted to develop linguistically-informed instructional intervention informed by Ionin, Ko & Wexler`s (2004) Fluctuation Hypothesis (Snape & Yusa, 2013; Lopez, 2017). Their instruction targeted definiteness, specificity and genericity with upper-intermediate L2 learners (Snape and Yusa, 2013) and specificity with low-intermediate learners. (Lopez, 2017). Overall no differences emerged between the post-test results of the experimental and control groups in both studies.

Most recently, Lopez (2017) compared the effectiveness of explicit instructional intervention targeting specificity and standard pedagogical grammar instruction focusing on definiteness with low-intermediate Chinese L2 learners of English. Three groups of learners (N total =50) who enrolled in a 10-week pre-sessional English course were assigned to one of the three conditions: specificity instruction condition, standard instruction condition and no instruction condition (control group). The intervention was comprised of three 90-minute lessons containing explicit instruction and practice exercises. Learners in the specificity instruction group were taught about definiteness and specificity using newly-created teaching materials. For the purposes of the study the definitions of definiteness and specificity proposed by Ionin et al. (2004) were simplified into pedagogical definitions. Learners in the standard instruction group were taught about definiteness using a set of published teaching materials which were already used within the teaching context where the study took place. The no instruction group did not receive any instruction on articles during the course. They were taught about sentence structure and prepositions during the intervention. The study followed a pre-test/post-test research design. Participants` knowledge was assessed by a pen and paper gap-fill task performed without a time constraint and a time-constrained acceptability judgment task. The results indicated that the instruction on specificity was not beneficial for participating learners since they did not outperform learners in a standard instruction group or learners who did not receive any instruction on articles. Furthermore, the analysis of the time-constrained judgement task revealed that the performance of the specificity instruction group worsened following the instructional treatment. It was concluded that the introduction of specificity into instructional intervention contributed to its difficulty and led to the reduction in accuracy after the treatment. Lopez argued that learners` relatively low level of proficiency and the short duration of the intervention likely contributed to their difficulty acquiring the complexities of the article system.

Overall the empirical findings of the existing research on the use of descriptive/theoretical linguistics to inform instruction suggest that it does not convey any benefit on the development of L2 article knowledge. By contrast, a number of studies (Bitchener & Knoch, 2008; Hu, 2011; Akakura, 2012; Ellis et al., 2008) that have examined how L2 learners develop linguistic knowledge of English articles taught by means of pedagogical grammar rules reported that English articles are amenable to instruction.

Whether explicit form-focused instruction can help with the acquisition of English articles has been the focus of several studies (Muranoi, 2000; Akakura, 2012). Muranoi (2000) investigated the effectiveness of form-focused instruction through interaction enhancement technique in which interaction was enhanced by means of feedback (e.g., requests for repetition and recasts) provided by a classroom teacher. The intervention was administered to 61 Japanese L2 learners of English. The instructional focus was on article use in indefinite contexts, more specifically the use of the indefinite article (*a*/*an*) for first mention and the generic use. Learners` knowledge was measured at the time of pre-test and post-test by means of two oral measures, a story description task and a picture description task, and two written measures, a picture description task and a grammaticality judgement test. The results indicated that interaction enhancement facilitated acquisition of English article knowledge on both written and oral measures of achievement.

Akakura (2012) examined the effectiveness of explicit instruction on the acquisition of explicit and implicit knowledge of articles with 94 L2 learners of Asian origin in a quasi-experimental pre-/post instructional intervention study. The targeted uses included generic and non-generic uses of the definite and the indefinite article. The results indicate that instruction facilitated the development of both explicit and implicit knowledge of articles. Furthermore, the analysis revealed that non-generic uses were less challenging for participants, compared to generic uses. This was interpreted as suggestive of the fact that the targeted article uses differ in terms of their difficulty and that generic uses appear to be more resistant to intervention than others.

One of the ways of using pedagogical grammar use to facilitate development of L2 article knowledge is to provide learners with corrective feedback. A number of studies (e.g. Bitchener & Knoch, 2008; Ellis et al., 2008) have explored the facilitative effect of various types of written corrective feedback on the acquisition of two functional uses of articles: use of the indefinite article for referring to something the first time and use of the definite article for a subsequent mention. The results indicated that written corrective feedback leads to improved control over the targeted uses.

The review of empirical studies concerned with L2 acquisition of the English article system suggests that provision of relevant metalinguistic descriptions in a form of pedagogical grammar rules leads to improved control over the targeted uses. By contrast, linguistically-informed instruction teaching learners the notion of specificity has not resulted in improved accuracy and even led to a decrease in performance following the instructional treatment.

1.4. Learner Factors that Influence L2 Acquisition

L2 learners show considerable variation in their ability to acquire a second language and seem to attain different levels of L2 proficiency even in almost identical acquisition circumstances. A number of learner-internal factors have been called upon to determine whether they can account for differences observed in individual language learning. Variables contributing to interindividual variation can be divided into three broad categories: affective, personality-oriented and cognitive (Tagarelli Ruiz, Moreno & Rebuschat, 2016). According to Skehan (1989) affective factors encompass motivation, language-learning anxiety, self-confidence, learner perceptions and beliefs; personality-oriented differences are made up of openness to new experience, conscientiousness and extraversion, to name a few, and cognitive differences include intelligence, language learning aptitude (Caroll & Sapon, 1959) and working memory capacity (Juffs & Harrington, 2011). The latter two were subsumed under the category of individual differences (IDs) in cognitive ability and have become an object of empirical research in SLA for a considerable time. In addition to the aforementioned factors, acquisition of L2 learning appears to be influenced by the factor of age (Jaekel, Schurig, Florian & Ritter, 2017; Muñoz, 2006) which refers not only to learners` biological and neurological maturity, but also their cognitive maturity.

1.4.1. Early conceptualization and measurements of aptitude

Foreign language aptitude is an umbrella-term used to refer to a set of perceptual and cognitive abilities which are assumed to help L2 learners efficiently and effectively acquire a target language (Saito, Suzukida & Sun, 2018; Dörnyei, 2005; Carroll, 1981). The early conception of aptitude was dominated by work conducted by the American psychologist John Carroll (1962, 1973, 1981) who together with his colleague Stanley Sapon (Carroll & Sapon, 1959) developed a comprehensive aptitude measure *Modern Language Aptitude Test* (MLAT). On the basis of a series of factor-analytic studies Carroll (1981) identified four critical factors assumed to affect an individual`s language learning:

- phonemic coding ability, which is the ability to identify sounds and to form associations between those sounds and symbols.
- grammatical sensitivity, defined as the ability to recognize the grammatical functions of linguistic entities in sentence structures.
- inductive language learning ability, which is the ability similar to grammatical sensitivity involving capacities to analyse language learning material and find patterns.
- associative memory understood as the ability to recognise and remember words and phrases

In Carroll`s conceptualization these abilities or aptitudes are innate, relatively stable, and resistant to training. This classic four-factor framework is regarded as one of the most influential models of aptitude that triggered an abundance of aptitude research and set a benchmark for subsequent conceptualisations of aptitude and measures associated with them, i.e. Pimsleur`s PLAB (1966); Petersen and Al-Haik`s DLAB (1976); Meara`s LLAMA (2005).

The two commercial aptitude batteries associated with the classic Carrollian model is the MLAT (Carroll & Sapon, 1959) focusing on adult L2 learners and Pimsleur Modern Language Aptitude Battery (PLAB; Pimsleur 1966) designed for adolescents. The two tests were developed to predict rate and success in formal language learning (Dörnyei, 2005; Ranta, 2008; Robinson, 2005). The MLAT is composed of five sub-tests tapping each of the four constituent abilities: (a) number learning, (b) phonetic script, and (c) spelling clues, which taps phonetic coding ability; (d) words in sentences, which taps grammatical sensitivity; and (e) paired associates, which taps rote learning/associative memory. The PLAB is comprised of six subtests: (a) grade point average, which calculates an individual`s grade point average in areas other than language learning; (b) interest, which measures interest in learning a foreign language and is a measure of motivation; (c) vocabulary, which measures word knowledge in English and is a measure of verbal ability; (d) language analysis, which measures the ability to reason logically in terms of a foreign language and is another aspect of verbal ability; (e) sound discrimination, which measures the ability to learn and recognize new phonetic distinctions in different contexts and is a measure of auditory ability; and (f) sound-symbol association, which measures the ability to associate sounds to written symbols and is another measure of auditory ability. Although the two measures draw on a similar conceptualisation of aptitude, they are quite different. Pimsleur (1966) broadened the concept of language learning aptitude by incorporating a motivation factor, acknowledging that a learner's interest in a foreign language plays a crucial role in the learning process (Dörnyei 2005). This view has not received support since aptitude and motivation are generally viewed as two separate concepts.

A third major aptitude test associated with the Carrollian model is the Defense Language Aptitude Battery (DLAB), that was designed to assess language aptitude in a military context by the American Armed Forces (Petersen and Al-Haik 1976). DLAB was primarily used to test learners' ability to learn an artificial language by means of auditory and visual materials. It puts an emphasis on Carroll's inductive language learning, phonemic coding ability and memory.

1.4.2. Recent conceptualizations and measurements of aptitude

Developments in educational and cognitive psychology have led aptitude research to refine and expand Carroll's original four-component aptitude framework. To exemplify, building on the earlier studies of L1 literacy research, Sparks and Ganschow (1991; 2001) proposed the Linguistic Coding Differences Hypothesis which suggests that L1 literacy skills are essential for predicting L2 learning. They argue that if an L2 learner has problems with L1 phonology/orthography, their L2 learning will most probably suffer as well (Sparks & Ganschow, 2001), a fact that warrants the inclusion of an additional phonological/orthographical measure of L1 and L2 as an important factor in the aptitude model. This model calls for deeper and more fine-grained cross-linguistical analyses between L1 and L2 combinations in future aptitude research (Wen, Biedron & Skehan, 2017).

Grigorienko, Sternberg and Ehrman (2000) offered a new conceptualisation of language learning aptitude: the CANAL-F theory (Cognitive Ability for Novelty in Acquisition of Language—Foreign) which draws on Sternberg`s (1997, 2002) theory of intelligence. According to this, intelligence comprises three distinct levels, analytical, creative and practical, which are not only related to formal learning contexts but are essential for everyday life. This theory emphasizes the ability to handle novelty and ambiguity when learning an L2 assumed to be “one of the central abilities required for FL acquisition” (Grigorenko et al. 2000, p. 392).

Following this conception, the authors also developed an entirely new approach to measuring aptitude, i.e. the CANAL-F test. The test taps into five knowledge acquisition processes: selective encoding - to dissociate between the relevant and irrelevant information in the input, accidental encoding - to encode less important information outside the learner’s focus of attention, selective comparison - to evaluate the relevance of old information for the fulfilment of current tasks, selective transfer - to apply inferred rules and patterns to new contexts, and selective combination - to synthesise new and old information. The measure uses an artificially-constructed language called Ursulu to test for language aptitude by simulating a naturalistic language learning environment where learners are gradually introduced to the target language and instructed to complete several small tasks. The Canal-F is comprised of five sessions: learning meanings of neologisms from context, comprehension of meanings of passages, continuous paired associates learning, sentential inference, and learning language rules. Learners receive vocabulary, grammar and examples of the workings of Ursulu and are expected to infer and generalize the rules governing the language. Their knowledge is subsequently assessed with L2 items measuring understanding of Ursulu. Although the model offered a theory-driven perspective on language learning aptitude, validation results of the Canal-F test did show its superiority in terms of predictive validity over the MLAT test (Wen et al., 2017).

The development of standardized tests led to extensive investigations of the role of aptitude and its components in L2 learning. Nonetheless, despite a variety of measures available to researchers, the use of MLAT dominated the field of SLA for decades given its high reliability and high degree of successful prediction. However, since it is no longer commercially available to individual researchers, teachers or students its use in research is no longer possible. One of recent measures of language learning aptitude widely available to SLA researchers and easily administered through the use of computers is the LLAMA test (Meara, 2005).

The LLAMA Language Aptitude Tests (Meara 2005) are a set of exploratory computer-administered tests designed to assess aptitude for second language learning which were initially developed as part of a research training programme for MA students at Swansea University. The LLAMA tests based loosely on the aptitude framework underpinning MLAT (Carroll and Sapon 1959) were designed as shorter, free, language-neutral tests with the aim of taking advantage of developments in technology and design to produce a more appealing and user-friendly interface. The four sub-tests presented in the collection of the LLAMA suite are conventionally referred to as LLAMA_B, LLAMA_D, LLAMA_E and LLAMA_F. LLAMA_B is the vocabulary learning module of the LLAMA tests assessing test-takers` ability to attach unfamiliar names to unfamiliar objects; LLAMA_D is a new measure that is not featured in MLAT tapping into learners` ability to recognise repeated sounds in spoken language and is assumed to be a measure of implicit aptitude (Granena, 2013; Rogers, Meara, Barnett-Legh, Curry & Davie, 2017); LLAMA_E is a measure of sound-symbol correspondence ability; and LLAMA_F assesses learners` grammatical inferencing ability. Since the LLAMA test is a free resource easily available from the official website it has gained a lot of popularity and has been widely used in empirical investigation on the role of aptitude in L2 learning (Granena, 2012; Yalçin & Spada, 2016; Yilmaz, 2012). The LLAMA tests have been cited over 700 times on Google Scholar since 2013 (Rogers et al., 2017). High level of interest and extensive application of the test in the field of L2 learning necessitated validation of the LLAMA aptitude battery. A recent validation study (Rogers et. al, 2017) using a large sample of participants (N=240) with age profiles from 10 to 75 coming from a variety of L1 backgrounds indicated that the LLAMA aptitude tests are robust as they are not subject to internal individual differences. More specifically it was found that the LLAMA tests are language neutral and can be used with participants from various L1 backgrounds, with male and female participants of differing education levels and with different ages, since these factors were not found to consistently affect the overall variance in LLAMA scores. The only consistent finding is that prior instruction in a second language can be a significant predictor of performance on LLAMA_B and LLAMA_F. It was therefore recommended to control for prior language learning experience when evaluating the role of aptitude in L2 performance by means of the LLAMA.

Granena (2013), who examined the underlying structure of the LLAMA test, found that although the LLAMA subtests are internally consistent they load on two different factors. The results of exploratory Principal Component Analysis (PCAs) showed that the tree tests designed to correspond to the sub-tests of the MLAT loaded on the same factor, i.e. LLAMA_B, LLAMA_E and LLAMA_F. The other test, which was a new addition, i.e. LLAMA_D, loaded on another factor. This result was further supported in Granena`s work (2013) by a series of exploratory PCAs where LLAMA_D loaded on the same factor as attention control and probabilistic serial reaction time task assumed to tap aptitude for implicit learning, while the three other LLAMA tests loaded with more explicit measures like the measure of general intelligence. These results were interpreted as indication of two different types of aptitude, aptitude for explicit learning and aptitude for implicit learning of L2s. By way of explanation, Granena argued that LLAMA_B, E and F incorporate an explicit learning phase that allows learners to rehearse material, focus on language forms and apply problem-solving strategies, and are thus measuring a dimension of aptitude hypothesised to be relevant for explicit learning. By contrast, LLAMA_D is a receptive task that appeals to a more implicit dimension of aptitude.

Indeed, more recent research (Woltz, 2003; Granena 2013, 2016) has suggested that cognitive processes underlying implicit learning are relatively distinct from explicit, declarative processes and that individual differences in implicit cognitive processes can potentially constrain long-term L2 outcomes in morphosyntax at early and late stages of L2 development (Granena, 2013). Subsequently, recent proposals (Woltz, 2003; Granena, 2016) on language aptitude have included cognitive aptitudes relevant for implicit learning. These include abilities in the domain of implicit cognitive processes, such as implicit memory and implicit inductive ability. By contrast, cognitive abilities in the domain of explicit attention-driven cognitive processes include rote memory, explicit inductive ability and analytical ability (Granena, 2016).

Other recent developments in conceptualization of aptitude have been done from a working memory perspective (Miyake & Friedman, 1998; Sawyer & Ranta, 2001; Wen, 2012; Wen et al., 2017). Working memory (WM) is assumed to constitute a key component in cognitive processes underlying L2 language processing and is viewed as a viable addition to the current understanding of aptitude (Wen et al, 2017). This theoretical advancement has been corroborated by recent metanalytic research that yielded robust positive associations between various subcomponents of WM and a range of L2 skills (Li, 2016; Juffs and Harrington 2011; Wen et al, 2017).

The most recent language aptitude battery that has taken into consideration relevance of WM to conceptualisation of aptitude along with the proposed distinction between aptitudes relevant for explicit and implicit learning is the High-level Language Aptitude Battery model (Hi-LAB; Linck et al., 2013; Doughty et al., 2010; Doughty, 2013; 2014). The authors speculate that aptitude components relevant for high-level achievement may be different from those at lower levels and define high-level aptitude as “a composite of domain-general cognitive abilities and specific perceptual abilities” (Linck et al. 2013, p. 535). The domain-general cognitive abilities are assumed to constrain the development of high-level proficiency. The perceptual abilities have been hypothesized to be of relevance to the development of high-level spoken language abilities. The rationale underpinning this aptitude model is rooted in contemporary cognitive science. In particular, the model assigns a major role to WM tapping different functions of central executive (i.e. updating, inhibitory control and task switching) and phonological short-term memory assessed by two different measures. It includes measures of long-term memory retrieval, and a more traditional measure of associative memory. Furthermore, it assesses implicit learning and processing speed. Finally, there are two measures of perceptual acuity, for phonemic discrimination and categorization. The development of the Hi-LAB constitutes a significant contribution to aptitude theory. Nonetheless, at present, many projects related to the model and the Hi-LAB aptitude test are still work in progress with very limited empirical evidence available to the public.

Robinson (2005, 2007) approaches aptitude from the information processing perspective in his Aptitude complexes/ Ability Differential framework which strives to capture dynamic interactions between learners` aptitude profiles understood as different combinations of abilities and characteristics of the tasks which learners need to complete in real-life situations. In this sense, Robinson treats aptitude as “cognitive abilities [that] information processing draws on during L2 learning and performance in various contexts and at different stages” (2005, p.46). He argues that such aptitude-treatment interactions (ATIs) are evident at all levels exerting their influence on learners` task performance.

In a similar vein, Skehan (2012, 2015) points out that different components of aptitude may be uniquely related to various putative stages of L2 acquisition and cognitive processes associated with them. With regard to morphosyntax, L2 acquisition can be broken down into a series of stages, which are: sound processing and segmentation, noticing, patterning, restructuring and integration, error avoidance, automatization and lexicalization. To exemplify, he suggests that aptitude components of phonetic coding ability and working memory are more likely to be related to initial stages of input processing and noticing, while language analytical ability is associated with stages of pattern identification and restructuring. In the most recent development of the model, it is argued that the first five stages are related to more explicit knowledge acquisition, and the remaining ones are associated with control over acquired knowledge in actual performance and capacity for more native-like performance, which is presumably associated with implicit learning and language processing.

The publication of reliable aptitude measures with strong predictive validity has spurred prolific research on the impact of individual differences in cognitive abilities on L2 development. The proliferation of aptitude studies is typically attributed to the high explanatory power of aptitude for L2 learning, as well as relevance of the research findings to L2 pedagogy (Li, 2016). Typically, aptitude research is subdivided into predictive investigating associations between aptitude and L2 learning outcomes (e.g. Bell & McCallum, 2012; Sparks, Patton, Ganschow, & Humbach, 2009) and aptitude-treatment interaction paradigm (ATI) concerned with investigation of how individual differences play out in different instructional conditions (e.g. Hwu & Sun, 2012; Erlam, 2005). Li`s comprehensive meta-analytic research seeking to examine the construct validity of language aptitude (2016) and its relevance for morphosyntactic learning (2015) indicated that aptitude is a strong consistent predictor of L2 learning outcomes. Furthermore, the analysis of studies conducted within the ATI paradigm revealed that aptitude is more strongly correlated with achievement in explicit instructional conditions and is more relevant in inductive approaches with high-aptitude learners at advantage, while it is typically less relevant or irrelevant at all in learners experiencing deductive instruction. Additionally, the meta-analysis revealed a strong association between aptitude and executive working memory which is more strongly related to aptitude and aptitude components than phonological short-term memory.

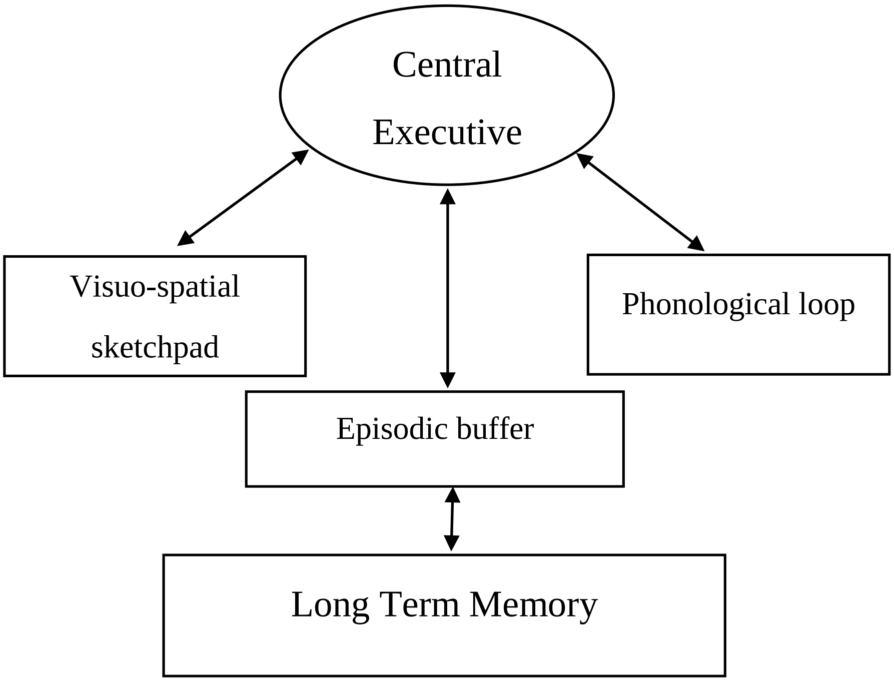
1.4.3. Working memory capacity

As mentioned above recent attempts to reconceptualise language aptitude have been influenced by development in areas of cognitive psychology which put the concept of working memory at the forefront, spurring a renewed interest in the topic (Wen et al, 2017). In the 1990s due to the extensive work in the field of cognitive psychology working memory was identified as a cognitive trait that is distinct from both long- and short-term memory systems and important for learning (Baddeley, 2000, 2007; Daneman & Carpenter, 1980). Applied linguists probed the relationships between WM and L2 acquisition and arrived at the conclusion that working memory is one of the essential components influencing L2 learning (Harrington & Sawyer,1992; Miyake & Friedman, 1998). A number of L2 researchers have suggested that working memory might be as important for language learning as aptitude (DeKeyser & Koeth, 2011; Sawyer & Ranta, 2001; Hummel, 2009; Serafini & Sanz, 2016). It was also suggested that working memory could be an additional cognitive element of L2 aptitude in the sense that it likewise predicts performance (Juffs & Harrington, 2011; Wen et al., 2017).

According to contemporary views, WM refers to cognitive systems responsible for control, manipulation and temporary storage of information in the course of online processing (Linck et al., 2013; Juffs & Harrington, 2011). WM underlies the ability to process linguistic input and store information derived from that input so that it could be retrieved later. According to Cowan (2005, p.39) WM can be understood as a “set of processes that hold a limited amount of information in a readily accessible state for use in an active task”.

Although, there exist several models of WM attempting to explicate the nature and functions of the construct, it is the multicomponent model proposed by Baddeley & Hitch (1974) that has been most widely used in L2 research. Initially the model included three main components: two short-term storage domains comprised of phonological loop and visuo-spatial sketchpad and a modality-free central executive that is an attention and control system. Later Baddeley (2000) added the fourth component: the episodic buffer endorsed with temporal storage and integration of information (see Figure 1.1).

Figure 1.1 Revised model of working memory (Baddeley, 2000)



The short-term storage domains have been allocated passive roles as repositories of information labelled “slave systems” managed by the central executive (Juffs & Harrington, 2011). According to Baddeley (1996, 2012) the central executive performs three main functions: focus, divide and switch attention. It is responsible for monitoring and coordinating the operation of the slave systems (i.e., visuospatial sketchpad and phonological loop) and relates them to long term memory (LTM) (Baddeley, 1996). The phonological loop is responsible for handling phonological and verbal information. Baddeley et. al (1998) emphasise the role of the phonological loop as a device essential to the process of acquiring new phonological forms. It is deemed crucial for vocabulary acquisition and long-term language development (Juffs & Harrington, 2011). The phonological loop consists of a phonological store which holds information in a speech-based form and an articulatory processing mechanism that rehearses and stores verbal information from the phonological store (Baddeley, Gathercole & Papagano, 1998). The visuo-spatial sketchpad manages visual and spatial information. It also displays and manipulates visual and spatial information held in long-term memory.

1.4.3.1. Measures of working memory

With respect to linguistics, the phonological loop is the most widely researched component of WM. Phonological loop capacity, often referred to as phonological short-term memory (PSTM), is typically assessed by tasks involving immediate serial recall of words (word span), digits (digit span) or non-word recall measures. The latter has been one of the most widely used measures of PSTM (Kormos & Sáfár, 2008) where test-takers are asked to repeat non-words of varying length. Non-words are linguistic items that do not exist in a target language but conform to its phonotactic rules (Kormos & Sáfár, 2008). Word or digit recall tests typically tap into both the phonological store and articulatory processing mechanism; non-words recall assesses the duration of information retention in PSTM (Georgidou & Roehr-Brackin, 2016).

Executive WM, which is a combined capacity for both maintenance and processing of information involving the central executive is typically measured by complex span tasks imposing dual-task demands that require the simultaneous storage and processing of information. A widely used complex span task is the reading span task (Daneman & Carpenter, 1980) that taps into the ability to simultaneously read and comprehend a set of sentences and then recall a target word. In this test participants are asked to read aloud a set of sentences and memorise the last word of each sentence. At the end, they need to recall sentence-final words - the final words of all the sentences in each set. The task becomes more and more demanding as the number of sentences presented in a set gradually increases. A spoken version of the reading span task is the listening span task which follows a similar design but instead of reading requires participants to listen to sentences (Daneman & Carpenter, 1980).

Comprehension of the sentences in the reading and listening span tasks requires learners to have a certain knowledge of L2 (Juffs & Harrington, 2011). It has been argued that the use of language-dependent measures (i.e. reading or listening span tests) administered in learners` L2 may not provide a reliable index for working memory since memory performance may be confounded with L2 proficiency (Juffs & Harrington, 2011). A non-verbal measure assumed to lessen the demand on language comprehension to some extent is the operation span task (Turner & Engle, 1989). This test uses simple arithmetic equations instead of sentences. Participants are asked to solve arithmetic equations and remember words or letters that are presented with each mathematical operation. An alternative to complex span tasks that further minimises reliance on language knowledge by using digits instead of words or sentences is the backward digit span task (BDST) (Kormos & Sáfár, 2008). In this test participants are presented with sequences of digits increasing in length, which they need to recall in a reverse order.

1.4.3.2. The relationship between working memory and L2 learning

The field of SLA is not short of empirical investigations on the role of WM in L2 development. In recent years, a growing number of empirical investigations have examined the contributions of the PSTM as measured by tasks assessing phonological loop capacity and executive WM as measured by tasks involving the central executive. Cumulative findings show that WM constrains a wide range of L2 phenomena and constitutes an important predictor of success in L2 learning. Indeed, a recent meta-analysis by Linck et. al. (2014) based on data from 79 samples involving adult L2 learners (N= 3,707) revealed a robust, positive correlation between WM and L2 processing and proficiency outcomes.

In relation to the role of PSTM, a number of empirical investigations reported relevance of PSTM to L2 vocabulary acquisition (e.g. French, 2006; French & O`Brien, 2008) and development of oral fluency (e.g. O`Brien et al., 2006). Importantly, PSTM has been found to be a robust predictor at early stages of development. Its effects on subsequent vocabulary and acquisition development appear to be limited and have no predictive power on gains after the basic vocabulary store has been constructed (Juffs & Harrington, 2011).

Some researchers have highlighted the fact that at later stages of L2 learning it is the executive function of WM endorsed with attention control, suppression of competing information resources and switching of attention that is more important for achievement than memory per se (Juffs & Harrington, 2011). Greater executive WM is conceived as more important for L2 achievement in a number of areas in language proficiency such as L2 language comprehension (e.g. Harrington & Sawyer, 1992), oral fluency (e.g. Trebits & Kormos, 2008; Gilabert & Muñoz, 2010), reading, listening and speaking (e.g. Kormos and Sáfár, 2008) and grammar (e.g. Linck & Weiss, 2011). Although executive WM is implicated in L2 development and appears to be a significant predictor of achievement, recent empirical evidence suggests that its facilitative role may lessen with a prolonged exposure to the target language and increasing L2 proficiency (Serafini & Sanz, 2016).

Overall, while it is uncontroversial that WM appears to constrain both L2 proficiency development and use, findings pertaining to the magnitude of its effects and specific components underlying these effects (i.e., the PSTM vs. the executive control) have been ambivalent across studies (Linck et al., 2014; Juffs & Harrington, 2011; Williams, 2012).

To summarize, different conceptualisations of language learning aptitude have been developed in the past five decades reflecting changes in theory and research paradigms. Importantly, proposals to incorporate WM as a component of aptitude along with more recent developments in empirical research pointing towards distinct cognitive aptitudes relevant for explicit and implicit learning may lead to the development of more innovative research methodology that can inform SLA. The review of existing empirical findings has suggested that individual differences in aptitude and WM are implicated in a range of L2 phenomena and emerge as strong and consistent predictors of achievement. Importantly, cognitive abilities gradually develop in conjunction with growing cognitive maturity. Thus, examination of the effects of age-related differences in L2 learning seems desirable.

1.4.4. Age-related differences

The contributions of age to interindividual variation in L2 achievement have been one of the most extensively investigated and debated topics in both naturalistic and instructed SLA. Initially the variable of age has been called upon to account for differences in immigrants` level of proficiency in the target language based on their age of arrival in L2 community. The findings of such studies have clearly demonstrated the edge younger learners have over older learners in different language dimensions (Flege, 1991; Flege and MacKay, 2004; DeKeyser 2000, Johnson and Newport 1989). Younger learners` advantage has been documented after a considerable period of immersive exposure to the target language. Studies comparing learners in naturalistic settings after a relatively short period of exposure evidenced that older starters advance faster in the first stages of the process of L2 acquisition and are more efficient learners in the short term. Younger starters, on the other hand, are slow at first but in the long term attain a superior proficiency level which is sometimes found to be native-like or almost native-like (Snow & Hoefnagel-Hohle, 1978).

In contrast to findings from a naturalistic context, studies of classroom foreign language learning (Muñoz, 2006; Jaekel et al., 2017) have consistently highlighted advantages of older learners (who start studying a foreign language at age 12 +) who acquire language at a faster rate than younger learners (who start studying foreign language between ages 6 and 11) in a minimal input setting. Longitudinal studies (Muñoz, 2006; Jaekel et al., 2017) which comprehensively assessed L2 development with learners differing in terms of the starting age of instruction indicated that older starters consistently and significantly outperformed younger starters on most measures, with the older learners` advantage being most evident after roughly 200 hours of instructional input. Furthermore, as reported by Muñoz (2006) younger starters caught up with the older starters only after 726 hours which equals 10-12 years of instructional exposure. This edge of cognitively mature learners has been explicated by their more advanced state of cognitive maturity allowing them to engage into explicit learning prevailing in the form-focused learning scenarios (DeKeyser, 2012, 2018). Younger starters, on the other hand, require prolonged input exposure to catch up with older starters since plentiful input is assumed to give them full advantage of implicit learning which older learners largely replace with explicit learning (DeKeyser, 2018).

There is some evidence that differences in implicit vs. explicit L2 learning may not be exclusively caused by L2 learners` age but also impacted by the type of instruction they experience (Lichtman, 2013, 2016; Tellier & Roehr-Brackin, 2016). In a 2013 study Lichtman attempted to dissociate the effects of age from the effects of instruction by comparing three groups of classroom learners of Spanish, i.e. implicitly instructed children (age range: 8-12), explicitly instructed adolescents (age range: 14-16) and implicitly instructed adolescents (age range: 16-17) Participants` knowledge of verbal agreement morphology was assessed by means of a time-pressured story-rewriting task tapping implicit knowledge and a verb conjugation task tapping explicit knowledge. Findings showed that whilst children and adolescents learning under implicit instructional conditions developed more implicit knowledge, explicitly instructed adolescents acquired more explicit knowledge. This finding was interpreted as suggestive of the fact that the instruction L2 learners are exposed to may have a greater impact on implicit vs. explicit learning than the factor of learner age. Put differently, instruction trumps the effects of age.

In a subsequent study, Lichtman (2016) explored the effects of age and instruction on learning and metalinguistic awareness of an artificial mini-language *Sillyspeak* with children (age range: 5-7) and adult university-level learners taught under implicit or explicit instructional conditions. Participants` knowledge was assessed by means of implicit and explicit production tests, and a grammaticality judgment test. Furthermore, after the main testing phase, the participating learners answered a series of debriefing questions, and adults completed a think-aloud task. The analysis indicated that compared to implicitly instructed learners, children and adults in explicit condition developed greater metalinguistic awareness of the structure of mini language, which was associated with better performance in both age groups. Explicit instruction was found to be equally beneficial for children's and adults` metalinguistic development. This lent support to the claim that age differences in implicit vs. explicit L2 learning are not exclusively constrained by maturation, but also influenced by instruction L2 learners are exposed to, and that bias towards explicit learning in adulthood may be an artefact of explicit instruction adult learners typically experience.

Further support for the effect of instruction on L2 learning mechanisms was provided by Tellier & Roehr-Brackin (2016) who investigated the relationship between language learning aptitude and metalinguistic awareness in 8 to 9-year-old primary-school learners in a quasi-experimental study following a pre-test/post-test design. Participating English-speaking children (N=111) were taught L2 French under explicit form-focused instruction over a school year. Children completed MLAT-E measuring their language learning aptitude, the measure of metalinguistic awareness as well as a measure of L2 proficiency administered at the end of the treatment. Among other findings it was reported that the measure of grammatical sensitivity was a significant predictor of achievement. This result is in direct contradiction to previously reported findings that young children tend to rely above all on memory abilities rather than language-analytic ability which is generally associated with morphosyntactic achievement in older learners (Harley & Hart, 1997; Robinson, 2005). By means of explanation it was argued that explicit form-focused type of instruction experienced by children led to the development of language analytic ability which is more pertinent for achievement in explicit instructional context than memory ability, with higher aptitude learners at advantage.

1.4.5. L2 learner metacognition and cognitive processes

Variation in perceptions and beliefs pertaining to L2 learning and its mastery have attracted the interest of language researchers and teachers (Dörnyei & Ushioda, 2009; Weseley, 2012). Perceptions and beliefs constitute a part of an individual`s metacognition assumed to be a contributor to success in L2 learning (Horwitz, 1985, 1987, 1988; Loewen et al., 2009). The concept of metacognition was first proposed by Flavell (1976, p.232) who defined it as "one's knowledge concerning one's own cognitive processes and products, or anything related to them, e.g. the learning-relevant properties of information or data".

It is assumed that metacognition is made up of two key components: metacognitive knowledge and metacognitive strategies (Flavell, 1976). Metacognitive knowledge refers to learners' awareness of their learning, while metacognitive strategies are understood as learners' management of their learning process inclusive of a wide range of activities: preparation and planning for effective learning, selection of the most effective strategies to perform on a task; monitoring, management and self-assessment of learning (Schraw, Crippen & Hartley, 2006).

Learners' perceptions and beliefs constitute a subset of their metacognitive knowledge. They are relatively stable and can be articulated in a verbal statement (Wenden, 1998, 1999). In the context of SLA, perceptions are typically discussed in terms of learner perceptions of themselves and their perceptions of learning contexts (Wesley, 2012). Perceptions of themselves refers to how students understand and make sense of themselves and their own learning process (Liskin-Gasparro, 1998; Williams & Burden, 1999). Perceptions of learning contexts includes how students experience and understand aspects of the classroom (Brown, 2009). Learner beliefs are rarely dissociated from learner perceptions. Nonetheless they are assumed to be more overarching and pervasive compared to perceptions, which are typically tied up to specific experiences (Wesley, 2012). Learner beliefs refer to what learners think about themselves, about contexts of learning. Horwitz (1988, p.284) defined beliefs as “student opinions on a variety of issues and controversies related to language learning”.

Existing L2 research holds that L2 learners` perceptions and beliefs about language and language learning may affect their achievement in the classroom (Scheffler, 2009; Horwitz, 1988; 1999). Studies focusing on the contributions of L2 learners` perceptions and beliefs typically employ a variety of measures often complementing each other. Various types of questionnaires typically containing closed-ended and open-ended items belong to one of the most commonly used methodological tools tapping learners` overall satisfaction with the course, perceived usefulness of instruction, or perception of difficulty of the targeted grammar points to name a few (Thepseenu & Roehr, 2013; Rodr ǵuez Silva & Roehr-Brackin, 2016; Loewen et al., 2009). One of the most well-known questionnaires, assessing L2 learner beliefs, is Beliefs About Language Learning Inventory (BALLI) developed by Horwitz (1988). The BALLI questionnaire is composed of 34 items, which fall into five categories: nature of language learning, difficulty of language learning, foreign language aptitude, learning and communication strategies, and motivation and expectations. Furthermore, learners` beliefs and perceptions may be tapped by various types of interviews as well as classroom observations.

Along with the administration of interviews and questionnaires, one of the most widely-used approaches for obtaining information about learner metacognition and cognitive processes is to ask learners directly to reflect upon their own experiences by means of verbal reports. The latter are distinguished on the basis of the conditions under which they are collected. Concurrent reports are used to collect relevant information while participants are performing a task, whilst retrospective reports are collected during the debriefing sessions, some time after performing the task. Reports that ask participants to verbalize their thoughts per se are referred to as nonmetalinguistic; those that require participants to verbalize additional information, such as explanations and justifications, are referred to as metalinguistic (Bowles & Leow, 2005).

Recently, verbal reports have been used as a classroom measure of awareness intended to probe the type of knowledge (i.e. explicit or implicit) possessed by L2 learners (Roehr, 2006; Bowles & Leow, 2005). Typically, learners are asked to verbalise any rules they may have learnt and applied to complete a task. L2 learners` knowledge is assumed to be implicit if they perform accurately on the task but are unable to describe the knowledge.

Among other widely-used measures of awareness are subjective measures which are administered by asking participants to complete a task and provide source attributions (e.g. guess, intuition, memory, rule) and confidence ratings for each test item. Subjective measures have been used in lab-based research examining learning of artificial and mini languages (Rebuschat & Williams, 2009, 2012); very few classroom-based studies have implemented them to distinguish between explicit and implicit knowledge developed by instructed L2 learners.

Overall, the use of different kinds of self-reports provides teachers and language experts with an opportunity to develop a more complete understanding of the language learner`s metacognition in the sense of perceptions and beliefs about their own language learning as well as instruction they are exposed to. What is more, inclusion of self-reported measures of awareness can provide an insight into whether L2 learners draw on explicit or implicit knowledge during language processing. Better understanding of learner metacognition is useful for the implementation and expansion of high quality foreign language programmes facilitating the development of a high degree of language competence.

1.5. Summary and Research Issues

As discussed in the preceding sections, both explicit and implicit knowledge are assumed to be implicated in instructed L2 learning (R. Ellis, 2005, 2015; N. Ellis, 2015; Roehr-Brackin, 2014). Second language learning outcomes in terms of the development of explicit and implicit knowledge are a subject of considerable variation between the learners (Tagarelli et al, 2016).

The source of this variation is multifaceted, arising from such factors as type of instruction L2 learners experience (Erlam, 2006; Haight et al., 2007; Yilmaz, 2012; Lichtman, 2013; 2016), difficulty of grammar points to be acquired (DeKeyser, 2005, Goldschenider & DeKeyser, 2001), individual differences in cognitive ability (Li, 2015; 2016), age (Jaekel et al., 2017; Muñoz, 2006), and learner perceptions and beliefs (Thepseenu & Roehr, 2013; Rodríguez Silva & Roehr-Brackin, 2016).

More specifically, recent meta-analytic research lent support to higher effectiveness of explicit form-focused instruction compared to implicit meaning focused instruction (Goo, Granena, Yilmaz, & Novella, 2015; Norris & Ortega, 2001). It has been suggested that explicit form-focused instruction may be particularly beneficial for the acquisition of non-salient grammatical features, which are often ignored at the stage of input, by facilitating noticing and thus guiding acquisition. English articles are grammatical morphemes, characterized by high learning difficulty (Goldschneider and DeKeyser, 2001) and pose substantial acquisition challenges for L2 learners whose L1s do not instantiate an article system.

L2 learning of difficult grammatical structures is likely to interact with individual differences in cognitive ability, i.e. aptitude and WM capacity (Housen & Simoens, 2016; Bulté & Housen, 2012; Dörnyei, 2009). Synthesis of empirical findings spanning over five decades of aptitude research indicated that aptitude is a strong predictor of language learning outcomes in general, and morphosyntactic learning in particular (Li, 2015, 2016). The relevance of WM to L2 learning has been amply demonstrated by research examining L2 proficiency more generally as well as the development of L2 vocabulary and oral skills (Linck et al., 2014; Juffs & Harrington, 2011). Furthermore, a number of studies concerned with the investigation of interactions between individual differences in cognitive ability and the type of instruction indicated that aptitude and WM have differential contributions to L2 learning in different instructional conditions (e.g. Hwu & Sun, 2012; Erlam, 2005). Nonetheless, to the best of my knowledge, there is no published study to date examining interaction between individual differences in cognitive ability and type of instruction in relation to the development of explicit and implicit knowledge of challenging grammatical structures like L2 English articles.

Persistent problems L2 learners experience with acquisition of articles have been attested by a large body of empirical investigations examining linguistic properties of the English article system (Hawkins et al., 2006; Lopez, 2017; Ionin, Ko & Wexler, 2004; Akakura, 2012; Sun, 2016). A series of highly influential studies conducted within the framework of generative Second Language acquisition (Ionin, Ko & Wexler, 2004; Ionin, Zubizaretta & Bautista Maldonado, 2008) indicated that L2 learners misuse and omit articles not randomly, but that their choices are influenced by semantic universals of definiteness and specificity. Few intervention studies which taught L2 learners the concepts of definiteness and specificity by means of linguistically informed instruction (e.g. Snape and Yusa, 2013; Lopez, 2017) did not detect any difference between the post-test results of the experimental and control groups. On the contrary, studies which taught articles by means of pedagogical grammar rules (e.g. Akakura, 2012; Muranoi, 2000; Hu, 2011) attested that overall articles are amenable to explicit intervention. What is more, it was reported that some articles/ article uses appear to be more challenging for acquisition and less amenable to instruction than others (Akakura, 2012). However, since very few studies analysed individual article uses as well as L2 learners` explicit and implicit knowledge of articles, empirical evidence to date remains limited.

The factor of age is one of the most consistent predictors of L2 learners` achievement in both naturalistic and instructed language learning. The research probing the contributions of age in the classroom context (Jaekel et al., 2017; Muñoz, 2006) consistently reports older learners` advantage over younger learners in a variety of achievement measures. This is typically attributed to differences in cognitive mechanisms employed by learners. Younger learners are thought to rely primarily on implicit learning which requires ample exposure to high quality input to be effective, whilst older learners` greater state of cognitive maturity allows them to make use of faster and more efficient explicit learning (DeKeyser, 2018; DeKeyser & Larson-Hall, 2005). Nonetheless, there is some evidence that the bias towards explicit and implicit learning is not exclusively caused by age but is also influenced by the type of instruction L2 learners experience. Recent empirical investigations (Lichtman, 2013, 2016) indicated that explicit instruction is equally beneficial in promoting acquisition for both younger and older learners. Since instruction appears to be on a par with age in terms of its effect on cognitive mechanisms employed by L2 learners, further investigations examining contributions of age and instruction as well as possible interaction between them to the development of L2 learners` linguistic knowledge is desirable.

Furthermore, research focusing on the role of L2 learners` metacognition suggests that learner perceptions and beliefs about instruction and their learning in general may be associated with their performance (Scheffler, 2009; Loewen et al., 2009). Thus, it is relevant to examine the relationship between learners` perceptions of instructional intervention and explicit and implicit knowledge they develop.

Finally, learners` self-reported measures of awareness such as source attributions and confidence ratings may provide an insight into the type of knowledge they possess (i.e. explicit or implicit) as well as the type of knowledge fostered by a particular instructional approach. Consequently, any classroom-based study interested in the contributions of explicit and implicit knowledge to L2 learning would benefit from the inclusion of self-reported measures of awareness, since they are able to discriminate between explicit and implicit knowledge in a more fine-grained way.

Overall, the research examining the role played by the type of instruction, individual differences in cognitive ability, age, and possible interaction between them as well as learner perception and beliefs for the development of explicit and implicit knowledge of grammatical structures characterised by high learning difficulty is not only relevant for SLA but has an important contribution to pedagogy. The latter does not necessarily take into consideration the interplay of the above-mentioned factors and the influence they exert on the process of instructed language learning - a consequence that might influence language learning in general and acquisition of challenging grammatical structures in particular.

The present study explores the following issues:

- explicit and implicit knowledge of different L2 article uses (Chapter 3)
- contribution of self-reported measures of awareness to the understanding of the type of knowledge elicited by one of the measures developed for the purposes of the study (Chapter 3)
- effectiveness of explicit form-focused instruction operationalised as deductive and guided inductive instructional approaches and implicit meaning-focused instruction for the acquisition of explicit and implicit knowledge of L2 English articles (Chapter 4)
- predictive value of foreign language learning aptitude and WM capacity for the development of explicit and implicit knowledge of L2 English articles (Chapter 4)
- effects of age and type of instruction on the development of explicit and implicit knowledge of L2 English articles (Chapter 5)
- predictive power of foreign language aptitude and WM capacity in younger and older teenage learners` development of explicit and implicit knowledge of L2 English articles (Chapter 5)
- associations between learner perceptions and beliefs about instruction and development of explicit and implicit knowledge of L2 English articles (Chapter 6)

These issues are addressed in the context of three articles intended for publication and presented in Chapter 3, Chapter 4 and Chapter 5. The issue of learner perceptions and beliefs is examined in Chapter 6.

1.5.1 Research Questions and Hypotheses

This study aims to address the following research questions:

RQ 1: Which tests measure explicit and which tests measure implicit knowledge of L2 English articles?

Multiple studies concerned with the construct validity of classroom-based measures of implicit and explicit knowledge (R. Ellis, 2005; R. Ellis et al, 2009; Bowles, 2011; Zhang, 2015) have indicated that time-pressured measures that require learners to focus on meaning will elicit primarily implicit knowledge, whereas measures conducted without time constraints and requiring learners to focus on form will elicit explicit knowledge. Therefore, it is predicted that an elicited imitation (EI) test and an oral production (OP) test that are meaning-focused and time-pressured will measure L2 learners` implicit knowledge of articles, while an untimed form-focused metalinguistic knowledge (MLK) test that requires the use of metalanguage and an untimed gap-fill test that focuses learner attention on form will measure L2 learners` explicit knowledge of articles (see section 2.5.4 for detailed description of the designed instruments of explicit and implicit knowledge).

RQ 2: How do source attributions and confidence ratings employed in a gap-fill test contribute to our understanding of the type(s) of knowledge measured?

In accordance with the studies that included self-reported source attributions and confidence ratings which examined associations between accuracy on a given measure and self-reported use of source attributions and/ or confidence ratings (e.g. R. Ellis, 2005; Elder, 2009; Tagarelli et al., 2016), significant correlations between self-reported use of implicit knowledge (e.g. guess and/or intuition) and accuracy will suggest that learners draw on their implicit knowledge. By contrast, significant correlations between self-reported use of explicit knowledge (e.g. memory and/ or rule) and accuracy on the test will indicate that learners draw on their explicit knowledge (see section 3.3.2 for discussion of representative studies). Since the gap-fill test was designed as a form-focused measure conducted without time constraint, it is expected that learners` accuracy on the test will be significantly associated with the use of memory and rule. Following Roehr (2006), it is predicted that self-reported use of explicit knowledge (e.g. memory and rule) will attract higher confidence ratings than the use of guess and intuition.

RQ 3: What is learners' explicit and implicit knowledge of different article uses targeted in the study?

Given the widely attested high learning difficulty of articles (Master, 2002; Butler, 2002; Akakura 2012) and absence of formal instruction on articles at the school of testing, it is predicted that learners will have limited explicit and implicit knowledge of different article uses. Furthermore, since there is some evidence from previous studies (Akakura, 2012; Muranoi, 2000) that articles differ in terms of their learning difficulty, it is predicted that there will be a variation in learners` explicit and implicit knowledge of different article uses with some uses being more difficult than others.

RQ 4: Do learners who have experienced different instructional approaches differ in their explicit and implicit knowledge of L2 English articles?

Substantial meta-analytic research has provided strong support for the larger and more durable gains brought about by explicit, form-focused instruction compared to an implicit meaning-focused type (Goo, Granena, Yilmaz, & Novella, 2015; Spada & Tomita, 2010; Norris & Ortega, 2001). Therefore, it is predicted that explicitly instructed learners will develop higher explicit and implicit knowledge of L2 English articles compared to learners exposed to implicit instruction. Empirical investigations that have compared the effectiveness of deductive vs. inductive instructional approaches have provided inconclusive results with some studies reporting an advantage of a deductive approach (Erlam, 2003; AbuSeileek, 2009) and some of an inductive approach (Cerezo et al, 2016; Haight et al., 2007). Therefore, no directional hypothesis can be formulated as to which approach will be more effective.

RQ 5: To what extent do differences in language learning aptitude and executive working memory predict the development of learners' explicit and implicit knowledge of L2 English articles?

Evidence from meta-analytic research (Li, 2015, 2016; Linck et al., 2014) indicated that individual differences in language learning aptitude and/or executive working memory constitute an important predictor of success in L2 learning. However, as suggested by the ATI line of research (e.g. Hwu & Sun, 2012; Erlam, 2005) individual differences in cognitive ability play out differently in different instructional conditions. More specifically, there is some evidence (Tagarelli et al., 2016; Erlam, 2005) that explicit form-focused instruction providing learners with pedagogical grammar rules along with sufficient output practices may level out individual differences in aptitude and working memory in the development of explicit knowledge (see section 4.3.4 for evidence provided by ATI research). It is therefore hypothesised that individual differences will not be relevant for the development of explicit knowledge in explicitly instructed learners but will be important for the acquisition of explicit knowledge in implicitly instructed learners. Furthermore, since the development of implicit knowledge is more challenging in a formal setting, it is predicted that individual differences will influence the development of implicit knowledge in both explicit and implicit instructional conditions.

RQ 6: Do younger and older teenage learners who have been exposed to different instructional approaches differ in their explicit and implicit knowledge of L2 English articles?

Empirical investigations of the effects of age in classroom foreign language learning (Muñoz, 2006; Jaekel et al., 2017) have accumulated sufficient evidence pertaining to advantages of older learners (starting age of instruction 12 +) who acquire language at a faster rate than younger learners (starting age of instruction 6 to 11) and consistently and significantly outperform younger learners on a variety of achievement measures. This edge of older learners has been typically attributed to their more advanced state of cognitive maturity allowing them to engage into explicit learning (DeKeyser, 2012, 2018). By contrast, younger learners are assumed to rely on implicit learning which is not always attainable in the context of limited input exposure (see section 1.4.4 for a detailed discussion of age effects on explicit vs implicit learning). Since in the context of the present study, age difference between the participating teenage learners is relatively narrow, it is expected that younger teenage learners can already engage into explicit learning, but that older teenage learners can probably do it more efficiently. Therefore, it is predicted that older teenage learners will have an advantage over younger teenage learners on the measures of explicit and implicit knowledge.

RQ 7: To what extent do individual differences in language learning aptitude and working memory capacity predict younger and older teenage learners` development of explicit and implicit knowledge of L2 English articles?

Studies that have looked into contributions of individual differences in cognitive ability to L2 learning have indicated that they constitute a significant predictor of achievement in both older (Li 2015, 2016; Erlam, 2006) and younger L2 learners (Rosa and Muñoz, 2013; Tellier & Roehr-Brackin, 2013; Muñoz, 2014), although studies with younger learners are less readily available. Thus, it is predicted that aptitude and/or working memory will predict the development of explicit and implicit knowledge in both younger and older teenage learners.

In addition to seven main research questions, one more research question was formulated that considered the effect of learner perception and beliefs about the instructional treatment on the development of L2 learners` explicit and implicit knowledge of L2 English articles.

RQ 8: Are there associations between L2 learners` perception and beliefs about instruction they have experienced and the development of explicit and implicit knowledge of L2 English articles?

There is some evidence that L2 learners` perceptions and beliefs about instruction they have experienced is associated with their L2 performance (Wesely, 2012; Mills et al., 2006, 2007; Thepseenu & Roehr, 2013). It has been shown that more positive and supportive beliefs about instruction may facilitate L2 achievement, while negative beliefs may impede it (Wesely, 2012; Hosseini & Pourmandnia, 2013). Therefore, it is predicted that positive perceptions and beliefs about instruction will be associated with the development of L2 learners` explicit and implicit knowledge.

CHAPTER TWO RESEARCH DESIGN AND GENERAL METHODOLOGY

2.1. Design of the study

The study followed a quasi-experimental pre-test/immediate post-test/delayed post-test research design to investigate contributions of type of instruction, individual differences in cognitive ability, age and learner perception and beliefs about instructional treatment to the development of explicit and implicit knowledge of L2 English articles.

Three sets of teaching materials and a three-step instructional approach were tailor-made for the instructional intervention. A specifically designed suite of tests was administered to measure L2 learners` explicit and implicit knowledge of English articles. In addition to these measures, a placement test was used to provide an independent assessment of learners' L2 proficiency. A test of foreign language aptitude and executive working memory were also used to further investigate learners' cognitive ability profiles. An instruction satisfaction questionnaire was used to elicit L2 learners` perceptions and beliefs about instructional intervention.

2.2. Context

The participating learners were studying English as a foreign language in a private language school "Britannia" in Syktyvkar, Russia. Since the majority of state mainstream schools at the local area provide students with either very basic education in English often limited to one forty-five minute session a week or do not offer English language as a subject in the curriculum, learners attend this private school in addition to a mainstream school. The programme is comprised of five different levels of approximately 144 hours each lasting one academic year from the beginning of September to the end of May (there are three trimesters a year of three months each). The first level is a beginner level, the second level is an elementary level, the third one is a pre-intermediate/lower-intermediate level, the fourth one is an intermediate level, and the fifth one is an upper-intermediate level. Upon completion of the upper-intermediate level, learners can either take an additional practice course that focuses exclusively on the development of speaking skills, or a course preparing them towards the University entrance examination – the Unified State Exam in English that assesses speaking, listening, reading, writing and grammar components with a special focus on learners` grammar and metalinguistic knowledge. Learners intending to major in modern languages can take both courses; however they are required to pay for one of them. Those learners who demonstrate excellent performance and attend all the classes are reimbursed at the end of the academic year.

The teaching programme in the five main levels focuses on the development of four key language skills (i.e. speaking, listening, reading, writing) and grammar. Learners have three 90-minute sessions a week. Classes follow a traditional PPP sequence targeting all skills with a focus on communicative activities reflecting real-life language use: for example, shopping, ordering food, travelling, buying tickets, discussing films and books. Students also learn about the geography, culture, traditions and way of life in English-speaking countries. Focus-on-form activities include explicit presentation and discussion of pedagogical grammar rules followed by controlled exercises targeting application of such rules in written and oral drills. Classes are conducted mainly in English; however, metalinguistic descriptions, explanations and feedback are provided in learners` L1 (Russian).

The school uses a wide range of teaching and learning materials published by Oxford and Cambridge University Press. At the beginning of the academic year each learner receives a study pack that includes a student book, a workbook, and all audio materials that will be covered during the year. Additionally, learners can order DVDs, grammar and vocabulary manuals for individual study. Teachers also provide learners with grammar and vocabulary materials associated with each targeted topic, tape scripts of videos and some audio materials to help learners prepare for their end of trimester achievement exams.

Upon completion of each study trimester, learners take two achievement exams: a written exam that assesses their knowledge of grammar, vocabulary, reading and writing skills, and an oral exam that assesses their speaking skills. The oral exam is composed of two parts: story retelling where learners are required to retell 4 key texts covered during the semester demonstrating their knowledge of relevant vocabulary and grammar; and speaking performed in pairs and individually. In pair activity learners are asked to act out a dialogue in accordance with a task card that assigns them roles and provides a brief description of the situation, i.e. airport check-in, ordering food in a restaurant, buying a ticket, giving directions etc. For individual activities learners receive a task card detailing the topic and key points they should talk about. They are given 2-3 minutes preparation time. Learners talk for 5 minutes, and then examiners ask them several questions pertaining to the topic.

Learners` performance is assessed on a standard for the Russian Federation five-point academic grading scale where 5 (excellent) denotes excellent knowledge and the highest distinction; 4 (good) denotes good knowledge; 3 (satisfactory/ fair) denotes a passing grade; 2 (unsatisfactory) denotes the first level of failing; and 1 (very poor) is the lowest possible grade denoting complete failure. Those learners who score below 3 at either exam are required to do a resit prior to the beginning of a new academic year; if they fail resit exams, they repeat the year.

Every week learners receive a progress mark which is an average of the marks they receive for their homework and classwork. Every 2 weeks learners are given written and oral assessments in exam conditions; these include end of topic speaking, vocabulary and grammar tests. Learners are provided with regular written feedback detailing their performance and any problems they may have on cards that are signed by parents and collected by teachers on a monthly basis. Learners are required to attend at least 85% of the teaching sessions in order to be allowed to take achievement exams. Learners missing classes due to absence are enrolled on weekend catch-up classes or are supported to catch up by teachers.

One major issue that learners face is that there are few opportunities to practise their listening and speaking skills outside the classroom with native or near-native speakers. The school is located in Syktyvkar - the capital of Komi Republic, which is a remote and not particularly affluent town, it cannot offer competitive salaries in the education sector and, thus, does not attract native English-speakers to the area. Consequently, learners have very limited exposure to native input compared to schools in the central area of Russia like Moscow and St. Petersburg that routinely employ native speakers of various languages. Furthermore, although the school offers study-abroad programmes in a variety of English-speaking countries, very few students can participate in them given the high cost of such programmes.

Learners at intermediate and upper-intermediate levels can additionally attend a Saturday speaking club where they engage in free production activities. Each week they receive a controversial topic, i.e. artificial intelligence, global warming, war, and topic materials associated with them such as newspaper articles, news features, written and/or recorded excerpts from speeches, videos and short films, and are asked to prepare to speak on the topic. At the speaking club learners share their opinions, engage in debates, and are encouraged to approach topics from different perspectives. During the speaking club, the moderating teacher provides learners with useful expressions and corrects the most common mistakes in grammar and vocabulary. This feedback is always supplied in English.

Additionally, at the end of each academic year learners receive a summer reading list with adapted short stories for beginner and elementary-levels, adapted and abridged fiction for lower-intermediate/intermediate levels, and original but abridged fiction for upper-intermediate level. Learners are required to read 2-3 short stories or novels, complete an exercise list assessing their knowledge of the text and new vocabulary and write an essay for each story/novel of their choice. At the beginning of the year learners present one story or novel of their choice to the whole class.

These activities are designed to expose learners to more high-quality input and improve their language competence.

2.3. Participants

A total of 115 teenage Russian L2 learners of English (mean age = 14.80, SD = 1.09, range = 12-17) from six intact classes were involved in the study. Out of the 115 participants, 54 were male and 61 were female. The learners differed in terms of age: younger teenage learners (age range 12-14; mean age = 13.84; SD = .63) began formal language instruction at the age of 8-10 and had studied English for four years; older teenage learners (age range 15-17; mean age = 15.68; SD = .58) began formal instruction at the age of 11-13, and had likewise studied English for four years. At the school of testing younger and older learners were assigned to separate classes in accordance with their age profiles. According to the school`s progress test, learners were at a lower intermediate level of English proficiency. For the purposes of the study the participants` level of English was assessed independently by means of the Oxford Quick Placement Test (UCLES, 2004) which showed that participants` scores (M = 36.15, SD = 2.30, range = 29-40) fell within the lower intermediate band according to the test manual. Lower intermediate level is assumed to be broadly equivalent to Level B1 of the Common European Framework of Reference. No inferences can be made regarding the quality and the amount of instruction the participants had been exposed to before they were enrolled on a language course in the school of testing; however before the enrolment their level of proficiency had been assessed as beginners or false beginners (learners who have already taken part in English language lessons at some point in life but did not progress far and their language knowledge is severely limited) in a placement test, and therefore they started from a beginner level. The information that the learners provided on the background information questionnaire (see Appendix A) is reported in what follows. Table 2.1 summarises younger and older teenage learners` characteristics.

Table 2.1 Summary characteristics of participants (N total = 115)

	Younger learners (n=55)	Older learners (n=60)
Years of study	4	4
Age at testing	12-14	15-17
Starting age of instruction	8-10	11-13

For all participants, English was an obligatory subject which they studied in a classroom. They had received the same amount of instruction: the year average of 240 minutes per week distributed into three sessions. At the time of pre-test and immediate post-test none of the learners had studied English outside of school and none of them had been exposed to the target language in a naturalistic setting for more than two weeks. The learners also reported studying or having studied either French (8 participants) or German (11 participants).

2.4. Targeted structure

English articles were chosen as the targeted structure since they exemplify constructions of high learning difficulty globally (Master, 2002; DeKeyser, 2005; Akakura, 2012) and are particularly challenging for acquisition for those L2 learners whose L1s do not instantiate an article system. Russian lacks articles and relies on word order to convey (in)definiteness; additionally, speakers draw on contextual clues to decide whether a referent is specific or generic.

Learners at the school of testing do not receive any formal language instruction on articles, thus any knowledge they possess is limited and would most likely have been acquired incidentally. Nine system- and item-based uses of the English definite/indefinite/zero article as illustrated in Table 2.2 were selected from Murphy`s *Essential Grammar in Use* (2007) recommended as a grammar reference manual for use by Elementary and Intermediate L2 learners. The decision to select the following article uses was motivated by the fact that they ranged in terms of frequency of use and allowed for suitable test items to be constructed.

Table 2.2 Targeted article uses

Targeted article uses	Examples
1. The + adjective denoting a group of people	The rich can never understand the poor.
2. The + type of animal/machine	My father can play the guitar.
3. A/an or zero article + general context	She loves music.
4. The + specific people/things in a given context	The book I'm reading at the moment is a bestseller.
5. The + one of something	The moon was bright last night.
6. A/an + what kind of person/thing somebody/something is	The BBC is a famous broadcasting company.
7.A/an + first mention	My neighbor bought a new car last week.
8. The + oceans/seas/rivers	The Red Sea has many coral reefs.
9. The + plural names of people/places	The Smiths have invited us for dinner.

L2 learners` knowledge on the nine article uses was assessed by means of the tests of explicit and implicit knowledge described in the following section.

2.5. Instruments

A specially designed suite intended to provide reliable measurements of participants` knowledge of the targeted article uses was composed of two measures hypothesised to tap learners` explicit knowledge and two measures hypothesised to elicit their implicit knowledge. An elicited imitation (EI) test and an oral production (OP) test were developed as tests of implicit knowledge, with a gap-fill test and a test of metalinguistic knowledge (MLK) as tests of explicit knowledge.

A pen and paper version of Oxford Quick Placement Test (QPT) (UCLES, 2004) was employed to determine learners` general proficiency, as mentioned above. The LLAMA aptitude test (Meara, 2005) and the backward digit span test (Kormos & Sáfár, 2008) provided measurements of learners` language learning aptitude and executive working memory respectively. Additionally, learners` perceptions of instructional treatments were captured by an instruction satisfaction survey.

2.5.1. General L2 proficiency test

The test of L2 English proficiency was the pen-and-paper version of the Oxford Quick Placement Test (QPT, UCLES, 2004), which assesses knowledge of vocabulary, grammar and reading skills in a multiple-choice format. The participants were required to answer the test questions by marking one letter A, B, C or D on their answer sheets. They were allowed 30 minutes to complete all the questions in the test paper. The scoring for the QPT test was done using a marking template provided with the test. The test was scored dichotomously, with 1 point awarded for each correctly resolved test item. The maximum possible score for the test was 40.

2.5.2. Language Aptitude Test

The language aptitude test used in the present study was the LLAMA language aptitude test (Meara, 2005), a computer-administered measure loosely based on the Carrollian model of aptitude. The LLAMA test was chosen for the purposes of the study since it is a free resource easily available from the official website (http://www.lognostics.co.uk/tools/llama), is accessible without the L1 being a factor (Meara, 2005; Rogers et al., 2016, 2017) and has been widely used in empirical investigation on the role of aptitude in L2 learning (Granena, 2012; Yalçin & Spada, 2016; Yilmaz, 2012).

The LLAMA aptitude test is made up of following four subtests:

LLAMA B: a test of vocabulary learning

LLAMA D: a test of sound recognition

LLAMA E: a test of sound-symbol correspondence

LLAMA F: a test of grammatical inferencing.

Each subtest in the LLAMA suite comprises two phases: (1) a training phase (with the exception of LLAMA_D) administered with a time constraint, and (2) a testing phase, which is not time-pressured. L2 learners received a set of written instructions in Russian on how to complete each subtest and were asked to closely follow them through the test administration.

LLAMA_B: A vocabulary learning subtest

This subtest is loosely based on the paired associates task of Carroll and Sapon (1959) but uses a completely different interface. In this subtest test-takers are presented with objects on the screen which represent words taken from Central American languages arbitrarily assigned to the target objects on the screen (see Figure 2.1).

Training phase: The main panel showed twenty objects. Participants were required to learn as many words as possible by associating each of them with the images provided in 2 minutes (default setting) allocated to the training phase. They proceeded to click the target images and the program displayed words associated with them in the centre of the main panel. Participants could click each image as many times as they wanted but they were not allowed to take any notes. The clock in the centre of the main panel showed them how much time they had left. When the training phase was over the programme played the bleep sound and deactivated all the buttons.

Testing phase: The program displayed the name of an object in the central panel. Participants were required to identify the correct object by clicking on it. They received feedback in a form of a ding for a correct answer, and a bleep for an incorrect answer. They scored one point for each object that was correctly identified; wrong answers were not penalized. The screen displayed the score as participants worked through the test.

Figure 2.1 LLAMA_B

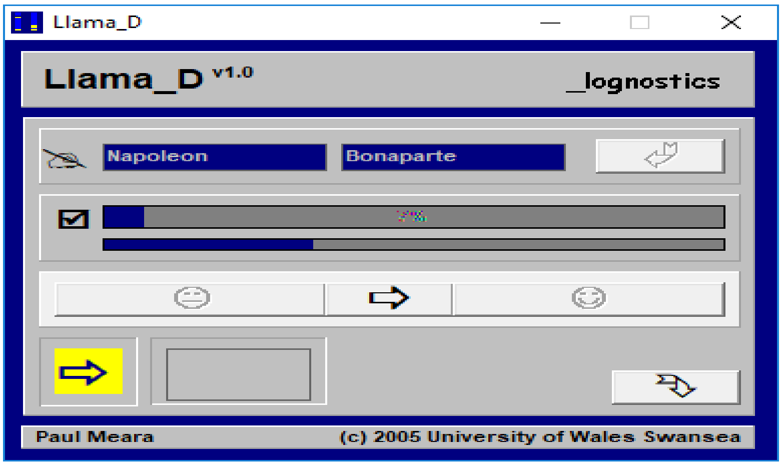
LLAMA_D: A sound recognition subtest

LLAMA_D is a sound recognition task which measures individuals' ability to recognize sounds in an unknown language that they hear at the onset of the test (see Figure 2.2). The sequences of sounds used in the test are computer-generated. The words they are based on are names of flowers and natural objects taken from a dialect of a language spoken in Northern Canada.

Training phase: This subtest does not incorporate a training phase

Testing phase: Participants listened carefully to the 10 words. When the program finished playing all the new sounds, they heard a bleep sound, and the buttons on the main panel were activated. The testing phase was initiated. Participants heard one word at a time and had to decide whether they had already heard the word before or not. If they thought the word had been played before, they clicked the ☺ button and if they thought it had not been played before, they clicked the ☹ button. Test-takers were provided with a feedback in the form of a ding for a correct answer, and a bleep for an incorrect answer. They scored points for making correct judgements and lost points for wrong judgements.

Figure 2.2 LLAMA_D



LLAMA_E is a sound-symbol correspondence task

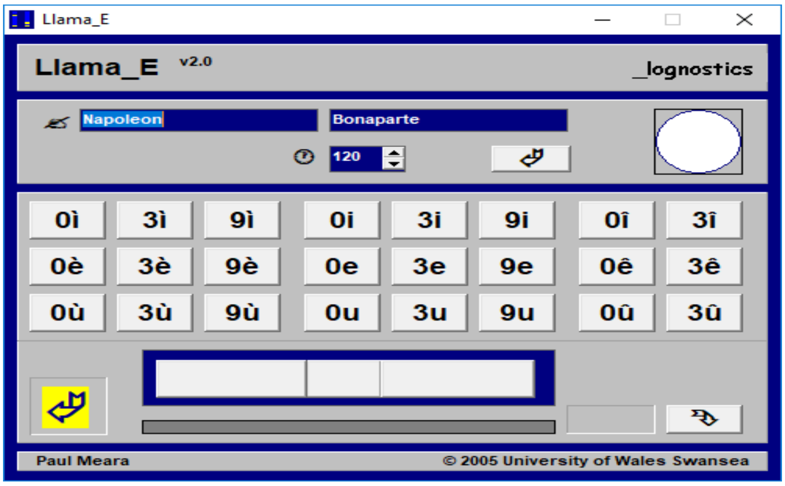
In this sub-test (see Figure 2.3) test-takers are presented with a set of 22 buttons corresponding to "a transliteration of syllables in an unfamiliar alphabet" (Meara, 2005, p. 11),

LLAMA_E: A sound-symbol correspondence task

Training phase: The main panel displayed twenty-two spellings. Participants were required to work out the rules underpinning the spelling system of the given language. They clicked one of the spelling buttons in the main panel, and the program played a sound file associated with it. Participants had 2 minutes (default setting) to listen to the sound sequences as many times as they deemed necessary, and were allowed to make written notes. The clock in the centre of the main panel showed how much time they had left. When the training phase was over the program played the bleep sound and deactivated all the buttons.

Testing phase: The program played a new word and showed two possible spellings for this word. One spelling was right, and the other one was wrong. Participants clicked the spelling that they assumed to be correct. The program provided them with feedback in the form of a ding for a correct answer, and a bleep for an incorrect answer. They were awarded points for every correctly resolved item and lost points for incorrect answers.

Figure 2.3 LLAMA_E

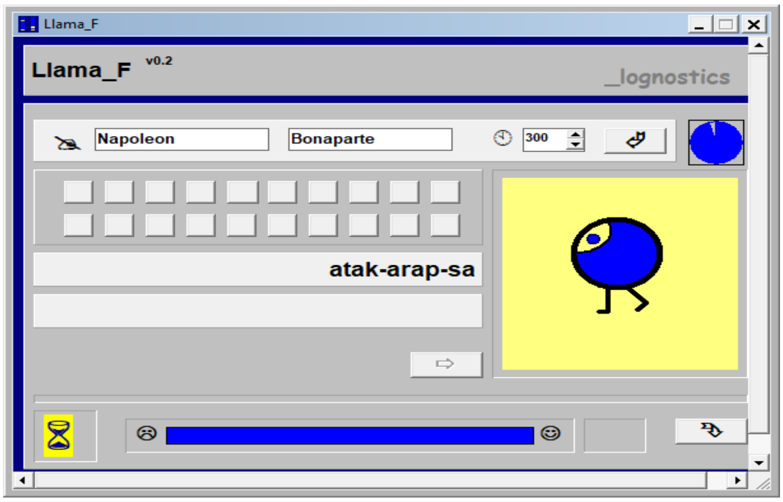


LLAMA_F is a task of grammatical inferencing (see Figure 2.4).

Training phase: The main panel displayed twenty buttons. Participants were required to learn as much as possible about a new language in 5 minutes (default setting). They began by clicking on one of the buttons in the main panel, and the program displayed a picture and a sentence illustrating it in the square on the right side of the panel. They could click the buttons as many times as they thought necessary and take any written notes that they needed. The clock showed how much time they had left. When the training phase was over the programme played the bleep sound and deactivated all the buttons.

Testing phase: The program displayed a picture and two sentences. One sentence was grammatically correct, while the other contained a grammar error. Participants chose the sentence that they believed to be correct. The program gave them feedback in the form of a ding for a correct answer, and a bleep or a wrong answer. Participants scored points for correct judgements, and lost points for incorrect judgements. The screen displayed the score as they worked through the test.

Figure 2.4 LLAMA_F



The computer does the scoring automatically after the completion of each subtest. The scores for all subtests range between 0 and 100 except for the LLAMA D subtest, where the score ranges between 0 and 75. The final score of each subtest was recorded for each participant.

2.5.3 Working Memory Test

Learners` executive working memory was measured by means of a backward digit span test (BDS test) administered in learner`s L1 (Russian). The BDS is assumed to be a measure of executive working memory since it taps both phonological loop capacity and executive function of working memory (Juffs & Harrington, 2011). The BDST (Kormos & Sáfár, 2008) which requires participants to recall strings of numbers increasing in length in a reverse order has been chosen since it does not include an overt language component, and thus minimises language dependency (Juffs & Harrington, 2011). The rationale for using a non-verbal span test was motivated by the fact that the BDS test was a useful complement to the entirely verbal LLAMA test. The BDS was administered in learners` L1 rather than their L2 in order to avoid a potential confound with L2 proficiency (e.g., Juffs & Harrington, 2011) and provide a more reliable index for working memory.

The test comprises seven sets with four sequences each, with the length of sequences increasing in each set. The shortest sequence comprises 3 digits, the longest 9 digits. Examples of two sequences are presented below (see Appendix F for the full BDS test).

Example 1:

Four-digit sequence: 6 – 4 – 3 – 9

Example 2:

Seven-digit-sequence: 5 – 9 – 1 – 7 – 4 – 2 – 8

At the beginning, the participants completed a brief training section with two sets of three and four sequences of digits and then they proceeded to the main phase of the test. The participants listened to the pre-recorded sequence of digits read in a monotone voice, one second apart. They were asked to repeat the numbers backwards. They listened to the same sequence again and were required to repeat the numbers in reverse order one more time. If they repeated two sequences in a given set correctly, they skipped the other two sequences of the set and moved on to the following set of sequences. However, the test was stopped if a participant failed on two consecutive trials. The test was administered in Russian. Administration and scoring were based on Blackburn and Benton’s (1957) BBII procedure. Participants were given 3 points for the first three-digit sequence, and subsequently .25 points for each sequence correctly repeated in reverse order, resulting in a maximum possible score of 9.75.

2.5.4. Measures of Implicit and Explicit Knowledge

The measures of explicit and implicit knowledge were designed on the basis of the criteria of degree of awareness, time available, focus of attention and use of metalinguistic knowledge (R. Ellis, 2005, 2006; R. Ellis et al., 2009). An untimed metalinguistic knowledge test that focused learners’ attention on form and required the use of metalanguage, and an untimed gap-fill test that focused learners' attention on form were used to elicit explicit knowledge of the targeted structure. An elicited imitation test (EI) and an oral production test (OP) that were meaning-focused and time-constrained because of their oral/aural modality, were used to elicit implicit knowledge of the targeted structure. Three out of four measures of implicit and explicit knowledge designed for the purposes of the present study (i.e. the EI test, the OP test and the MLK test) were based on the measures of explicit and implicit knowledge as used by R. Ellis (2005) and R. Ellis et al. (2009). In terms of timed and untimed Grammaticality Judgement Tests (GJT) that were used in validation studies by R. Ellis (2005) and R. Ellis et al. (2009) to elicit implicit and explicit L2 knowledge respectively, the decision was made to exclude them from the suite of tests used in the present study since the construct validity of GJT as a measure of explicit or implicit knowledge remains debatable. Recent empirical investigations (Gutiérrez, 2013; Godfroid et al, 2015; Vafaee et al, 2017) concerned with the validation of GJTs indicated that the type of knowledge elicited by such measures appears to be constrained by test-related variables (i.e. item grammaticality and time pressure see section 3.3.1 for a detailed discussion of validity of GJTs). In order to compensate for the exclusion of the GJT from the suite of tests, an untimed form-focused gap-fill test featuring source attributions and confidence ratings was designed to provide an additional measure of explicit knowledge. Table 2.3 provides a comparison of the measures of implicit and explicit knowledge used in the studies by R. Ellis et al (2009) and measures administered in the present study.

Table 2.3 Comparisons between the measures of implicit/explicit knowledge as used by R. Ellis et al. (2009) and measures used in the present study

Measures of implicit/explicit knowledge (R. Ellis et al., 2009)	Measures of implicit/explicit knowledge used in the present study
Measures of implicit knowledge	**Measures of implicit knowledge**
Elicited Oral imitation test	*Elicited Oral Imitation test*

A beliefs questionnaire Modality: oral N of items: 34	A beliefs questionnaire Modality: oral N of items: 48
Oral narrative test	*Oral narrative test*
A story seeded with targeted structures Modality: oral N of items: varies	A story seeded with targeted article uses Modality: oral N of items: 75
Timed Grammaticality Judgement Test	Not used
A set of grammatical/ungrammatical sentences Modality: written with a time constraint N of items: 68	
Measures of explicit knowledge	**Measures of explicit knowledge**
Untimed Grammaticality Judgement Test	*Gap-fill test*
+ confidence ratings and source attributions A set of grammatical/ungrammatical sentences Modality: written without a time constraint N of items: 68	+ confidence ratings and source attributions A set of sentences with gaps Modality: written without a time constraint N of items: 36
Metalinguistic Knowledge Test (2 parts)	*Metalinguistic Knowledge Test* (2 parts)
Part 1: correction of ungrammatical sentences and explanation of corrections Part 2: 2 sections (subtests) Section 1: identification of the targeted structures in a text; section 2: identification of grammatical parts in sentences Modality: written without a time constraint N of items: 38	Part 1: correction of ungrammatical sentences and explanation of corrections Part 2: 1 subtest Subtest 2: writing up of sentences illustrating the targeted rules Modality: written without a time constraint N of items: 81

As suggested by the comparison of the measures of implicit and explicit knowledge provided in Table 2.3, the elicited imitation test and the oral production test used in the present study closely follow comparable measures of implicit knowledge (e.g. the oral elicited imitation test and the oral narration test) administered by R. Ellis et al. (2009). These tests differ only in the number of test items they include, and names assigned to them.

In terms of the measure of metalinguistic knowledge, while Part 1 of the metalinguistic knowledge test used in the present study (e.g. sentence correction and explanation subtest) closely resembles that administered by R. Ellis et al. (2009), the two measures differ in Part 2. Since the present study targeted one grammatical structure as opposed to a wide range of structures examined by R. Ellis et al. (2009), the original sections (subtests) included in Part 2 were assumed to be less suitable for assessing L2 learners` metalinguistic knowledge of a single grammatical structure. Therefore, they were replaced with a rule illustration subtest that was administered in a variety of studies (e.g. Absi, 2014; Scheffler, 2011; Rodrǵuez Silva, 2017) examining L2 learners` metalinguistic knowledge. What is more, the two measures of metalinguistic knowledge differ in the number of test items comprising them. This is due to the differences in the make-up of the tests.

A detailed description of the measures of explicit and implicit knowledge used in the present study is provided in what follows.

2.5.4.1. Elicited imitation test *(*EI)

The elicited imitation test developed for the purposes of the study was based loosely on the measure employed by Erlam (2006). Erlam points out that in order to ensure that an elicited imitation test of this type elicits primarily implicit knowledge it needs to incorporate the following characteristics in its design: the test is completed under time pressure, its design requires L2 learners to attend primarily to meaning rather than form, there is a delay between the presentation of the targeted stimulus and their subsequent repetition, and test-takers spontaneously correct ungrammatical stimuli.

Following R. Ellis et al. (2009), the EI test was described to participants as a “belief questionnaire” to ensure that learners would focus on meaning rather than form of the questions they would be presented with. For each article use four questions were constructed. Two questions were grammatically correct and two grammatically incorrect. The questions were loosely organised around various topics covered in L2 learners` curriculum such as environment, natural objects, politics, culture, geography and technical gadgets. All the beliefs questions were pre-recorded. They were presented to test-takers auditorily in a pseudo-randomized order. Participants heard a question eliciting their opinion and decided whether they agreed with it, disagreed with it or whether they did not know the answer. They then needed to repeat the question in correct English. All instructions were provided in English and Russian to avoid any confusion in what participants were required to do. The total number of items in the EI test was 48 elicited in 34 opinion questions (ten questions incorporated two test items and two questions incorporated three test items). The maximum possible score was 48.

Two examples are provided below (see Appendix B for the full EI test). The asterisk “*” indicates an incorrect stimulus.

Example 1: Grammatical question

Do you agree that **the poor** and **the rich** should pay the same tax? Yes No Don`t know

Pause to answer the question

Repeat the question

Example 2: Ungrammatical question

*Do many people all over the world respect **British queen**? Yes No Don’t know

Pause to answer the question

Repeat the question

As evidence that learners' focus of attention was on meaning for every question they heard, four questions were selected which were likely to attract a "yes" answer, four questions which would most likely elicit the answer "no" and finally four questions which would be answered with "don`t know". Table 2.4 presents raw frequency of responses made by participants for the selected questions.

Table 2.4 Participants` responses to selected questions

Participants` responses	Yes	No	Don't know
Questions likely to attract "yes" responses			
Do you agree that **the** Russian **president** has become very powerful?	85	16	14
*Do many people all over the world respect **British queen**?	73	19	23
Do you agree that **a mobile phone** has become necessary in our society?	97	11	7
*Is it true that in Russia **the lawyers** are not as well paid as in Europe?	68	17	30
Questions likely to attract "no" responses	Yes	No	Don't know
Do you believe that many people like **opera** and **ballet**?	29	65	21
*Can many young people play **guitar** or another musical instrument?	27	76	12
*Do you think that we can always trust **a media** nowadays?	14	84	17
Do you agree that **the poor** and **the rich** should pay the same tax?	5	91	19

Questions likely to attract “don’t know” responses	Yes	No	Don’t know
Is it true that **the ostrich** can run very long distances?	35	32	48
Is it true that **the Canary Islands** have amazing national parks?	38	13	64
*Do you believe that Brazil is **the** very fast developing **country**?	27	29	59
Is it correct that **the penguin** is **a bird** not **a mammal**?	39	18	58

The results in Table 2.4 provide evidence for the claim that the participants were attending to the meaning of the questions as intended in the design of the test. For the questions assumed to attract a “yes” answer, most participants provided “yes” responses. For the questions thought to elicit a “no” answer, the majority of the participants responded with “no”. Finally, more than half of the participants indicated “Don`t know” for the questions assumed to attract “Don`t know” responses.

The EI was scored dichotomously, with each correctly produced targeted article awarded 1 point irrespective of lexical accuracy or any grammatical errors on structures that did not pertain to the targeted structure. Examples 1 and 2 were scored incorrect; examples 3 and 4 were scored correct.

Example 1: Incorrect stimulus, incorrect repetition

Item 3: Participant 56

Stimulus: Do you believe that **old** are afraid to use mobile phones?

Response: Do you agree that **old** are afraid of mobiles?

Example 2: Correct stimulus, incorrect repetition

Item 23: Participant 108

Stimulus: Is it correct that **the Indian Ocean** has rich fauna?

Response: Is it true that **Indian Ocean** has good fauna?

Example 3: Correct stimulus, correct repetition

Item 33: Participant 72

Stimulus: Do many English people have a garden where they grow **fruits and vegetables**?

Repetition: Do many English people grow **fruits and vegetables**?

Example 4: Incorrect stimulus, correct repetition

Item 6: Participant 26

Stimulus: Is it true that **a Red** Sea has many coral reefs?

Repetition: Is it true that **the Red Sea** has many coral reefs?

2.5.4.2. The oral production test (OP)

As in the case of the EI test, the oral production test was designed to elicit participants` implicit knowledge of the targeted article uses. The oral production test was a short story (The Cambridge Egg, 615 words) featuring all nine article uses targeted in the study. A short excerpt from the story is provided below; the targeted structures are in bold for the benefit of the reader (see Appendix C for the full OP test).

Example (extract):

The Whites are **a** very pleasant **family**. Ask their neighbours, colleagues or friends and everybody will tell you they are **the nicest people** in Cambridge. Mrs White is **a professor** at Cambridge University; Mr. White is **a journalist** who works for **the BBC**. Their three children

John, James and Sue are always sweet and polite. **The Whites** live in **a little house** and have **a garden** where Mrs White grows **flowers** and **strawberries**. On Sunday, she bakes **cakes** and gives them to **the old** and **the homeless**. She likes helping **the weak**. Mr White plays **the piano**, Sue plays **the violin** and **the boys** love **the drums**. They lived **a** happy **life** but one day everything changed.

Table 2.5 shows the number of obligatory occasions for each targeted article use included in the story

Table 2.5 Obligatory occasions of nine article uses

Targeted article uses	Obligatory occasions
1. The + adjective denoting a group of people	3
2. The + type of animal/machine	4
3. A/an or zero article + general context	7
4. The + specific people/things in a given context	21
5. The + one of something	13
6.A/an + what kind of thing somebody/something is	7
7.A/an + first mention	10
8. The + oceans/seas/rivers	5
9. The + plural names of people/places	4

The story contained a total of 75 instances of the nine targeted article uses. However, since certain article uses (i.e. a/an + first mention, the + specific people/things in a given context etc.) naturally occur more frequently than others (i.e. the + adjective denoting a group of people), it was not possible to ensure that all uses were equally represented in the story without drawing participants` attention to them.

The participants were presented with the story which they read and listened along to. The story was pre-recorded. Upon the completion of the recording, the participants were instructed to retell the story giving as many details as possible. For their convenience the names of the main characters were provided on a card. Participants` retellings were recorded for subsequent scoring.

The scoring of the OP test was based on an obligatory occasion analysis (Brown, 1973; see R. Ellis & Barkhuizen, 2005). L2 learners` retellings of the story were transcribed for subsequent scoring and analysis. The participants` grammatical accuracy in supplying articles was measured on the basis of whether they were accurate or not in producing the instances of the targeted article uses in obligatory contexts. The accuracy score on any targeted article use was calculated as follows: the number of correctly produced instances was multiplied by 100 and then divided by the total number of obligatory occasions. A minimum of three obligatory occasions was set for a participant to be given a score for a targeted article use. The maximum possible score for each article use is thus 100%.

2.5.4.3. Gap-fill test

The test presented participants with 36 sentences containing gaps and asked them to fill in the gaps with a definite article, an indefinite article or an indication that no article was necessary. For each targeted article use four sentences were constructed. After each test item the participants were required to provide self-reported measures of awareness (Rebuschat, 2013; Tagarelli et al, 2016; Elder, 2009; Ellis, 2005), source attributions underpinning their answers, i.e. Guess, Intuition, Memory or Rule, and confidence ratings reflecting their level of certainty for each answer on a percentage scale: 100% 80% 60% 40% 20% 0%.

Inclusion of confidence ratings has been informed by the certainty criterion proposed by R. Ellis (2005) who argued that the degree of certainty may help dissociate between explicit and implicit knowledge since the use of implicit knowledge will evoke more certain responses from learners than the use of explicit knowledge. A 100% 80% 60% 40% 20% 0% scale was selected in order to enable L2 learners to make more precise confidence judgements about answers they provide for each test item. Importantly, the inclusion of a detailed numerical scale was assumed to provide a more sensitive measure of L2 learners` confidence since it may detect slight differences in learners` perceived level of confidence in their knowledge of individual article uses, which is one of the research aims of the present study. The selection of the type of confidence scale constitutes an important methodological issue and to date there is no consensus as to what type of scale may provide better sensitivity (Rebuschat, 2013). Different studies have used different scales to collect confidence ratings. Rebuschat & Williams (2009) employed a binary scale (low vs. high confidence) to assess how conscious/unconscious was the knowledge developed by participants after exposure to a semi-artificial language. Tagarelli et al. (2016) selected a verbal categorical scale where participants were asked to select one of four response options: not at all confident, somewhat confident, quite confident, and extremely confident when judging the grammaticality of semi-artificial language stimuli. In his validation study of the measures of explicit and implicit knowledge, R. Ellis (2005) utilised a 0-100% confidence scale to assess how confident his participants were when performing on an untimed GJT.

In terms of source attributions, the use of both Guess and Intuition is associated with implicit knowledge, since participants claim that they have guessed, when in fact they had knowledge or drew on feel (intuition). The use of Memory and Rule is associated with explicit knowledge, since participants report having encountered a similar instance (memory) or having sufficient metalinguistic knowledge to construct an answer (rule).

Source attributions in the present study were defined as follows:

Guess: the participant is guessing the answer.

Intuition: the participant feels that the answer is right but has no knowledge why it is correct.

Memory: the participant has a memory of having heard or encountered something similar.

Rule: the participant knows the rule and applies it to make an answer.

Examples of test items are given below (see Appendix D for the full gap-fill test)

Example 1:

I hate it when __ fit and healthy are always trying to make you go to the gym and eat broccoli!

Target answer: the

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

Example 2:

She received __ strange parcel from Mexico.

Target answer: *a*

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

The gap-fill test was scored dichotomously, with 1 point awarded for each correct answer. The maximum possible score was 36.

2.5.4.4 Metalinguistic knowledge test

The metalinguistic knowledge test (MLK) was constructed to tap learners` explicit knowledge. It included two subtests: sentence correction and explanation and rule illustration. In the sentence correction and explanation subtest (Ziętek & Roehr, 2011; Rodríguez Silva & Roehr-Brackin, 2016) participants were presented with 36 ungrammatical sentences which they had to correct (the location of error was highlighted) and provide an explanation for their correction either in Russian or in English. An example is provided below (see Appendix E for the full MLK test)

Example:

In Saint Petersburg **a sky** is always grey.

Correction: the sky

Explanation: We use a definite article when there is one of something.

In the rule illustration subtest (Absi, 2014; Scheffler, 2011; Rodr ǵuez Silva, 2017) participants were presented with nine targeted pedagogical grammar rules describing use of articles and asked to write an L2 sentence illustrating each rule. An example is provided below.

Example:

Rule: We use a zero article when we are talking about things or people in general.

Sentence: Vegetables are good for your health

The MLK test was scored dichotomously. In the sentence correction and explanation subtest, 1 point was awarded for each appropriate correction and explanation. The maximum possible score for the sentence correction and explanation subtest was 72. The following responses were scored correct (awarded 2 points):

Sentence correction and explanation subtest

Item 35: Participant 15

My father plays **a guitar**.

Correction: the guitar

Explanation: we use a definite article with musical instruments

The following responses were scored as incorrect (awarded zero points)

Item 20: Participant 69

The life has changed a lot in the last 30 years.

Correction: A life

Explanation: we use an indefinite article with singular countable nouns

1 point was awarded if the participant provided an appropriate correction but incorrect explanation or if no explanation was provided. The following responses were awarded 1 point.

Item 19; Participant 34

Who is **a woman** in this photograph?

Correction: Who is the woman in this photograph?

Explanation: we use a definite article if there is one of something.

Item 36: Participant 84.

Don`t look at **sun** without sunglasses! It`s bad for your eyes.

Correction: Don`t look at the sun without sunglasses.

Explanation: -

In the rule illustration subtest, 1 point was awarded if the illustrative sentence was correct or 0 points if the example sentence was incorrect. The maximum possible score for the rule illustration subtest was 9. For example, the following response was scored correct (awarded 1 point):

Rule illustration subtest

Use 9: We use a definite article with plural names of islands, people, and countries

Sentence: The Baltic sea is always very cold

The following response was scored incorrect (awarded 0 points).

Use 1: We use a definite article + adjective to talk about groups of people.

Sentence: The beautiful people attract attention.

Errors that did not pertain to the targeted structure were disregarded. The maximum possible score for the MLK test was 81.

2.5.5. Instruction satisfaction questionnaire

A rough probe of learners` perceptions and beliefs about the instructional treatment was measured through a questionnaire comprised of ten statements. For the first eight statements participants were asked to indicate the extent to which they agreed with the statements on a six-point scale (strongly agree-agree-agree somewhat-disagree somewhat-disagree-strongly disagree). An example of a statement is given below (see Appendix G for the full Instruction Satisfaction Questionnaire).

Example

Please choose the evaluation option that is closest to your personal experience of the course you have taken part in by ticking one of the options next to each statement.

Statement	Strongly agree	Agree	Agree somewhat	Disagree somewhat	Disagree	Strongly disagree
1.I enjoyed the classes						

In questions 9 and 10 participants were asked to list three things they liked about the classes and three things they did not like about the course respectively.

In terms of scoring, each time a participant chose the first option ("strongly agree") they received 6 points, the second option ("agree") attracted 5 points and so on until the last option ("strongly disagree") which attracted 1 point. Learners` responses were added up to arrive at an aggregate course satisfaction score. The maximum possible score was 48. Participants` responses to entries 9 and 10 were subjected to qualitative analysis.

2.6. Teaching materials

For the purposes of the instructional intervention the author developed nine core texts for each of the targeted article uses and three sets of follow-up exercises designed in accordance with specific requirements of each instructional approach. The tenth session focused on revision activities which targeted all the article uses covered in nine teaching sessions. At the beginning of the class learners received a set of materials that included a core text, exercises tailor-made to fit a specific instructional approach and homework. The core texts were audio recorded to ensure that learners had the correct pronunciation of relevant vocabulary and could practise their pronunciation and listening skills as part of obligatory individual work at home. Since the instructional intervention was administered during the academic year and was presented to the participating learners as a compulsory part of the curriculum, the topics for the texts were chosen in accordance with the requirements of the curriculum. The developed core texts were included in oral and written achievement exams. Table 2.6 shows topics covered as a part of instructional intervention, associated texts and article uses, and teaching sessions in which the article uses were targeted.

Table 2.6 Teaching sessions, associated texts and article uses, and topics covered as a part of the instructional intervention

Session	Core text and article use associated with it	Topic
1	*Healthy Henry and Susanne Stressed*: A/an + first	Society and culture

	mention	
2	*Where do the odd socks go?*: The + specific people/things in a given context	Mysterious world
3	*Modern values vs Victorian values: why you should not moan!:* A/an or zero article + general context	Society and culture
4	*Guide to fantastic beasts and monsters: all you need to know to stay alive*: A/an + what kind of thing/person something/somebody is	Mysterious world
5	*Ancient religions: The sun, the moon and the sky*: The + one of something	Society and culture
6	*Endangered birds*: The + type of animal/machine	Environment
7	*Fat taxes*: The + adjective denoting a group of people	Society and culture
8	*Mysterious water: are you brave enough to take a dip?*: The + oceans/seas/rivers	Environment
9	*Mind the totem poles*: The + plural names of people/places	Mysterious world
10	Revision	

The texts were seeded with relevant examples of article uses with an aim to increase their salience through frequency. Furthermore, in order to facilitate noticing and promote acquisition, where possible the core texts and subsequent exercises presented the instances of the targeted article uses contrastively. For example, instances of first mention with the indefinite article were followed by instances of subsequent mention with the definite article; instances of use of adjectives with the definite article to denote a group of people (the old, the rich etc.) were contrasted with the use of zero article for adjectives followed by a noun (old people, rich people) etc. Examples of contrastive use of articles in the text (example 1) and exercises (example 2) are given below and are in bold for the reader's convenience.

Example 1: Contrastive use of the indefinite and the definite article in the text (Healthy Henry and Susanne Stressed).

After breakfast Henry puts on **a** special bacteria proof **suit**: **the suit** is black and covers all his body.

Susanne doesn`t use **a house lift**; she tries to exercise a bit. Moreover, **the house lift** is very old and makes funny noises, Susanne is scared of it.

Example 2: Contrastive use of the definite article and an adjective to denote a group of people and the zero article and an adjective followed by a noun in a gap-fill exercise.

Statistics show that __ rich people consume as much fast food as __ poor

Target answer: – (zero article); the (definite article)

The most commonly used controlled practice activities included various gap-fill tasks, true or false judgement tasks and sentence unscrambling tasks. Gap-fill tasks required participants to fill in the gaps with an appropriate grammatical form (the deductive and guided inductive group) or relevant textual information (the incidental group). Examples of the items in the gap-fill test as used for the deductive and the guided inductive groups (Example 1) and the incidental group (Example 2) are provided below.

Example 1: Teaching session 6: *Endangered birds*

Scientists tried to be bring ____ Pyrenean Ibex back into existence via cloning; however their attempts were not successful.

Target answer: the

Example 2: Teaching session 2: *Where do the odd socks go?*

Antony took off his shoes and went straight into **_____**

Target answer: the living room

In true or false judgement tasks learners were asked to indicate whether statements they were given were true or false and to correct faulty statements. The statements presented to learners in the incidental group were grammatically correct but contained factual mistakes (Example 1). By contrast, statements developed for the deductive and the guided inductive group contained both factual and grammatical mistakes (Example2) which were highlighted.

Example 1: Teaching session 3: *Modern values vs Victorian values: why you should not moan!*

*Queen Victoria was a very relaxed queen and didn`t care much about a morality code.

Target answer: False. Queen Victoria had a very strict morality code.

Example 2: Teaching session 3: *Modern values vs Victorian values: why you should not moan!*

***The Victorian ladies** were not supposed to wear their hair pinned up.

Target answer: False. **Victorian ladies** were supposed to wear their hair pinned up.

In sentence unscrambling tasks learners were asked to put words in the correct order to form a sentence, adding appropriate capitalization. Example 1 illustrates a practice item for the deductive and the guided inductive groups. Unscrambling tasks for the incidental group either did not include articles or articles were not separated from nouns as illustrated by Examples 2 and 3.

Example 1: Teaching session 5: *Ancient religions: The sun, the moon and the sky*

sun/ represented/ in/ Dažbog/ the/ Slavic/ mythology

Target answer: In Slavic mythology Dažbog represented the sun

Example 2: Teaching session 5: *Ancient religions: The sun, the moon and the sky*

goddess / morning and evening/ Slavic/ Zorja /represents

Target answer: Slavic goddess Zorja represents morning and evening

Example 3: Teaching session 5: *Ancient religions: The sun, the moon and the sky*

the sun/ represented/ in/ Dažbog/ Slavic/ mythology

Target answer: In Slavic mythology Dažbog represented the sun

In order to make lessons more interactive, practice activities were followed up by competitive language games such as "Hang man", a snowball game or a memory game.

Free production exercises which concluded each session were designed as meaningful activities that give students the opportunity to practise the language more freely and were broadly in line with the speaking practice activities implemented in the school. The free production activities included individual work, pair work or work in teams. The most commonly used activities included:

- Personalisation and role activities. Learners are given cards assigning them specific roles and are asked to express their views based on the role assigned.
- Interviews. Learners choose the interviewee who is an expert in the field/a celebrity etc. and ask him/her questions.
- Opinion exchange. Learners engage in discussion or debates.
- Mini presentations. Learners make short presentations on the topic drawing on the text and exercises or by weaving in their own knowledge.

In the tenth session learners were given an opportunity to revise the materials they covered in nine sessions in a form of a quiz. Learners were split into two teams; each team received a card with a task, i.e. fill in the gaps with a correct article (word for the incidental group), form sentences with the words provided, give factual information pertaining to the topics covered in the class, talk for a minute on a given topic etc. After completion of each task, teams received points; the team with the highest score won.

2.7. Instructional Intervention

Three different types of instructional approaches labelled deductive, guided inductive and incidental were employed in the study. The deductive and guided inductive approaches instantiated explicit form-focused instruction, while the incidental approach instantiated implicit meaning-focused instruction. Explicit instruction is understood as any instructional intervention that involves provision of metalinguistic descriptions in a form of pedagogical grammar rules or induces learners to attend to particular constructions and arrive at metalinguistic generalization underlying them on their own. By contrast, implicit instruction exposes learners to meaningful linguistic input but does not include any overt rule explanation or encourages learners to work out such rules (Norris & Ortega, 2001). The decision to select the deductive and guided inductive instructional approaches was motivated by the fact that they belong to explicit instructional techniques most commonly used by language teachers and professionals (Hwu & Sun, 2012; Erlam 2003, 2005). Furthermore, since the superiority of one approach as opposed to the other is a subject of debate in L2 teaching with some studies reporting an edge for the deductive approach (e.g. Erlam, 2003; AbuSeileek, 2009) and some for the inductive approach (Haigh et al., 2007; Cerezo et al, 2016; Herron and Tomasello, 1992), it seemed desirable to investigate the effectiveness of these two approaches in respect to the development of explicit and implicit knowledge. The incidental approach was selected with a view to examining whether exposure to input seeded with relevant instances of the targeted structures alone could result in the development of explicit and implicit knowledge of non-salient grammatical features like English articles. This is of particular relevance for the instructional context where the participating learners acquire English since it does not provide learners with any formal instruction targeting articles; consequently any knowledge learners possess appears to be a product of unguided acquisition in the first place.

The instructional groups followed a three-step sequence that was specifically tailored to accommodate instructional requirements for each approach. The description of teaching sequences is provided in what follows.

Deductive instruction. The deductive instructional approach followed a traditional sequence of presentation, controlled practice, and free production (PPP). In Step 1, learners were presented with the pedagogical rule explaining the targeted article use and provided examples on the board. Learners could ask questions pertaining to the use and application of the rule. Then they proceeded to reading and listening to the core text flooded with relevant instances of the targeted article use. This was followed by form-focused written and oral practice activities allowing learners to practise the rule in Step 2. The controlled form-focused practice activities for the deductive approach were broadly in line with activities used by teachers at the school of testing and were modelled on the exercises in Essential Grammar in Use (Murphy, 2007) including gap fill exercises, various drills, true or false statements, sentence transformations, scrambled sentences, answering questions and reordering sentences. Step 3 involved free production of the targeted article use involving pair and/or team work. Learners were provided with corrective feedback in the form of recasts and requests for clarification and repetition; learners' errors were highlighted by intonation. If students persisted with a mistake they received metalinguistic feedback aimed at the elicitation of the correct form. The instruction and corrective feedback was mostly provided in English; however, explanation of grammar involved the use of Russian.

At the end of each session learners received homework that closely resembled standard homework they are given at the school of testing. Learners were asked to complete written form-focused activities allowing them to revise and further practice the acquired forms as well as new vocabulary. These included writing sentences or short essays/ descriptions featuring targeted forms. Homework provided learners with additional practice facilitating the acquisition of new grammar material.

Guided Inductive instruction. The aim of guided inductive instructional treatment was to enable learners to arrive at pedagogical grammar rules describing the targeted article use on their own. In order to focus learner attention on relevant aspects of input and thereby facilitate the process of induction, targeted forms in the materials developed for the guided inductive approach were typographically enhanced by bold facing. Textual input enhancement was intended to draw learner attention to targeted language unobtrusively and subsequently activate deeper engagement with the input. Textual enhancement was deemed particularly useful for those uses where contrastive presentation was either not possible or could be perceived as unnatural (i.e. the + one of something; the + oceans/seas/rivers). Furthermore, to guide acquisition learners were provided with scaffolding in the form of guided questioning. The combined use of textual input enhancement and guiding questioning was hypothesised to enable learners to arrive at metalinguistic realisation of the targeted feature on their own. In Step 1, learners were encouraged to engage in practice activities to actively form and test hypotheses about the targeted article uses. The practice activities involved reading core texts with targeted grammatical features highlighted, and completing a series of exercises designed to allow learners to derive understanding of how a grammatical structure functions in the target language. In Step 2, guided questioning aimed at rule elicitation was used. After series of guided questions, the rule was elicited and put on the board. If learners experienced difficulties in formulating rules after guided questioning, the teacher presented them with a partially formulated rule that they needed to fill in by choosing one of the provided options. This was done to ensure that learners would have the rule by the end of step 2 and would be able to practise it in step 3. The example of a partially formulated rule is given below:

Article use a/an + what kind of thing/person something/somebody is

We use 1___ article when we 2____ people or objects.

1. Indefinite article (a/an) or definite article (the)

2. Continue talking about... or give definitions to...

Formulation of the rule was followed by games or additional practice activities similar to activities described above for the deductive approach. In Step 3 learners applied derived rules in communicative exercises to gain understanding of how they are applied in language use. Corrective feedback was provided. As in the case of the deductive approach, learners in guided inductive condition received written form-focused homework activities focusing on the forms targeted in the classroom.

Incidental group. In the incidental instructional condition learners received the same set of materials as the deductive and guided inductive groups, but all activities were meaning-focused, targeting the development of communicative competence and aiding comprehension and production. The students in the incidental group did not receive any explicit form-focused instruction or any reference to pedagogical grammar rules. The targeted forms in the texts they received were not highlighted. Instead they completed an extensive range of oral activities. Learners were asked to answer questions pertaining to the factual information provided in the core texts, work with true and false statements and vocabulary. In order to ensure even distribution of input across the conditions, learners in the incidental approach received additional oral and written exercises. Step 1 involved reading and listening to the core texts and work with a glossary and pronunciation of new vocabulary. In step 2, learners completed text-based exercising, language games or various discussion tasks. Step 3 involved individual and pair-work speaking tasks. No form-focused corrective feedback was provided. After each teaching session learners received homework that focused on vocabulary and development of writing and speaking skills. Learners were asked to learn new words and collocations, write short essays expressing their opinions or prepare retelling of core texts in pairs using cues provided by the teacher.

Table 2.7 illustrates three steps students followed in each instructional approach for the article use (a/an + first mention) based on the texts “Healthy Henry and Susanne Stressed” (see Appendix H for a full set of teaching materials)

Table 2.7 Teaching sequences for the use A/an + first mention (core text: “Healthy Henry and Susanne Stressed”)

Steps	Deductive	Guided Inductive	Incidental
Step 1	Presentation Presentation and explanation of the grammatical rule (a/an + first mention) + exercise on the use of articles	Rule search Reading and Listening to 2 texts: Healthy Henry and Susanne Stressed (articles are highlighted). Students are instructed to look for the grammar patterns.	Work with a text Reading and Listening to 2 texts: Healthy Henry and Susanne Stressed.
Step 2	Practice Reading and Listening to 2 texts: Healthy Henry and Susanne Stressed Exercise based on the texts: 1. Gap fill (a/an or the) + true or false judgement 2. Language Game: “Simon says”	Rule search + Practice Exercise based on the texts: 1. Gap fill (a/an or the) + true or false judgement. Rule elicitation 2. Language Game: “Simon says	Practice Exercise based on the texts: 1.True or false judgement + sentence correction 2. Speaking task: Individual work + discussion in pairs: five

			more things Henry and Susanne do every day
Step 3	Production Individual work + pair work: Are you Healthy Henry or Susanne Stressed?	Production Individual work + pair work: Are you Healthy Henry or Susanne Stressed?	Production Individual work + pair work: Are you Healthy Henry or Susanne Stressed?

2.8. Pilot studies

This section details the results of two pilot studies targeting the suite of tests tapping explicit and implicit knowledge of originally ten L2 article uses as well as the set of teaching materials and the measures of executive working memory and language learning aptitude. Pilot study 1 was set to test the instruments hypothesised to measure explicit knowledge of the selected article uses and scrutinise source attributions and confidence ratings introduced for the gap-fill test. Pilot study 2 sought to assess the instruments hypothesised to provide a measure of implicit knowledge, a test of executive working memory, and language learning aptitude. Furthermore, it tested the instructional intervention in terms of the three-step approach and a set of teaching materials designed for one of the targeted article uses.

2.8.1. Participants

A total of 52 Russian L2 learners of English (age range 12-17) participated in the pilot studies. The learners were at a lower intermediate level of English proficiency according to the school's assessment. Independent assessment of the participants' level of English by means of the QPT (UCLES, 2004) indicated that L2 learners' mean scores fell within the lower intermediate band according to the test manual, which is equivalent to Level B1 of the Common European Framework of Reference. The participants were from the same English programme and school of testing where the main study would take place.

2.8.2. Target structure

For the purposes of the pilot studies ten system-based and item-based uses of the English definite/indefinite/zero article were selected from R. Murphy`s Essential Grammar in Use (2007). The targeted article uses are given in the Table 2.8 below.

Table 2.8 Article uses targeted in the pilot studies

Targeted article uses	Examples
1. The + adjective denoting a group of people	The rich can never understand the poor.
2. The + type of animal/machine	My father can play the guitar.
3. A/an or zero article + general context	She loves music.
4. The + specific people/things	The book I'm reading now is a bestseller.
5. The + one of something	The moon was bright last night.
6. A/an + what kind of person/thing somebody/something is	The BBC is a famous broadcasting company.
7. The + context	He was sitting on the chair nearest to me
8.A/an + first mention	My neighbour bought a new car last week.
9. The + oceans/seas/rivers	The Red Sea has many coral reefs.
10. The + plural names of people/places	The Smiths have invited us for dinner.

2.8.3. General procedure

Since participating L2 learners were below 18, their parents or legal guardians were asked to sign a consent form before the instructional treatment and the instruments were administered. Following this, the learners were asked to fill in a short questionnaire aiming to collect their biographical information and experience of studying English. The learners completed the instruments in separate sessions. The order of instruments administration was as follows: pilot study 1 - the QPT test, the measures of explicit knowledge: the gap-fill test and the MLK test; pilot study 2- the QPT test, the LLAMA test, the BDS test, and the measures of implicit knowledge: the EI test and the OP test. The description, scoring and details of the administration is provided in the relevant sub-sections of 2.5. In addition to that in the pilot study 2, instructional intervention for one of the targeted article uses was administered. The details pertaining to the teaching materials and the instructional intervention are given in section 2.6 and 2.7 respectively.

2.8.4. Pilot study 1

Tests of explicit knowledge were completed by 32 teenage Russian L2 learners of English. The gap-fill test and the MLK test included 10 article uses. The maximum possible score was 40 for the gap-fill test and 90 for the MLK test. The process of scoring revealed that it was not always possible to distinguish between uses 4 (the+ specific people or things) and 7 (the + context) (see Table 2.7) since the contexts where given uses were realised appeared to be very similar or even overlapping. While these uses are discussed separately in the Essential Grammar in Use (Murphy, 2007), dissociation between them in practice was not always possible.

At the beginning of the testing phase the participants completed a ten-minute background questionnaire. They then proceeded to the QPT which was administered during their regular English class and took approximately one hour to complete. This was followed by the gap-fill test and the MLK administrated in that order. The two measures were completed within 90 minutes.

2.8.4.1. Preliminary analyses

Before proceeding with the statistical tests, a normality analysis and an internal reliability analysis for all the tests and their subsections were conducted. A series of one-sample KS tests did not show any significant deviation from the normal data distribution, so the use of parametric statistics was warranted. The results of the internal reliability analysis are presented in Table 2.9.

Table 2.9 Reliability analysis

Measures	Number of items	Cronbach`s alpha
Gap-fill	40	.705
Error correction	40	.650
Error explanation	40	.919
Rule illustration	10	.568
MLK test total	90	.885

Overall, the results of the reliability analysis indicated that the internal consistency of the piloted measures ranges from satisfactory to excellent with an exception of the rule illustration subtest which is not as reliable as desired; however since item deletion would not have affected alpha, none of the items in this subtest were excluded.

2.8.4.2. Learners' performance on the measures of explicit knowledge

The results in Table 2.10 indicate that overall both tests were sufficiently challenging for the participants. Indeed, the L2 learners scored just above 50% for both the gap-fill test and the MLK total. Further scrutiny of descriptive statistics by the MLK subtests indicate that some subtests were more challenging than others. More specifically, L2 learners obtained the highest accuracy means for the sentence correction and the rule illustration subtests, while the sentence explanation subtest was the most challenging for participating learners with the lowest mean facility value of 22%.

Table 2.10 Descriptive statistics for the measures (N=32)

Measures	Mean	SD	Min	Max	Max. possible	Mean %
Gap-fill	21.31	5.23	10	34	40	53%
Sentence correction	32.00	4.26	22	39	40	79%
Sentence explanation	8.72	7.24	0	25	40	22%
Sentence correction and explanation	40.22	9.79	22	59	80	50%
Rule illustration	6.44	1.85	3	9	10	64%
MLK total	46.66	10.81	26	68	90	52%

As a next step, correlations were conducted to assess the relationship between the error correction, error explanation, rule illustration subtests, the gap-fill test and the MLK total. The results of the correlation analysis are summarised in Table 2.11.

Table 2.11 Correlations: sentence correction, sentence explanation, rule illustration subtests, MLK total and a gap-fill test (N=32).

	Gap-fill	MLK total	Sentence correction	Sentence explanation
MLK total	41*			
	p=.020			
Sentence correction	40*	.42*		
	p = .032	*p*=.019		
Sentence explanation	.30*	.47*	.40*	
	p=.048	*p*=.027	*p* =.024	
Rule illustration	.22	.60*	.40*	.44*
	p =.068	*p*<.001	*p* =.022	*p* =.018

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

The results of the correlation analysis indicate that all three subtests constituting the MLK test are significantly and positively correlated at a moderate level which suggests that there is shared variance among the subtests without them overlapping completely. The MLK test correlates with each of its subtests, which indicates that each of the subtests represents a coherent subordinate measure of metalinguistic knowledge. This relationship was highest between the MLK test and rule illustration where the learners had to provide sentences illustrating pedagogical grammar rules, suggesting that this subtest represented the MLK test to a greater extent than other subtests. The gap-fill test is significantly associated with the MLK total at a moderate level. Furthermore, it correlates with the sentence correction and explanation subtests but not with the rule illustration where the coefficient is only approaching significance.

Table 2.12 displays the correlations between the participants' performance on the measures of explicit knowledge and language proficiency.

Table 2.12 Correlation: proficiency, gap-fill test, sentence correction, sentence explanation, rule illustration and MLK total (N=32)

Tests	QPT score
Gap-fill test	.41*
	p =.019
Sentence correction	.47*
	p =.015
Sentence explanation	.41*
	p = .024
Rule illustration	.35*
	p =.047

MLK total	.53*
	p =.002

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

The results of correlation analysis show that all the measures are significantly correlated with learner proficiency at a medium level. The positive relationship indicates that higher-proficiency is associated with better performance on the instruments hypothesised to elicit explicit knowledge of the targeted article uses.

In order to investigate the type of knowledge elicited by the gap-fill test, an item analysis for the gap-fill test examining source attributions and confidence ratings provided by the L2 learners was carried out. Table 2.13 shows descriptive statistics for the distribution of source attributions and confidence ratings.

Table 2.13 Descriptive statistics for source attributions and confidence ratings (N of items = 40)

Source attributions	Mean	SD	Minimum	Maximum	Mean %
Guess	3	5.30	0	19	8%
Intuition	16	11.00	0	39	39%
Memory	12	8.28	1	33	30%
Rule	9	8.38	0	30	22%
Confidence ratings	n/a	21.14	0%	100%	67%

As demonstrated in Table 2.13 intuition was the most frequently indicated source attribution followed by memory and rule. Guess was chosen least frequently with a frequency mean facility value of 8%. The scrutiny of confidence ratings suggests a relatively high mean level of confidence participants had when performing on the gap-fill test.

Table 2.14 provides an overview of Pearson correlation coefficients for the gap-fill test, source attributions and confidence ratings.

Table 2.14 Correlations: gap-fill test, source attributions and confidence ratings (N of items = 40).

	Gap-fill	Guess	Intuition	Memory	Rule
Guess	-.40*				
	p = .022				
Intuition	-.19	.12			
	p = .310	*p* = .518			
Memory	.16	-.40*	-.67**		
	p = .384	*p* =.025	*p* <.001		
Rule	.33	-.38*	-.71**	.16	
	p = .068	*p* =.034	*p* < .001	*p* = .375	
Confidence	.17	-.30	-.49**	.40*	.44**
	p = .366	*p* =.099	*p* =.005	*p* =.023	*p* =.013

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

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

The results indicate that there is a significant negative correlation between accuracy on the gap-fill test and the use of guess. This points towards an inverse relationship between these two variables, i.e. use of guess is associated with a decrease in accuracy. The correlation between accuracy and the use of rule is approaching significance suggesting a trend towards more accurate performance when rule was indicated as a basis of an answer. The correlations did not yield significant association between accuracy and confidence ratings suggesting that L2 learners did not necessarily endorse correctly resolved items with higher confidence ratings. Furthermore, while memory and rule are significantly positively associated with confidence ratings, the use of intuition is significantly negatively associated with confidence ratings, indicating that the use of memory and rule attracted higher confidence ratings while the use of intuition attracted lower confidence ratings. Taking everything stated above into consideration, it seems plausible that those learners who performed accurately on the gap-fill test may have drawn primarily on explicit knowledge (use of rule); a positive correlation approaching significance between the use of rule and accuracy on the measure endorses this interpretation.

2.8.4.3. Concluding remarks

Overall, the results of the Pilot study 1 showed that instruments hypothesised to measure explicit knowledge of the targeted article uses were suitable to be used in a larger sample of participants in the main study. The piloted measures have desirable reliability with internal consistency of items ranging from excellent to satisfactory with all items worthy of retention. The measures differed in their facility value with some measures being more difficult than others. What is more, all the measures were significantly correlated with proficiency suggesting that higher proficiency learners performed better on the measures. Since explicit knowledge of articles arguably constitutes a part of an individual`s general proficiency in the L2, significant correlation between them is expected.

Importantly, the MLK test and the gap-fill test could be tapping the same type of knowledge to some extent given a positive association of medium strength between them. Furthermore, the results of the item analysis of source attributions for the gap-fill test yielded a marginally significant positive association between accuracy on the measure and the use of rule. This finding implies that those learners who performed accurately on the measure may have drawn on explicit knowledge.

2.8.5. Pilot study 2

The second pilot study involved 20 teenage lower-intermediate learners (age range 12-17) who completed two tests of implicit knowledge, the LLAMA test tapping their language learning aptitude and the BDS test measuring their working memory capacity. The EI and the OP tests included 10 article uses. The maximum possible score was 52 for the EI test and 100% for the OP test. The testing was completed with the administration of the three types of instructional intervention targeting one article use.

The student participants completed a short background questionnaire in ten minutes at the beginning of their regular English class followed by the administration of the QPT test. This was followed by the LLAMA test which took approximately an hour to complete. The administration of LLAMA was followed by the BDS test completed within one session. The EI test and the OP test took place in a quiet room on a one-to-one basis. The EI was completed within 2 sessions; the OP test was completed within 3 sessions. Finally, the learners participated in one 80-minute session teaching them the use of the indefinite article in the context of first mention (A/an + first mention). To this purpose, they were randomly assigned to 3 learning conditions: Deductive (N=7), Guided Inductive(N=6) and Incidental (N=7). The groups followed a three-step approach that was specifically tailored to accommodate instructional requirements for each group.

2.8.5.1. Preliminary analyses

With respect to the normality analysis, it was found that the analysed data did not significantly deviate from normal distribution as confirmed by a series of one-sample KS tests. An internal reliability analysis was conducted for the EI test and the OP test. Both measures showed overall good internal consistency (EI test, Cronbach's alpha = .82; OP test, Cronbach's alpha = .88).

2.8.5.2. Learners` performance on the measures

Overall, the results in Table 2.15 show that the EI test appears to be more challenging than the OP with a % mean facility value of 56%.

Table 2.15 Mean correct scores and standard deviations across the measures (N=20).

Test	Mean	SD	Minimum	Maximum	Max. possible
EI	22.90	6.274	7	34	48
EI %	56%	15.482	17%	85%	100%
OP %	61 %	17.209	18%	85%	100%

The correlation analysis run on the EI and OP tests yielded a significant positive correlation of medium strength (r =.50*; p=.029) suggesting that the measures may elicit the same type of knowledge without complete overlap.

Learners' performance on the LLAMA test and WM test is displayed in Table 2.16.

Table 2.16 Descriptive statistics for language aptitude (N=20)

	Mean	SD	Min	Max	Max. possible	Mean %
Llama B (vocabulary learning)	68	11.74	45	85	100	68%
Llama D (sound recognition)	60.75	10.42	45	75	75	81%
Llama E (sound symbol correspondence)	79.50	10.38	60	95	100	80%
Llama F (grammatical inferencing)	51	14.29	30	75	100	51%
Llama total	259.25	68.95	105	245	375	69%
BDS	6.36	.86	4.75	7.75	9.75	65%

It is clear from the means in Table 2.16 that overall participants showed a strong performance on the aptitude measure. With regard to the subtests, descriptive statistics reveal that LLAMA F (grammatical inferencing) was the most challenging aptitude subtest for the participants with a mean facility value of 51%, which is in line with performance trends reported in the test manual (Meara, 2005). Participants scored the highest on LLAMA_D (sound recognition) and LLAMA E (sound-symbol association) with 81% and 80% respectively. While the results for the latter subtest correspond with existing findings (Granena, 2013; Rogers et al., 2016), high scores obtained for LLAMA_D is in direct contradiction with previously reported trends (Granena, 2013; Rogers et al., 2016) which documented the challenging nature of LLAMA_D subtest. As far as the working memory capacity is concerned, the results show a mean in the 6-digits backwards range, which is indicative of a strong performance compared to means reported in comparable studies (Kormos & Sáfár, 2008; Trebits and Kormos, 2008).

Table 2.17 displays the correlations between the participants' performance on the measures of implicit knowledge, language proficiency, language aptitude and working memory.

Table 2.17 Correlation: proficiency, aptitude, WM and implicit measures (N=20)

	Proficiency	Aptitude	WM
Aptitude	.79		
	p=.058		
WM	.43	.357	
	p=.058	*p*=.122	
EI	.50*	.45*	.21
	p=.025	*p*=.044	*p*=.310
OP	.33	.47*	.29
	p=.157	*p*=.037	*p*=.219

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

The results in Table 2.17 show that general L2 proficiency is associated with learners` performance on the EI test but not on the OP, suggesting that proficiency-related differences were important only for the performance on the EI test. What is more, whilst aptitude is moderately correlated with all the measures, individual differences in WM are not associated with any of the other tests. Interestingly, proficiency is strongly associated with aptitude, and the correlation coefficient is approaching significance for WM, which implies that individual differences in cognitive ability may have affected L2 learners' performance on the measure of proficiency with higher aptitude learners at advantage. Finally, the analysis did not yield any association between aptitude and WM which runs contrary to previously reported findings (DeKeyser & Koeth, 2011; Linck et al., 2014; Hummel, 2009).

2.8.5.3. Instructional treatment

Students assigned to the deductive condition did not encounter any difficulties in following the three-step approach of presentation-practice-production of the targeted article uses since it closely resembled the sequence of teaching they were familiar with from their standard English classes. Students in the guided inductive group, in contrast, found it somewhat hard to adjust to a novel approach requiring them to engage with active hypothesis testing about the linguistical material they were exposed to. Since they had to change their learning strategy from when the rule was explicitly given to them to individual rule search, they required extensive guiding questioning to arrive at the metalinguistic realization of the targeted rule on their own. The students in the incidental condition did not experience any difficulties assuming the lesson focused on the acquisition of new vocabulary and development of oral fluency.

The piloting of instructional treatment indicated that the three-step approach developed for the main study was effective for teaching articles under deductive and guided inductive conditions since all key stages of the instructional sequences were completed within one standard 80-minute session. With regard to teaching materials, it was decided to introduce a glossary for each core text in order to decrease the amount of time spent providing students with translations and transcriptions for unknown vocabulary.

2.8.5.4. Concluding remarks

The findings obtained in this second pilot study suggest that the measures of implicit knowledge as used in the study could be administered to the participants in the main study. The instruments showed overall good internal consistency with all test items worth retention. The same applied to the results of the LLAMA test and the BDS test. The measures of implicit knowledge were significantly correlated with learner proficiency pointing towards shared variance between them, which is important given the assumption that implicit knowledge of articles is a part of one`s proficiency.

As suggested in the first pilot study, article uses 4 and 7 should be combined into one. The rationale for the decision was justified by the fact that scoring and analyses of these uses are problematic given a high degree of similarity between them. The new use was formulated as follows: We use a definite article when it is clear from the context which specific thing(s) or person/people we mean.

2.9. Main study procedure

L2 learners` involvement in the study was voluntary. Since the participants were below 18, their parents or legal guardians received and signed a consent form prior to the administration of the instruments and the instructional treatment. L2 learners` explicit and implicit knowledge of articles was assessed three times: at pre-test (administered 2 weeks before the instructional treatment), immediate post-test (administered after the completion of instructional treatment) and delayed post-test (administered 6 months after the instructional treatment). Their general L2 proficiency, the test of aptitude and working memory were assessed once at the time of pre-test. An instruction satisfaction questionnaire was administered after the instructional treatment. Table 2.18 provides an overview of instruments administered at each testing time.

Table 2.18 Administration of instruments

	Background Questionnaire	QPT	BDS	LLAMA	Instruction satisfaction	EI	OP	Gap-fill	MLK
Pre-test	✓	✓	✓	✓		✓	✓	✓	✓
Post-test					✓	✓	✓	✓	✓
Delayed post-test						✓	✓	✓	✓

For the pre-test the order of administration was as follows: background information questionnaire, QPT test, the BDS test, the LLAMA test, the EI test, the OP test, the gap-fill test and the MLK test.

The pre-test was followed by the instructional treatment comprised of ten 80-minute sessions spread over three weeks. The instructional intervention was administered during the academic year and constituted a part of the compulsory curriculum. The topics covered during the instructional intervention were assessed in the school`s regular end of the term written and oral achievement exams.

Six intact classes of L2 learners were randomly assigned to one of the three instructional conditions: deductive, guided inductive or incidental. The participants received three treatment sessions a week which is in line with the standard number of English classes they have. Each class targeted one article use and followed a three-step approach detailed in section 2.7. The last session was designed as revision of the targeted uses for the deductive and guided inductive group and additional speaking practice for the incidental group. The author delivered the instructional treatment in all groups. Table 2.19 details the order in which targeted article uses were taught.

Table 2.19 Article uses: order of teaching

	Week 1	Week 2	Week 3	Week 4
Monday	Session 1 A/an + first mention	Session 4 A/an + what kind of thing/person something/somebody is	Session 7 The + adjective denoting a group of people	Session 10 Revision
Wednesday	Session 2 The + specific people/things in a given context	Session 5 The + one of something	Session 8 The + oceans/seas/rivers	
Friday	Session 3 A/an or zero article + general context	Session 6 The + type of animal/machine	Session 9 The + plural names of people/places	

At the pre-test the participating learners filled in a short background information questionnaire (see Appendix A for the full background information questionnaire) which was followed by the administration of the QPT test. The BDS test was conducted on a one to-one basis with the author in a quiet room. This was followed by the LLAMA test which took place in 2 computer labs supervised by me and an assisting teacher in 3 sessions.

The administration of the EI and the OP tests was conducted by the author and the assisting teacher on a one-to-one basis. The author tested 60 learners and the teacher tested 55 learners. The EI test was completed in 4 sessions during weekday classes. At the beginning of the EI test participants completed a short training phase which consisted of two example questions. All the test items were pre-recorded. The test-takers listened to each question twice. They were given four seconds to answer the questions with either “yes”, “no” or “don`t know”. After this they repeated the question. Their utterances were recorded on a Sony IC audio recorder. The administration of each session of the test took approximately 80 minutes.

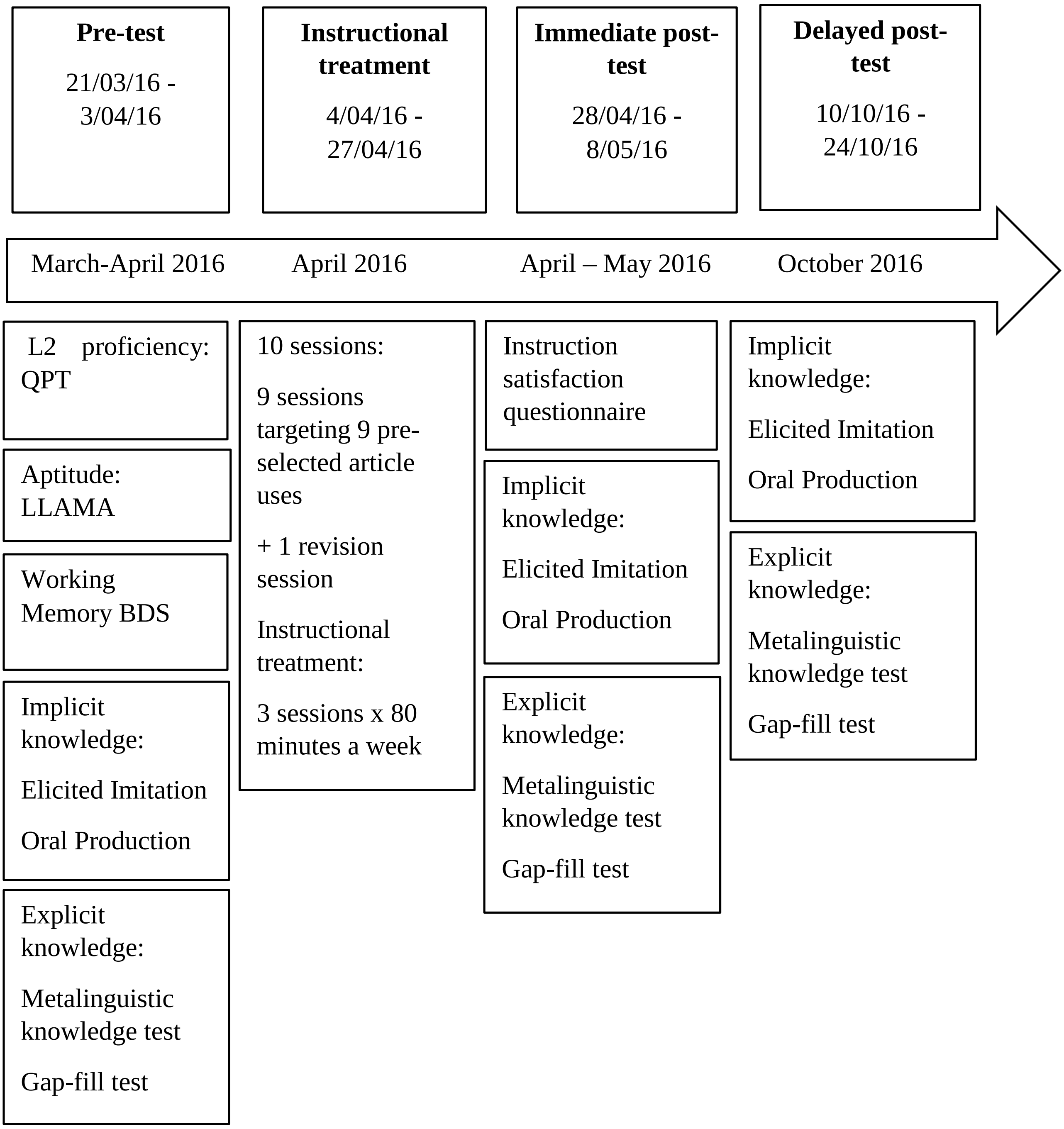
The administration of the OP test was completed within 3 sessions during weekday classes and 3 sessions during Saturday classes. The administration of each session of the test took approximately 80 minutes. For the OP test participants read and listened to a pre-recorded story “The Cambridge Egg”. When the learners finished reading and listening to the story, they were instructed to retell it, giving as many details as possible. For their convenience the names of the main characters were provided on a card. In general, it took learners five to seven minutes to retell the story. Participants` retellings were recorded for subsequent scoring.

The pre-test concluded with the gap-fill test and the MLK test group-administered in two sessions. The participants were allocated 20 minutes to fill in the gaps at the sentence level and provide source attributions and confidence ratings for each test item. After 20 minutes students` answer sheets were collected. All the participants managed to finish the test.

The MLK test was completed within 1 session which lasted approximately 80 minutes. The participants were explicitly instructed in both Russian and English to correct highlighted errors in the target sentences, provide explanations as to why they believed the sentence was incorrect and illustrate rules with relevant L2 sentences. The learners could explain their corrections either in Russian or English. Once they completed the first subtest, their answer sheets were collected, and participants proceeded to the rule illustration subtest.

The immediate post-test was conducted straight after the instructional treatment; the delayed post-test was administered 6 months after the immediate post-test (in the subsequent academic year). The order of instruments administration for either post-test was as follows: instruction satisfaction questionnaire (immediate post-test only), EI test, OP test, gap-fill test and MLK test. The administration procedure was as described for the pre-test. Figure 2.5 summarises key stages of the testing and instructional intervention as conducted in the main study.

Figure 2.5 Timeline and the key stages of the main study



CHAPTER 3 INVESTIGATING EXPLICIT AND IMPLICIT KNOWLEDGE OF DIFFERENT ARTICLE USES BY INSTRUCTED L2 LEARNERS OF ENGLISH

(Article 1 - Irina Tomak)

3.1. Abstract

This paper reports on a study examining explicit and implicit L2 knowledge of different English article uses by employing a specially designed suite of tests tapping into constructs in question as well as self-reported measures of awareness. One hundred and fifteen teenage Russian L2 learners acquiring English in an instructed setting completed an elicited imitation test, an oral production test, a test of metalinguistic knowledge and a gap-fill test targeting implicit and explicit knowledge of nine article uses and reported source attributions and confidence ratings for the gap-fill test. Results indicate that accurate performance on the gap-fill test is associated with the use of explicit knowledge. Nonetheless, an interaction between the type of knowledge elicited by the test and individual article uses was detected. L2 learners` performance varied substantially by article use, with some uses standing out as "hard" in terms of implicit knowledge and "easy" in terms of explicit knowledge and vice versa. Analysis of difficulty rankings by article use did not yield significant association between the two types of knowledge; thus it was argued that L2 learners seem to construct explicit knowledge of some article uses and implicit knowledge of others, but not necessarily both types of knowledge together.

3.2. Introduction

The constructs of explicit and implicit knowledge have been a subject of interest in the field of second language acquisition (SLA) for decades. Second language (L2) researchers tend to treat explicit and implicit knowledge as inherently distinct on the evidence that the two types of knowledge are represented differently and draw on distinct cognitive processes (Paradis, 2009; N. Ellis, 2015). Explicit knowledge refers to conscious knowledge that can be called up on demand (Dörnyei, 2009) and potentially verbalized (N. Ellis, 2015; Rebuschat, 2013), whereas implicit knowledge is described as tacit, intuitive (R. Ellis, 2009) and inaccessible to consciousness (Hulstjin, 2015; Andringa & Rebuschat, 2015). Since both types of knowledge are assumed to be implicated in L2 development, a number of studies (e.g. R. Ellis, 2005, 2006; Ellis et al. 2009; Elder, 2009; Bowles, 2011; Gutiérrez, 2013; Hu, 2011) have examined instructed L2 learners` explicit and implicit knowledge of grammatical structures drawn from a typical teaching curriculum by employing a battery of tests tapping into the constructs in question. The results indicate that instructed learners can develop both explicit and implicit knowledge of grammar, and that the two types of knowledge are significantly associated with L2 proficiency as measured by standardized proficiency tests (Erlam, 2006; R. Ellis, 2006).

It has been suggested (Rebuschat, 2013; R. Ellis, 2005) that any study probing into the contributions of explicit and implicit knowledge to L2 development would benefit from the inclusion of self-reported measures of awareness (i.e. subjective measures), which could help further distinguish between the constructs. While subjective measures have been extensively used in lab-based research, (Rebuschat, 2008; Rebuschat & Williams, 2009, 2012) very few classroom-based studies (R. Ellis, 2005; Elder, 2009) have incorporated them in their research design.

The present study is concerned with the investigation of explicit and implicit L2 knowledge of nine article uses with instructed Russian teenage L2 learners of English at lower intermediate level of proficiency by employing an elicited imitation (EI) test, an oral production (OP) test, a metalinguistic knowledge (MLK) test and a gap-fill test, as well as subjective measures introduced for the gap-fill test.

3.3. Background

3.3.1. Validity research on measures of explicit and implicit knowledge

R. Ellis (2005) developed a battery of tests hypothesized to provide relatively independent measures of explicit and implicit knowledge. An oral elicited imitation test (EI), an oral narration test (ON), and a timed grammaticality judgement test (TGJT) were designed to elicit implicit knowledge, while an untimed grammaticality judgement test (UGJT) and a metalinguistic knowledge test (MKT) were designed to elicit explicit knowledge. 20 native speakers and 91 L2 learners of English at various levels of proficiency completed tests assessing 17 grammatical structures. Participants` scores were submitted to exploratory factor analysis which yielded a two-factor solution with the EI, the ON and the TGJT loading on the first factor and the UGJT and the MKT loading on the second factor. R. Ellis interpreted the obtained factors as analogous to implicit and explicit knowledge, respectively.

Further support to the construct validity of Ellis`s battery of tests was lent by Bowles (2011) and Zhang (2015). Bowles conducted a replication study with a pool of L2 learners and heritage learners of Spanish and Zhang with Chinese university-level learners of English. The results of the confirmatory factor analyses yielded a two-factor solution interpreted as corresponding to implicit and explicit knowledge, providing support for the construct validity of R. Ellis`s (2005) battery of tests with a different population of L2 learners.

It has been widely accepted that the MKT is a valid measure of explicit knowledge since it asks L2 learners to verbalize their knowledge in metalinguistic terms and “forces” them to draw on their metaknowledge (Elder, 2009; Zhang, 2015; Gut érrez, 2012). However, the situation is not as clear cut with the EI, the ON and various grammaticality judgement tests, since their use cannot guarantee that participants will only ever draw on one type of knowledge to the exclusion of the other.

Several studies (e.g. Erlam, 2006; Spada, Shiu & Tomita, 2015) have provided support for the construct validity of the EI test as a measure of implicit knowledge. Erlam (2006) administered an EI test targeting 17 grammatical structures to 95 Chinese L2 learners and 20 native speakers of English. Additionally, participants completed the ON test and the IELTS. The analysis indicated that native speakers obtained high scores for the EI test, correctly repeating 97 % of grammatical stimuli and correcting 91 % of ungrammatical stimuli, which was interpreted as evidence of the validity of the EI test as a measure of implicit knowledge. L2 learners repeated 61% of grammatical stimuli correctly and corrected 35% of ungrammatical stimuli. Erlam (2006) argued that since L2 learners had not just repeated grammatical items but also corrected ungrammatical statements, the EI test had reconstructive nature. Additionally, the correlation analyses between the EI test and the IELTS showed that coefficients were higher for the EI and the speaking and listening components of the IELTS which are more likely to encourage learners to process language in real time and draw on implicit knowledge, and lower for the reading and writing components, which allow L2 learners to access explicit knowledge and monitor their output. This result was interpreted as suggestive evidence that the EI was accessing implicit L2 knowledge.

In a validation study by Spada, Shiu & Tomita (2015) with 73 university-level L2 learners of English from Taiwan and 20 native speakers, an EI test targeted passive constructions. The administered battery of tests included a written TGJT, an auditory TGJT, a written error correction, error identification and error explanation tasks, an EI test and an ON task. An exploratory factor analysis generated a two-factor solution with the written TGJT, error correction, error identification and error explanation tasks loading on a factor labelled explicit knowledge and the EI and the TGJT loading on a factor labelled implicit knowledge. These findings were in line with those reported by R. Ellis (2005), Bowles (2011) and Zhang (2015). The loadings for the ON test did not reach the cut-off point value introduced by the authors as an indication that the variable loaded on the factor; thus, no further comparisons of the ON with the EI test were warranted.

Although GJTs have been used extensively to assess learners` knowledge of L2 grammar, there is still no consensus as to what type of knowledge L2 learners resort to when making their judgements. It has been argued that test-related variables (i.e. item grammaticality and time pressure) may impact the type of knowledge elicited by GJTs. Most validation studies (R. Ellis, 2005; Bowles, 2011; Zhang, 2015) reported that the variable of time pressure, rather than item grammaticality, had the most impact on the type of knowledge elicited by GJTs; thus, timed and untimed GJTs were assumed to tap implicit and explicit knowledge respectively. Contrasting findings were reported by Gutiérrez (2013) who administered a UGJT, an MKT and a TGJT to 49 university-level L2 learners of Spanish. The results indicated that grammatical items of the GJTs loaded on one factor, while ungrammatical items of the GJTs and the MKT loaded on another factor. Gutiérrez interpreted this result as indicating that grammatical items most likely constitute the measure of implicit knowledge, whereas ungrammatical items are the measure of explicit knowledge.

A study by Godfroid et al. (2015) investigated construct validity of GJTs by administering timed and untimed GJTs targeting 17 grammatical structures to 20 native speakers and 40 L2 learners of English and tracking participants` eye movements during reading. The results indicated that both time pressure and item grammaticality influenced construct validity of the GJTs. Introduction of time pressure suppressed the amount of reading with regression (right-to-left eye movements) for L2 learners only, whereas native speakers remained largely unaffected by it and exhibited uniform processing patterns in both conditions. By way of explanation, it was argued that TGJT did not allow L2 learners to engage in controlled processing and limited their ability to access explicit knowledge. The authors concluded that timed and untimed GJTs measure distinct constructs, which could correspond to explicit and implicit knowledge, since regression results point to varying degrees of controlled and automatic processing involved in participants` responses to timed and untimed GJTs. In terms of item grammaticality, it was found that its effect was relevant only for the untimed condition. Compared to untimed, ungrammatical items, both L2 learners and native speakers regressed more on untimed, grammatical items. It was argued that grammatical and ungrammatical sentences offer different type of evidence pertaining to the grammaticality of the sentence. The presence of ungrammatical evidence provides test-takers with sufficient evidence that a sentence is ungrammatical. By contrast, the absence of an ungrammatical element essentially represents a lack of evidence, therefore participants may regress on grammatical items to confirm their initial impression. Godfroid et al. (2015) suggest that the rereading of grammatical sentences in untimed condition may be an artefact of the task where learners attempt to confirm their initial impressions, and it is unclear what type of knowledge untimed grammatical items measure.

A more recent study on GJTs with 79 Chinese L2 learners of English by Vafaee et al. (2017) employed more fine-grained measures of implicit knowledge: a self-paced reading task and word-monitoring replacing EI and ON respectively. The analysis revealed that manipulation of time pressure and item grammaticality did not provide distinct measures of explicit and implicit knowledge. The authors concluded that GJTs were too coarse to elicit implicit knowledge and that different GJTs elicit different levels of explicit knowledge.

In summary, validation research has indicated that while the MKT constitutes a valid measure of explicit knowledge, and time-pressured oral measures like EI and ON are more likely to tap implicit knowledge, the construct validity of GJT as a measure of explicit or implicit knowledge remains debatable. The type of knowledge elicited by the latter appears to be constrained by test-related variables of time pressure and item grammaticality. In order to further scrutinize the validity evidence of the measures of explicit and implicit knowledge, one needs to examine the issue of learner awareness.

3.3.2. Measures of awareness

It has been suggested that studies seeking to dissociate between explicit and implicit knowledge would benefit from the inclusion of measures of awareness alongside measures of explicit/implicit knowledge in their research design (Rebuschat, 2013, Rebuschat & Williams, 2012; Spada, Shiu & Tomita, 2015; Vafaee et al., 2017). Among the most commonly used measures of awareness are subjective measures which are administered by asking test-takers to perform a task and provide source attributions (e.g. guess, intuition, memory, rule) and confidence ratings for each test item. Subjective measures have been used extensively in laboratory-based research with mini or artificial/semi-artificial languages (Dienes, 2008; 2012; Dienes & Scott, 2005; Rebuschat & Williams, 2009, 2012a). However there are relatively few studies that have implemented them to dissociate between the types of knowledge L2 learners acquire in an instructed setting with natural languages.

In his validation study of the measures of explicit and implicit knowledge, R. Ellis (2005) asked participants to indicate the degree of certainty of their judgements for the UGJT on a scale from 0% to 100% and report whether they used “rule” or “feel” for each judgement. It was predicted that the measures of explicit knowledge would encourage learners to use “rule”, while the tests of implicit knowledge would invoke the use of “feel”. Moreover, the use of “rule” would be strongly correlated with the UGJT and the MKT but not with the EI, the ON and the TGJT. Correlation analysis yielded statistically significant correlation between “rule”, the UGJT (ungrammatical items) and the MKT and nonsignificant correlations between “rule” and measures of implicit knowledge. With regard to certainty, it was predicted that the measures of implicit knowledge would elicit more certain responses than the measures of explicit knowledge. Contrary to the prediction, the analysis yielded strong association between certainty and use of explicit knowledge but not implicit knowledge. The prediction was further disconfirmed by Roehr (2006) who likewise found that self-reported use of metalinguistic knowledge of L2

German adjectival inflections as elicited by stimulated recall protocols co-occurred more frequently with certain rather than uncertain decisions.

Another study that also made use of subjective measures was conducted by Elder (2009) with 229 L2 learners and 20 native speakers of English. She asked the participants to indicate what processes they drew on when judging test items on an UGJT on a 3-point scale, where 1 stood for use of intuition, 2 for use of both rule and intuition and 3 for use of rule. She hypothesized that there would be a significant relationship between self-reported use of rule for the UGJT and performance on the rule-based component of the MKT, which independently assesses knowledge of these rules. The results of the analyses confirmed the hypothesis and revealed that those learners who reported rule when completing the UGJT, were more likely to perform better on the rule-based component of the MKT.

Overall, although several classroom-based studies have incorporated subjective measures in their research designs, the scale they employed had a limited range of options, which did not allow for a more fine-grained dissociation between the type of knowledge elicited by the measures. Further classroom-based research employing a wider range of options (i.e. guess, intuition, memory, rule) commonly used in the lab-based research could provide more sensitive measures of learner awareness.

3.3.3. Studies measuring L2 explicit and implicit knowledge of grammatical structures

The development of reliable measures of explicit and implicit knowledge gave rise to research examining L2 learners` explicit and implicit knowledge of grammatical structures drawn from the syllabus taught by means of pedagogical rules.

R. Ellis (2006) investigated explicit and implicit learning difficulty of 17 grammatical structures of English (e.g. verb complement, indefinite article, ergative verbs etc.) drawn from all proficiency levels of a teaching syllabus. A total of over 220 L2 learners of English of Asian origin completed the tests. The analysis revealed that learning difficulty of the structures varied depending on whether explicit or implicit knowledge of the structures was involved. Some structures (e.g. indefinite article and question tags) were found to have low learning difficulty with respect to explicit knowledge, but high learning difficulty with respect to implicit knowledge, while some structures (e.g. modals, ergative verbs) were of equal difficulty in terms of explicit/implicit knowledge. There was no significant correlation between the rank orders of difficulty of the targeted structures for explicit and implicit knowledge. A correlation analysis yielded a number of moderately strong significant correlations between the measures of explicit and implicit knowledge and general language proficiency. Further analysis indicated that it was explicit and implicit knowledge of different rather than the same set of structures that was significantly associated with proficiency. What is more, both explicit and implicit knowledge were significant predictors of general language proficiency, accounting for 34% of variation in proficiency scores.

Rodríguez Silva & Roehr-Brackin (2016) investigated perceived learning difficulty and actual performance on the measures of explicit and implicit knowledge targeting 13 L2 English structures (e.g. simple past tense, indefinite article, modal verbs etc.) with university level Spanish L2 learners of English (n=30), applied linguists (n=3) and university teachers of English (n=11). All three groups completed difficulty judgement questionnaires specially designed for them which assessed the learning difficulty of the targeted grammar points as implicit and explicit knowledge. Additionally, L2 learners completed a metalinguistic knowledge test tapping their explicit knowledge and an EI test tapping their implicit knowledge. In terms of the learners' performance on the measures of implicit and explicit knowledge, the Spearman`s rank order correlation yielded no association between explicit and implicit rank orders of difficulty of the targeted grammar points. This suggested that the learners developed explicit knowledge of certain grammar points and implicit knowledge of the others and vice versa, but not necessarily both implicit and explicit knowledge of the same grammar point. Regarding the perceived learning difficulty, it was found that the experts` judgements did not lead to significant predictions of L2 learners' performance, while L2 learners` difficulty judgements significantly correlated with their performance on the measure of explicit knowledge. Furthermore, the teachers` difficulty rankings exhibited a trend towards successful prediction of L2 learners` performance on the measures of both explicit and implicit knowledge.

Several studies (Muranoi, 2000; Hu, 2011; Akakura, 2012; Ellis et al., 2008,) have examined how L2 learners develop linguistic knowledge of English articles highlighting their learning difficulty. Pedagogically, articles are frequently cited to be challenging even for advanced learners (Butler, 2002), since they represent highly abstract non-salient grammatical features that are extremely hard to infer either explicitly or implicitly from exposure to input (Goldschneider & DeKeyser, 2001).

Muranoi (2000) examined the effectiveness of form-focused instruction operationalised through interaction enhancement in which interaction was enhanced by means of feedback (e.g., requests for repetition and recasts) on the acquisition of generic and non-generic articles. The study involved 61 Japanese L2 learners of English and followed a pre-test and two post-tests design and assessed the result of instructional intervention by means of oral story description and picture description tasks, a written picture description task and a GJT. The results indicated that interaction enhancement had a positive effect on learning of English articles on both written and oral measures; however no information was given as to what uses were easier/ more difficult for acquisition.

Hu (2011) investigated the acquisition of metalinguistic knowledge of 6 English structures: definite, indefinite, zero article, simple present, simple past and present perfect with 76 Chinese L2 learners of English. The results of an untimed rule verbalization task indicated that L2 learners had acquired much metalinguistic knowledge of targeted structures which was consistent with typical pedagogical rules. However, the percentage of correct rule verbalization varied by structure: the participants had better explicit knowledge of articles than tenses. They obtained the highest scores for the zero article followed by the indefinite, the definite article, simple past, present perfect and past simple. Hu reported that since pedagogically articles and tense/aspect are universally problematic for acquisition, the participants possessed a rather high level of metalinguistic awareness and explicit knowledge of the structures. However, the scores L2 learners obtained for targeted article uses were collapsed into total accuracy scores with no information provided as to what article uses were the most/least problematic for the participants.

Akakura (2012) examined the effectiveness of explicit instruction on the development of explicit and implicit knowledge of generic and non-generic uses of L2 English articles with a pool of 94 L2 learners of English of Asian origin. The study followed the pre-test/post-test/delayed post-test design and administered explicit instructional intervention by means of Computer Assisted Language Learning. The battery of tests included an EI and an ON task, a UGJT and an MKT. The results indicated that instruction had significant effect on the development of both explicit and implicit knowledge of articles; however L2 learners obtained higher means for non-generic than generic uses at all testing times. The author concluded that generic article uses pose substantial acquisition problems for L2 learners and are less amenable to instruction than non-generic uses, suggesting that article uses differ in terms of their learning difficulty and should be distinguished.

To summarize, the research to date has indicated that both explicit and implicit knowledge of grammatical structures is implicated in the development of general language proficiency. However it is explicit and implicit knowledge of different rather than the same grammar points that is involved. Studies focusing on L2 acquisition of articles have provided evidence that articles appear to be amenable to explicit instruction. Nonetheless, most studies examined L2 learners` total accuracy scores and did not provide evidence as to what article uses were more/less challenging for acquisition. Additionally, very few studies have examined both explicit and implicit knowledge of articles as well as knowledge of individual article uses; thus empirical evidence to date remains limited.

3.4. Research issues

Since L2 learners can be expected to possess both explicit and implicit knowledge of the target language, a number of empirical studies have attempted to dissociate between them by employing a battery of tests purporting to provide relatively separate measures of both constructs. However, it is notoriously difficult to ensure that classroom-based measures of explicit and implicit knowledge will elicit only one type of knowledge at the exclusion of the other type of knowledge; therefore, the introduction of subjective measures in research design may allow discrimination between explicit and implicit knowledge in a more fine-grained way.

The research on grammatical structures taught by means of pedagogical rules shows evidence that both types of knowledge are implicated in L2 development; however it seems that it is explicit and implicit knowledge of different rather than the same structures that are significantly associated with proficiency. Several studies have investigated L2 English articles, highlighting their learning difficulty. Despite that, very few investigations have examined both explicit and implicit knowledge in relation to individual article uses. The current study was designed to fill this gap by employing a battery of tests of explicit and implicit knowledge targeting different article uses as well as source attributions and confidence ratings introduced for one of the tests.

3.5. Methodology

This study aims to address the following research questions:

RQ1: Which tests measure explicit and which tests measure implicit knowledge of L2 English articles?

RQ2: How do source attributions and confidence ratings employed in a gap-fill test contribute to our understanding of the type(s) of knowledge measured?

RQ3: What is learners' explicit and implicit knowledge of different article uses targeted in the study?

3.5.1. Participants

115 L1 Russian learners of English from six intact classes at a private language school in Russia (mean age = 14.78, SD = 1.10, range = 13-17) were recruited to participate in the study. The learners were at a lower intermediate level of English proficiency as assessed by the school`s progress test. For the purposes of the study the participants` level of English was assessed independently by means of the Oxford Quick Placement Test (UCLES, 2004) which indicated that L2 learners` scores (M= 36.15, SD = 2.30, range = 29-40) fell within the lower intermediate band according to the test manual. Lower intermediate level is deemed to be broadly equivalent to Level B1 of the Common European Framework of Reference.

At the school where the study was carried out, English is an obligatory subject. Learners have three 80-minute sessions a week. The English programme is aimed at developing and improving L2 communicative skills, but it also incorporates an explicit grammar instruction component in preparation for the unified state exam that assesses formal grammatical knowledge. It should be noted that English articles are not included into the teaching curriculum and learners do not receive any formal instruction on articles. At the time of data collection, on average, the participants had been studying English for 4 years and none of the participants had spent more than two weeks in an English-speaking country.

3.5.2. Targeted uses of L2 English articles

Nine uses of the English definite/indefinite/zero article were selected from “Essential Grammar in Use” (Murphy, 2007) as the target structures of the study. Selected article uses correspond to course book requirements set for lower intermediate - intermediate L2 learners of English at the school where the study was conducted. Table 3.1 illustrates targeted article uses.

Table 3.1 Targeted article uses

Targeted article uses	Examples
1. The + adjective denoting a group of people	The rich can never understand the poor.
2. The + type of animal/machine	My father can play the guitar.
3. A/an or zero article + general context	She loves music.
4. The + specific people/things in a given context	The book I'm reading at the moment is a bestseller.
5. The + one of something	The moon was bright last night.
6. A/an + what kind of thing somebody/something is	The BBC is a famous broadcasting company.
7.A/an + first mention	My neighbour bought a new car last week.
8. The + oceans/seas/rivers	The Red Sea has many coral reefs.
9. The + plural names of people/places	The Smiths have invited us for dinner.

3.5.3. Instruments and procedure

In addition to a short questionnaire that aimed to collect L2 learners` biographical information and their experience of studying English, the participants completed an L2 English proficiency test and the battery of tests aimed to elicit explicit and implicit L2 knowledge of articles. The instruments used are described in what follows.

3.5.3.1 Test of explicit knowledge

The MLK test was comprised of an error correction, an error explanation (Rodríguez Silva & Roehr-Brackin, 2016; Ziętek & Roehr, 2011) and a rule illustration sub-test (Absi, 2014; Scheffler, 2011) with 81 items in total. In the error correction and explanation sub-tests participants were asked to correct highlighted errors at a sentence level and provide appropriate explanation for their correction in either Russian or English (Ziętek & Roehr, 2011). In the rule illustration sub-test participants were given a short description of the targeted article uses and asked to write sentences illustrating each use. The MLK test was scored dichotomously, i.e. 1 point was awarded for each appropriate correction, explanation and rule illustration. Errors that did not pertain to the targeted article uses were disregarded. The maximum possible score for the MLK test was 81. Sample items for the MLK test are given below.

Error correction and explanation

Example: *Nile is in Egypt.

Correction: The Nile is in Egypt.

Explanation: We use a definite article with the names of rivers.

Rule illustration

Example: We use a definite article with plural names of people/places.

Sentence illustrating this article use: The Smiths are a very nice family.

3.5.3.2. Tests of implicit knowledge

An EI test (R. Ellis et al., 2009; Erlam, 2006; Spada, Shiu & Tomita, 2015; R. Zhang, 2015; Suzuki & DeKeyser, 2015) was presented to the L2 learners as an opinion questionnaire comprised of both grammatical and ungrammatical questions targeting selected article uses. The questionnaire was comprised of 34 questions presented auditorily in a fixed pseudo-random order. The test takers were required to listen to a question, answer it with either *Yes*, *No* or *Don`t know* and then repeat it in correct English. The elicited questions were recorded for subsequent analysis. The EI test was scored dichotomously with each correctly produced targeted article use attracting 1 point. Errors that did not pertain to the targeted article uses were disregarded. The maximum possible score was 48. Sample grammatical and ungrammatical items are shown below.

Example: Do you agree that *the oranges are healthy because they are full of vitamins?

Example: Do you believe that many people like opera and ballet?

In the oral production (OP test (R. Ellis et al. 2009; Bowles, 2011; Spada, Shiu & Tomita, 2015) the L2 learners read and listened to the recording of a story (The Cambridge Egg, 615 words) seeded with items representing targeted article uses. They could listen to the story once and read along while they were listening, and they were then required to retell the story from memory as accurately as possible. There was a total of 75 instances of targeted article uses in the story; however due to the nature of the task, different participants produced different numbers of obligatory occasions for the targeted uses. In order to receive a score, the participants were required to produce a minimum of three obligatory occasions per targeted use. Performance was scored as the percentage of correct uses out of the obligatory occasions created. The excerpt from the story is given below with targeted article uses underlined.

<u>The Whites</u> live in <u>a little house</u> and have <u>a garden</u> where Mrs White grows <u>flowers</u> and <u>strawberries</u>. On Sunday she bakes <u>cakes</u> and gives them to t<u>he old</u> and <u>the homeless</u>. Mr White plays <u>the piano</u>, Sue <u>the violin</u> and <u>the boys</u> love t<u>he drums</u>.

For the purpose of analysis, the scores the L2 learners obtained for the EI and the OP tests were combined to produce an overall percentage score for “Oral measures”.

3.5.3.3. Gap-fill test

The test presented participants with sentences containing gaps and asked them to fill in the gaps with a definite article, an indefinite article or an indication that no article was required and indicate source attributions for their answers, i.e. Guess, Intuition, Memory or Rule.

Guess: the participant has guessed the answer

Intuition: the participant feels that the answer is right but has no knowledge why it is correct.

Memory: the participant has a memory of having heard or encountered something similar.

Rule: the participant knows the rule and applies it to make an answer.

Additionally, the participants were required to provide confidence ratings for their answers on the percentage scale: 100% 80% 60% 40% 20% 0%. The gap-fill test was scored dichotomously with 1 point awarded for each accurate answer. The maximum possible score for the test was 36. A sample item for the test is shown below.

Example: What should I give your sister for her birthday?

Ha-ha! Her tastes are very expensive! She wants _ new Audi.

Target answer: *a*

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

3.6. Preliminary analyses

All the measures were piloted with a similar population of learners (N= 52) and were revised as necessary. Table 3.2 illustrates reliability coefficients for each measure. The internal consistency of the finalized tests as used in the present study was good with Crobach`s α ranging from .711 to .848.

Table 3.2 Internal consistency (Crobach`s α) for tests of explicit and implicit knowledge (N=115)

Tests	Crobach`s α
MLK total	α = .802
Error correction	α = .848
Error explanation	α = .813
Rule Illustration	α = .736
Gap-fill test	α =. 711
EI test	α = .741
OP test	α = .711

A series of one-sample KS tests confirmed that the data did not differ significantly from a normal distribution, so parametric statistical tests were used. The alpha level was set at .05

3.7. Results

3.7.1. Construct validity of the tests

The first research question asked which tests measure explicit and which tests measure implicit knowledge of L2 English articles. Table 3.3 presents means, standard deviations and range for the measures completed by the L2 learners.

Table 3.3 Descriptive statistics for the measures of explicit and implicit knowledge of English articles (N=115)

Measures	Mean	SD	Min	Max	Max. Possible	Mean %
MLK total	36.64	7.49	23	54	81	45
Error	26.83	2.79	15	33	36	75

Correction						
Error Explanation	6.87	4.36	0	18	36	19
Rule Illustration	2.94	1.98	0	7	9	33
Gap-fill	19.71	3.77	13	28	36	55
Oral measures total	31.54	9.94	10	61	100	32
EI	16.30	4.96	5	28	48	34
OP	27.86	11.09	0	60	100	28

As illustrated in Table 3.3, the L2 learners performed better on the written tests (i.e. the gap-fill test, the MLK) than on the listening/speaking tests (i.e. Oral measures). The L2 learners scored the best on the gap-fill test with 55% of correct responses. Analyses by sub-tests reveal a more complex picture. The error correction sub-test was the easiest for the L2 learners in the MLK suite, attracting 75% of correct answers. With respect to the error explanation sub-test, the results show that it was the most challenging for the L2 learners in the MLK suite with 19% of correct responses followed by the rule illustration sub-test with 33% of correct responses. Regarding the listening/speaking suite of tests, the L2 learners performed slightly worse on the OP than the EI sub-test, obtaining 28% and 34% of correct responses respectively.

Table 3.4 summarizes Pearson correlation coefficients for the L2 learners` performance on all the sub-tests.

Table 3.4 Pearson correlation matrix for L2 learners` performance on the sub-tests (N=115).

	Gap-fill	MLK	Error	Error	Rule	Oral	EI

			Correction	Explanation	Illustration	Measures	
MLK	.51**						
	p<.001						
Error	.36**	.72**					
Correction	*p*<.001	*p*<.001					
Error	.44**	.90**	.40**				
Explanation	*p*<.001	*p*<.001	*p*<.001				
Rule	.44**	.79**	.42**	.64**			
Illustration	*p*<.001	*p*<.001	*p*<.001	*p*<.001			
Oral	.38**	.36**	.54**	.200*	.18		
Measures	*p*<.001	*p*<.001	*p*<.001	*p* = .031	*p*= .060		
EI	.41**	.30**	.45**	.15	.17	.80**	
	p<.001	*p* <.001	*p*<.001	*p*= .109	*p*= .072	*p*<.001	
OP	.37**	31**	.46**	.18	.13	.82**	.79**
	p <.001	*p* =.001	*p* <.001	*p*= .051	*p*= .152	*p* <.001	*p*<.001

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

The metalinguistic sub-tests designed to tap into L2 learners` explicit knowledge correlate with each other at a moderate-to-strong level which suggests shared variance among the sub-tests without them overlapping completely. The correlation is the strongest between the error explanation and rule illustration sub-tests. The strength of association between the error correction, error explanation, and rule illustration sub-tests is moderate, which suggests that the L2 learners might have drawn on different sources of knowledge when performing on the error correction sub-test. Furthermore, the correlation results reveal that neither the EI nor the OP sub-tests significantly correlate with the error explanation and the rule illustration sub-tests; however there is a significant correlation at a moderate level of strength between the error correction, the

EI, and the OP sub-tests. The EI and the OP sub-tests which were designed to tap into participants` implicit knowledge are highly intercorrelated. Relatively high correlation between the measures is in keeping with findings of previous studies (Bowles, 2011; R. Ellis, 2011; Erlam, 2006). The gap-fill test correlates with all other sub-tests at a moderate level, which suggests that it might tap into explicit and implicit L2 knowledge to a similar extent.

As a next step, a principal component analysis was performed on the scores L2 learners obtained for six measures, with a criterion to retain only components with eigenvalues greater than 1. Table 3.5 shows the eigenvalues of the two generated components, while table 3.6 presents the rotated component matrix for the variables. Loadings that cluster together on one component are in bold.

Table 3.5 Principal component analysis

Component	Eigenvalue	Variance (%)	Cumulative (%)
1	2.946	49.107	49.107
2	1.405	23.422	72.529

The principal components analysis with varimax rotation generated two components with an eigenvalue greater than 1, which indicated that the tests measured two distinct constructs. Component 1 accounts for 49% of the variance, and component 2 accounts for 23% of the variance. These components combined explain 73% of the total variance.

Table 3.6 Rotated 2-component matrix for the measures (N=115)

Measures	Component 1: Implicit knowledge	Component 2: Explicit knowledge
Error Correction	.54	.51

Error Explanation	.06	**.87**
Rule Illustration	.04	**.88**
Gap-fill	.42	.60
EI	**.93**	.09
OP	**.92**	.08

Table 3.6 shows that the error explanation and the rule illustration load on component 2, which was labelled “explicit knowledge”. The EI and the OP sub-tests load heavily on component 1, labelled “implicit knowledge”. These results are broadly consistent with previous research (R. Ellis, 2005; Bowles, 2011, Spada, Shiu & Tomita, 2015, Zhang, 2015). It is important to note that the error correction sub-test has similar loadings on both components (.54 and .51). The ambivalent nature of the error correction sub-test suggests that the L2 learners may have resorted to both explicit and implicit knowledge to make an appropriate correction. As with the error correction sub-test, the gap-fill test also loads on both components with slightly larger loadings on the component of explicit knowledge.

Overall, the results of the correlation and factor analyses provide evidence that the error explanation and rule illustration sub-tests of the MLK test and the EI and OP indeed tap into relatively separate pools of knowledge, while the error correction and the gap-fill test might measure both types of knowledge to some extent. Forthcoming analyses of source attributions and confidence ratings introduced for the gap-fill test will address the second research question to provide more conclusive evidence for the status of the gap-fill test.

3.7.2. The status of the gap-fill test

In order to investigate the type of knowledge elicited by the gap-fill test in a more fine-grained way, an item analysis examining source attributions and confidence ratings provided by the L2 learners was carried out. Table 3.7 summarises descriptive statistics for the gap-fill test items, source attributions and confidence ratings.

Table 3.7 Descriptive statistics for source attributions (frequency of use) and confidence ratings by item (N of items = 36)

	Mean	SD	Min.	Max.	Max. possible	Mean %
Gap-fill accuracy score by item	63.00	41.14	2	115	115	55
Guess	13.90	7.77	3	37	115	12
Intuition	49.36	17.17	24	79	115	43
Memory	29.44	11.21	9	50	115	26
Rule	21.72	14.96	2	59	115	19
Confidence	65.31	8.214	50	82	100	65

Descriptive statistics for the gap-fill test indicate that in terms of source attributions, intuition was the most frequently indicated basis of an answer followed by memory and rule, while guess was indicated least frequently. Confidence ratings of 65% suggest a relatively high mean level of confidence reported for the measure.

Table 3.8 provides an overview of Pearson correlation coefficients for the gap-fill test, source attributions and confidence ratings.

Table 3.8 Pearson correlation matrix for source attributions and confidence ratings (N of items = 36)

	Gap-fill	Guess	Intuition	Memory	Rule
Guess	-.80**				

	p < .001				
Intuition	-.94**	.69**			
	p < .001	*p* < .001			
Memory	.82**	-.75**	-.81**		
	p < .001	*p* < .001	*p* < .001		
Rule	.81**	-.71**	-.82**	.50**	
	p < .001	*p* < .001	*p* < .001	*p* < .001	
Confidence	.83**	-.84**	-.86**	.69**	.86**
	p < .001	*p* < .001	*p* < .001	*p* < .001	*p* < .001

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

As illustrated in Table 3.8, the accuracy of performance on the items of the gap-fill test is positively and strongly correlated with memory and rule, suggesting that the L2 learners were more accurate when reporting rule and memory as source attributions. Significant strong negative correlations between the gap-fill test, guess, and intuition indicate an inverse relationship between the variables, i.e. guess and intuition are associated with a decrease in accuracy.

Memory and rule were found to be positively and strongly associated with confidence ratings, indicating an increase in confidence ratings when they were reported as a basis of an answer. High accuracy is correlated with greater reported confidence, suggesting that successful performance and certainty go hand in hand (i.e. learners can judge their own knowledge quite well). The strength of associations between the variables is higher for rule than memory. Guess and intuition on the other hand were found to be strongly and negatively associated with confidence ratings indicating a drop in confidence ratings when they were chosen as a basis of an answer.

A partial correlation was then computed between the reported use of memory, rule and confidence ratings, while controlling for accuracy. If memory and rule are still correlated with greater confidence with the variable of accuracy controlled for, it would be plausible to assume that the reported use of explicit knowledge is a principal determinant of an increase in confidence ratings. The results of partial correlation analysis show that the use of rule is significantly correlated with confidence ratings at a medium level of strength (r =.55, p < .001), while memory is no longer significantly associated with an increase in confidence ratings when accuracy on the gap-fill test is controlled for (r =.04. p =.802). Thus, the results confirm the claim that the reported use of pedagogical grammar rules is associated with greater certainty. However, reported use of memory is not associated with greater certainty once accuracy is partialled out. In other words, the correlation between use of memory and certainly is an artefact of the correlation of both variables with accuracy.

A partial correlation was then run between the reported use of guess, intuition and confidence ratings, with the variable of accuracy partialled out. If guess and intuition are still found to be correlated with lower confidence when accuracy is controlled for, then it can be assumed that the reported use of implicit knowledge is a principal determinant of a reduction in confidence ratings. The analysis yielded a negative correlation between the reported use of guess and confidence ratings (r = -.53, p = 001) and intuition and confidence ratings (r = .42, p = .012) when accuracy on the gap-fill test is partialled out. The results support the claim that the reported use of implicit knowledge is associated with lower certainty.

To sum up, high intercorrelation between rule and memory source attributions instantiating participants` explicit knowledge and accuracy and an inverse relationship between guess and intuition instantiating participants` implicit knowledge and accuracy indicate that the L2 learners` who performed successfully on the gap-fill test reported drawing on explicit knowledge. The use of rule but not memory was associated with an increase in confidence ratings once accuracy had been partialled out, while the reported use of guess and intuition co-occurred with a reduction in confidence; the association remained once accuracy had been partialled out.

As a next step, an analysis by targeted article use for the gap-fill test was carried out to gain further insight into the distribution of source attributions and confidence ratings across the uses. Table 3.9 shows the distribution of source attributions and confidence ratings for the targeted article uses.

Table 3.9 Distribution of source attributions and confidence ratings per targeted article uses by item (N of uses = 9)

Targeted article uses	Guess %	Intuition %	Memory %	Rule %	Confidence %	Mean %
1.The + adjective denoting a group of people	20	64	12	4	54	11
2.The + type of animal/machine	16	59	17	10	58	22
3. A/an or zero article + general context	8	27	40	19	69	92
4.The + specific people/things in a given context	14	58	18	10	61	15
5.The + one of something	48	41	27	16	66	48
6.A/an + what kind of thing/ person somebody or something is	9	42	31	18	69	53
7.A/an + first mention	11	38	30	21	66	66
8.The + oceans/seas/rivers	5	26	26	44	77	98

9.The + plural names of people/places	9	32	30	29	70	87

The analysis of source attributions and confidence ratings reported for the article uses shows that intuition was the most frequently indicated source attribution for the uses with the lowest accuracy means (i.e. uses 1, 2 and 4). Memory and rule were the most frequently indicated source attributions for uses with the highest accuracy means (i.e. uses 3, 8 and 9). The results are less clear cut for uses 5-7 where the L2 learners seemed to have drawn on both types of knowledge to a similar extent which is reflected in roughly equal proportion of intuition, memory and rule. Overall, the analysis suggests that the type of knowledge elicited by the test interacts with article uses.

3.7.3. Explicit and implicit difficulty of targeted article uses

The third research question asked what learners' explicit and implicit knowledge of the targeted article uses is. The analysis for the third research question was informed by the results of principal component analysis which indicated that the error explanation and rule illustration sub-tests are measures of explicit knowledge, and thus the scores the L2 learners received for these sub-tests were used as measures of explicit knowledge. The gap-fill test was found to elicit mostly explicit knowledge, but also allowed for the use of implicit knowledge, and is therefore, examined separately. In terms of the measures of implicit knowledge, given that not all L2 learners received a score for each article use on the OP sub-test, the decision was made to examine the scores for the EI sub-test only.

Table 3.10 displays descriptive statistics and difficulty ranking for the error explanation and rule illustration sub-tests.

Table 3.10 Difficulty ranking (descending order) and descriptive statistics for the error explanation and rule illustration sub-tests by targeted article uses by item (N of uses = 9)

Targeted article uses	Mean	SD	Min	Max	Mean %	Max. possible
9. The + oceans/seas/rivers	77.80	16.75	48	88	68	115
8. The + plural names of people/places	38.20	26.73	17	82	33	115
5. The + one of something	28.80	31.95	4	84	25	115
3. A/an or zero article + general context	24.00	24.93	3	66	21	115
4. The + specific people/things in a given context	23.40	9.97	17	41	20	115
6. A/an + what kind of thing/ person something/somebody is	10.40	11.06	2	29	9	115
2. The + type of animal/machine	10.20	7.56	3	23	9	115
7. A/an + first mention	9.80	7.40	3	22	9	115
1. The + adjective denoting a group of people	8.00	13.73	0	32	7	115

As illustrated by Table 3.10, article uses varied extensively in their explicit difficulty. Uses 1, 2, 6 and 7 were the most challenging for participating L2 learners, uses 3-5 were moderately difficult and use 8 and use 9 were relatively easy.

Table 3.11 summarizes descriptive statistics and difficulty ranking for the gap-fill test.

Table 3.11 Difficulty ranking (descending order) and descriptive statistics for the gap-fill test by targeted article uses by item (N of uses = 9)

Targeted article uses	Mean	SD	Min	Max	Mean %	Max possible
8. The + oceans/seas/rivers	113.25	2.36	110	115	98	115
3.A/an or zero article + general context	105.50	15.09	83	115	92	115
9.The + plural names of people/places	99.50	7.55	91	109	87	115
7. A/an + first mention	75.50	11.03	62	85	66	115
6.A/an + what kind of thing/person something/somebody is	60.75	13.07	43	72	53	115
5.The + one of something	55.25	37.56	3	92	48	115
2.The + type of animal/machine	25.20	39.92	2	85	22	115
4.The + specific people/things in a given context	17.50	13.38	4	36	15	115
1.The + adjective denoting a group of people	12.75	6.08	4	18	11	115

Inspection of descriptive statistics for the gap-fill test and the error correction and rule illustration sub-tests indicate that the means the L2 learners obtained for article uses on the gap-fill test are generally higher than those obtained for the measures of metalinguistic knowledge. Scrutiny of difficulty ranking for the measures suggests similarity between the most and least difficult article uses.

Table 3.12 shows descriptive statistics and difficulty ranking for the EI.

Table 3.12 Difficulty ranking (descending order) and descriptive statistics for the EI test by targeted article uses by item (N of uses = 9)

Targeted article uses	Mean	SD	Min	Max	Mean %	Max possible
3. A/an or zero article + general context	86.17	30.88	39	111	75	115
8. The + oceans/seas/rivers	65.25	29.58	27	91	57	115
5. The + one of something	48.80	49.50	0	105	42	115
6.A/an + what kind of thing/person something/somebody is	44.00	33.48	6	82	38	115
2.The + type of animal/machine	33.75	8.77	21	40	29	115
4. The + specific people/things in a given context	24.60	13.69	13	47	21	115
7. A/an + first mention	22.71	27.23	3	79	20	115
1.The + adjective denoting a group of people	19.67	17.16	1	48	17	115
9.The + plural names of people/places	10.75	4.57	4	14	9	115

Inspection of Table 3.12 indicates that article uses differ in their implicit difficulty with some uses characterised by high difficulty, i.e. uses 1,2, 4, 7 and 9 and some by low difficulty, i.e. use 3 and 8, while uses 5 and 6 appear to be moderately difficult.

In order to ascertain whether there is any statistically significant relationship between the difficulty rankings for the tests, Spearman rank order correlations were run. The results of the analyses are displayed in Table 3.13.

Table 3.13 Correlations (Spearman`s rho): difficulty rankings for the error correction and rule-illustration sub-tests, the gap-fill test and the EI test

Measures	EI	MLK
MLK	.42	
	p = .265	
Gap-fill	.45	.67*
	p = .224	*p* = .050

*Correlation is significant at 0.05 level (2-tailed)

The results in table 3.13 indicate that the difficulty ranking of the error explanation and rule illustration sub-tests and the gap-fill test are significantly and quite strongly correlated. There is no significant relationship between difficulty ranking on the EI test and the error correction and rule illustration sub-tests in the analysis by article uses, indicating that L2 learners have acquired explicit knowledge of some article uses and implicit knowledge of others, and vice versa, but not both explicit and implicit knowledge of the same article uses.

3.8. Discussion

3.8.1. Measuring explicit and implicit L2 knowledge

In order to examine L2 learners` explicit and implicit knowledge of articles, a specially designed suite of tests similar to that of R. Ellis`s (2005) was administered to provide relatively independent measures of the two types of knowledge. Overall, the results of the correlation and factor analyses indicated that a two-factor model was replicated for the present sample. However, the gap-fill test and the error correction sub-test were found to be ambivalent, eliciting both types of knowledge to some extent.

Analyses of subjective measures introduced for the gap-fill test provided evidence that L2 learners who performed successfully on the test reported drawing on explicit knowledge, since rule and memory were found to be significantly and highly correlated with accuracy. Analysis of confidence ratings yielded significant correlation between accuracy and greater reported confidence, indicating that L2 learners could judge their own knowledge quite well and endorsed correctly resolved items with higher confidence ratings while erroneous items attracted lower confidence ratings.

The results of partial correlations indicated that the reported use of rules is associated with increased certainty, while the use of memory is no longer linked to a higher level of certainty when accuracy is controlled for, thus pointing to a different status of memory and rule in the learners` minds. Memory is assumed to instantiate a more specific item-based representation of knowledge since it relies on particular occurrences of L2 constructions retained by L2 learners, whereas knowledge of pedagogical grammar rules describing form, function and use of L2 constructions is highly schematic and generalizable and can be applied to many instances, and consequently appears to be perceived as more useful. While in the context of the present study any type of explicit knowledge was useful for accurate performance on the gap-fill test, regardless of whether it was item-based or abstract, the difference between memory and rule manifested itself in the lack of association between memory and higher confidence ratings when accuracy was controlled for, i.e. only accurately resolved test items underpinned by the knowledge of grammatical rules were endorsed with higher confidence ratings. The association between the reported use of metalinguistic knowledge and a higher degree of certainty disconfirms R. Ellis`s prediction (2005) that measures of implicit knowledge will elicit more certain responses than measures of explicit knowledge. A higher degree of certainty evoked by measures of explicit knowledge corroborates findings by Roehr (2006) who reported that the use of metalinguistic knowledge co-occurred more often with certain than with uncertain decisions.

In terms of guess and intuition, the results indicated that both source attributions were in an inverse relationship with accuracy on the test suggesting that inaccurate performance was associated with the reported use of implicit knowledge. The results of partial correlations indicated that both source attributions were significantly negatively associated with confidence. Thus, it seems plausible to argue that in learners` metacognition guess and intuition have a somewhat equal status, i.e. both were associated with absence of knowledge and were endorsed with low confidence ratings. However, as indicated by frequency analysis, guess was reported least frequently, whereas intuition was the most frequently indicated source attribution, which in turn suggests that even though L2 learners did not fully dissociate between the them, they appeared to be more inclined to report intuition rather than guess, though they had no reliable knowledge to fall back on.

3.8.2. L2 learners` explicit and implicit knowledge

In terms of learners` performance it was found that the measures of implicit knowledge (based on the combined score for the EI and the OP) were more challenging than the measures of explicit knowledge (based on the error correction, error explanation and rule illustration sub-tests of the MLK). This result is in keeping with previous research (Zhang, 2015; Rodr ǵuez Silva & Roehr-Brackin,2016, Akakura, 2012) indicating that instructed L2 learners seem to develop a higher degree of explicit than implicit knowledge since instruction they are exposed to may facilitate the development of explicit knowledge over implicit knowledge.

Scrutiny of participants` performance on the MLK test showed that the error explanation and rule illustration sub-tests requiring retrieval, formulation or interpretation of pedagogical rules posed higher difficulty for L2 learners compared to the error correction sub-test and the gap-fill test which arguably do not require the same extent of metalinguistic knowledge. This result is concordant with previous research that also pointed to greater difficulty of the rule-explanation component of the MLK (R. Ellis, 2006; Rodr ǵuez Silva & Roehr-Brackin, 2016; Spada, Shiu & Tomita, 2015), albeit contrasting with findings reported by Hu (2011) who found that L2 learners had amassed much explicit knowledge of articles they could successfully verbalise and that their metalinguistic knowledge was consistent with typical pedagogical rules.

Overall, the scores L2 learners obtained for the MLK test and Oral measures were found to be significantly correlated at a low level of strength. This result is consistent with previous research that has indicated that instructed L2 learners construct both explicit and implicit knowledge of grammar when two types of knowledge are assessed at a global level by means of instruments examining a range of L2 constructions (R. Ellis, 2005, 2006; Rodr ǵuez Silva & Roehr-Brackin, 2016). Since the present study targeted a single grammatical structure albeit with multiply uses, it could be argued that different article uses behaved like different grammatical structures altogether and in this sense, may well be equivalent to a range of L2 constructions.

3.8.3. Explicit and implicit knowledge of different article uses

The scrutiny of rank orders of difficulty for the error explanation and rule illustration sub-tests and the EI test indicate that article uses varied in their difficulty with certain uses standing out as “hard” or “easy”. Uses 1 (the +adj. denoting a group of people) and 7 (a/an + first mention) were particularly challenging in terms of both explicit and implicit knowledge, whereas uses 8 (the +oceans/seas/rivers), 5 (the + one of something) and 3 (a/an or zero article + general context) were relatively easy both explicitly and implicitly. Difficulty of targeted article uses also appeared to be subject to whether implicit or explicit knowledge of uses is involved, e.g. use 9 (the + plural names of people/places) was easy explicitly but difficult implicitly and use 4 (the + specific thing/people in a given context) was slightly easier explicitly than implicitly, whereas uses 2 (the + type of animal/machine) and 6 (a/an + what kind of thing/person something/somebody is) were more challenging in terms of explicit knowledge but easier in terms of implicit knowledge. Since the gap-fill test allowed for use of both explicit and implicit knowledge, difficulty ranking for the test was analysed separately. The analysis indicated that targeted article uses also varied extensively in terms of their difficulty and that the rank order of difficulty of the gap-fill test and the error explanation and rule illustration sub-tests follow a similar pattern and even converge in terms of the least and most difficult uses. Overall, the finding that article uses differed in their explicit and implicit difficulty corresponds with the results of a large-scale study by R. Ellis (2006) targeting 17 grammatical structures, which reports that difficulty of grammatical structures varied in accordance with whether explicit or implicit knowledge was considered, with some grammatical structures being easy explicitly but difficult implicitly and vice versa. The fact that different article uses vary in their difficulty and behave like different grammatical structures is worth noting. Previous studies examining L2 acquisition of articles (Muranoi, 2000; Hu, 2011) did not dissociate between various article uses, providing total accuracy scores, thus differences between them were not evident.

Several explanations can be considered to account for differences in the explicit/implicit difficulty of targeted article uses. Firs, the difficulty pattern was examined, drawing on the distinction between generic/non-generic article uses proposed by Akakura (2012), who found that generic article uses pose substantial acquisition problems for L2 learners and are less amenable to instruction than non-generic uses. According to this distinction uses 1-3 are generic, uses 4-5, 7-9 are non-generic and use 6 does not fit either category since it represents non-specific focus of the indefinite article. While two non-generic article uses (i.e. uses 4 and 9) were indeed easier in terms of explicit knowledge but more difficult in terms of implicit, the analysis yielded a mixed pattern of generic and non-generic uses for uses of low explicit/implicit difficulty (i.e. uses 3, 5 and 8), high explicit/implicit difficulty (i.e. uses 1 and 7) and low explicit but high implicit difficulty (uses 2 and 6).

Second, the assumptions of the Fluctuation Hypothesis (FH) proposed by Ionin, Ko & Wexler (2004, 2008) were considered to account for the uncovered difficulty pattern. According to the FH, L2 learners of English whose native languages do not instantiate an article system will fluctuate between the parameters of definiteness and specificity until input leads them to set it to appropriate value, i.e. definiteness. Learners are expected to experience more problems with definite/non-specific items and indefinite/specific items characterised by contrasting parameter settings compared to definite/specific and indefinite/non-specific items where both parameters converge. In accordance with the hypothesis uses 1 and 2 can be categorised as definite/ non-specific and are, thus, presumed to be more challenging for acquisition, while indefinite/non-specific (i.e. uses 3, 6-7) and definite/specific (i.e. uses 4-5 and 8-9) are assumed to be less problematic. Since the FH draws on the assumptions of Universal Grammar (UG) it can only be applied to account for the implicit learning difficulty of targeted article uses. Thus, although the hypothesis fully accounts for low implicit difficulty of uses 2-3, 5-6 and 8 as well as high implicit difficulty of use 1, it fails to account for high implicit difficulty of uses 4, 7 and 9.

Third, a system-based versus item-based distinction was considered as a possible explanation for the case. The rationale underpinning the classification is based on the assumption that all the uses that include only a particular category (i.e. people, animal, machine etc.) are item-based, while uses incorporating a broader spectrum (i.e. somebody/something) are system-based. In accordance with this classification uses 1-2 and 8-9 are item-based, whereas uses 3-7 are system-based. System-based uses were hypothesised to be less challenging compared to item-based uses in terms of both explicit and implicit knowledge since arguably their more schematic nature makes application of rules or the induction of patterns easier. However, the results indicate that some system-based uses were more difficult than item-based uses and vice versa. Neither system-based nor item-based uses were clearly less/more difficult in terms of explicit and implicit knowledge. Analysis of source attributions for the gap-fill test may provide an insight as to why the distinction does not explain the observed difficulty pattern. Since L2 learners reported to have drawn on schematic knowledge as well as memory of particular items, their accuracy could be determined not only by the correct application of rules but also memory of previously encountered occurrences of grammatical structures, indicating that some system-based and item-based uses may be equally easy/difficult, since more generalisable knowledge was not necessarily superior in terms of ease of application than more specific knowledge. Since none of the considered accounts has yielded a clear pattern, it seems plausible to assume that difficulty may be influenced by other factors such as the amount of instruction/practice activities L2 learners receive.

The Spearman`s rank order correlations on the difficulty ranking for the error explanation and rule illustration sub-tests and the EI test did not yield a significant result. The absence of relationship between the measures when analysed by article use indicates that instructed L2 learners might not acquire both types of knowledge of article uses together but rather construct one type of knowledge first and then develop the other, which corresponds with conclusions drawn in previous research (R. Ellis, 2006; Rodr ǵuez Silva & Roehr-Brackin, 2016) examining L2 learners` explicit and implicit knowledge of a range of grammatical features. The absence of correlation further suggests that targeted article uses behave like a range of L2 constructions and may be considered separately.

3.9. Conclusion

The present study investigated explicit and implicit knowledge of L2 English article uses by employing a battery of tests of explicit and implicit knowledge as well as subjective measures introduced for the gap-fill test.

It was found that the gap-fill test elicits both explicit and implicit knowledge to some extent. Subsequent examination of subjective measures showed that explicit knowledge was associated with accurate performance on the measure. Further analysis of source attributions by article use revealed a more complex picture with some uses eliciting explicit knowledge and others eliciting implicit knowledge, suggesting an interaction between the type of knowledge measured by the test and different article uses.

The analysis of difficulty rankings showed that targeted article uses appeared to behave like different grammatical structures since they varied extensively in terms of their explicit/implicit difficulty. Some uses were found to be equally hard/easy in terms of both explicit and implicit knowledge, while others were easy in terms of explicit knowledge but difficult in terms of implicit knowledge and sometimes vice versa. Analysis of difficulty rankings by article use did not yield significant association between the two types of knowledge, and thus it was argued that L2 learners seem to construct some explicit and some implicit knowledge of article uses, but not necessarily both types of knowledge together. The fact that different article uses differ in their learning difficulty has important pedagogical implications since some article uses appear to be less amenable to instruction than others.

3.10. Limitations and suggestions for further research

The present study is not without limitations. Since confidence ratings and source attributions are self-reported measures they can be a subject to response bias, i.e. participants may report drawing on rules or memory when in fact guessing their answers. Ideally, a combined use of several types of measures of awareness (e.g. debriefings and verbal reports) might reveal inconsistencies in self-reports and help assess response bias.

As the results of the study suggest that individual article uses may behave like different structures altogether. Further classroom-based research examining different article uses rather than concentrating on total accuracy scores is needed to investigate instruction and acquisition of L2 articles. The present study concentrated on a limited range of article uses with L2 learners at lower intermediate level of proficiency. Further research focusing on a wider range of article uses drawn from all proficiency levels of the teaching syllabus as well as different L1-L2 combinations is essential to ensure true generalizability of results.

CHAPTER 4 THE ROLE OF LANGUAGE LEARNING APTITUDE AND TYPE OF INSTRUCTION IN THE DEVELOPMENT OF EXPLICIT AND IMPLICIT KNOWLEDGE OF L2 ENGLISH ARTICLES

(Article 2 - Irina Tomak & Karen Roehr-Brackin)

4.1. Abstract

The present study investigated the role of language learning aptitude and executive working memory (WM) in the development of explicit and implicit knowledge of second language (L2) articles – a construction that is notoriously challenging for the participating Russian-speaking learners (N = 115). Participants were assigned to one of three instructional conditions, with a deductive and a guided inductive condition instantiating explicit, form-focused instruction, and an incidental condition instantiating implicit, meaning-focused instruction. The instructional treatment comprised ten 80-minute sessions over three weeks. Participants completed the LLAMA aptitude battery and a backward digit span test as well as a specifically designed suite of written and oral tests aimed at measuring their explicit and implicit knowledge of the targeted article uses. Results indicate that the two explicit types of instruction resulted in larger gains in explicit knowledge than implicit instruction, while individual differences in aptitude and WM did not predict the development of explicit knowledge in any of the instructional conditions. By contrast, guided inductive instruction resulted in larger gains in implicit knowledge. Aptitude and WM predicted the development of implicit knowledge in the deductive and incidental instructional conditions, respectively, but not in the guided inductive condition. We argue that learning in this latter condition most closely resembles the bottom-up trajectory from exemplar to schema that is assumed to underlie implicit learning in a usage-based approach to language development – a circumstance that may level out individual differences in cognitive ability when the aim is to develop implicit knowledge.

4.2. Introduction

Many researchers in the field of instructed second language (L2) learning agree that explicit and implicit knowledge are key components of L2 proficiency (e.g. R. Ellis, 2005; N. Ellis, 2015; Roehr-Brackin, 2014). The distinction between explicit and implicit knowledge is based on the assumption that the two types of knowledge draw on distinct cognitive processes. This is reflected in the measures typically used to assess these types of knowledge as well as in the conceptualization of L2 instruction as either explicit or implicit. Research in the area of instructed L2 learning has provided substantial evidence in support of the overall effectiveness of explicit, form-focused instruction compared with implicit, meaning-focused instruction (Goo, Granena, Yilmaz, & Novella, 2015; Norris & Ortega, 2001). Aptitude-treatment interaction (ATI) research has shown that individual learner differences in cognitive ability interact with L2 achievement in different instructional conditions (Erlam, 2005; Robinson, 1997; Wesche, 1981; Yilmaz, 2012). However, relatively little is known about how ATI plays out in relation to the development of explicit and implicit L2 knowledge. The current study provides insight into how learners with different cognitive ability profiles respond to different types of instruction in terms of the development of explicit and implicit knowledge of L2 English articles. The study was motivated by the fact that important pedagogical implications may be derived if particular instructional approaches are found to interact with individual learner differences and thus to facilitate the development of explicit and implicit knowledge in distinct ways.

4.3. Background

4.3.1. Explicit and implicit knowledge and learning

Explicit knowledge can be defined as conscious knowledge that can be called up on demand and potentially verbalized (Dörnyei, 2009; N. Ellis, 2015; Rebuschat, 2013), whereas implicit knowledge is tacit, intuitive and inaccessible to conscious inspection (Hulstjin, 2015; Andringa

& Rebuschat, 2015). Along similar lines, explicit learning relies on controlled cognitive processes (N. Ellis, 2015; Rebuschat, 2013). Learners may engage in analytical reasoning and hypothesis-testing to subsequently infer generalizations (inductive learning), or they may apply explicit knowledge provided in a textbook or by a teacher to aid comprehension of input and production of output (deductive learning) (Roehr-Brackin, 2014, 2015). By contrast, implicit learning is a process of induction that that does not entail conscious operations (N. Ellis, 2015). Implicit learning is a powerful mechanism resulting in highly systematic and accessible knowledge; however, in the context of L2 learning, it requires ample exposure to input over time to be effective. Explicit learning is a more efficient process which can result in fast learning even from relatively limited input. However, it is resource-intensive and thus cognitively taxing.

In recent years, a usage-based approach has become more widespread in L2 learning research (Eskildsen, 2009, 2012; Spoelman & Vespoor, 2010; N. Ellis & Cadierno, 2009; Roehr-Brackin, 2010, 2014, 2015). According to this perspective, language learning follows an exemplar-to-schema developmental trajectory (Tomasello, 2000, Eskildsen, 2009, 2012). In other words, learners first acquire linguistic exemplars encountered in the input and then generalize to partially schematic patterns towards increasingly abstract schemas (N. Ellis, 2002; Tomasello, 2000). This bottom-up learning path is essentially implicit and applies to both first language (L1) (Tomasello, 2005, Behrens, 2009) and L2 learning (N. Ellis, 2011, Roehr-Brackin, 2015). By contrast, explicit learning follows a top-down trajectory where pedagogical rules in the sense of simplified schemas are applied to specific exemplars (Roehr-Brackin, 2010, 2014, 2015).

While L2 researchers of all persuasions treat explicit and implicit knowledge and learning as distinct constructs, many assume that they are nonetheless engaged in interplay (Dörnyei, 2009; R. Ellis, 2006; Suzuki & DeKeyser, 2017). The so-called interface positions argue that explicit knowledge and learning may facilitate implicit learning and the development of implicit knowledge, with explicit knowledge and learning focusing the learner's attention onto relevant input features and thus both priming and guiding implicit mechanisms. The attested success of L2 instruction (compared with no instruction) is entirely compatible with such an interface position.

4.3.2. Explicit and implicit instruction

Explicit instruction can be defined as any instructional intervention that involves pedagogical rule explanation (deductive approach) or induction, e.g. by encouraging learners to attend to a particular construction and arrive at metalinguistic generalizations of their own (inductive approach). Implicit instruction exposes learners to meaningful input, but does not include pedagogical rule explanation or openly encourages learners to try and work out such pedagogical rules (Norris & Ortega, 2001). In view of the fact that explicit instruction is aimed at raising learners' awareness and may thus lead to noticing (Schmidt, 1990; Leow, 1997, 2000), it is expected to accelerate the process of L2 learning. Empirical research has provided strong support for the effectiveness of instruction overall, and in particular for the larger and more durable gains brought about by explicit, form-focused instruction when compared with implicit, meaning-focused instruction (Goo, Granena, Yilmaz, & Novella, 2015; Spada & Tomita, 2010; Norris & Ortega, 2001).

Explicit form-focused instruction is typically operationalized by means of deductive or inductive approaches. Empirical examinations of the effectiveness of deductive and inductive approaches have provided inconclusive results, with some studies reporting superiority of a deductive approach (e.g., Erlam, 2003; AbuSeileek, 2009), and others superiority of an inductive approach (e.g. Herron & Tomasello, 1992; Cerezo et al, 2016; Haight et al., 2007).

Herron & Tomasello (1992) and Haight et al. (2007) compared the effectiveness of deductive and guided inductive approaches on teaching selected grammatical structures (i.e. adverbial pronouns, relative pronouns, partitive articles) to beginner-level L2 learners of French. Learners` knowledge was assessed by means of a written grammar-based outcome at two times. Herron and Tomasello (1992) assessed learners` knowledge of each grammatical structure following the instruction of each structure and one week after. Haight et al. (2007) administered the test immediately after the instruction of each structure and upon the completion of the instruction of all targeted structures. The results of the two studies showed that the guided inductive group outperformed the deductive group at both testing times suggesting an edge for guided induction in both short-term achievement and retention of acquired grammatical knowledge.

The advantage of the inductive instructional treatment was documented also in the learning of a single challenging structure *gustar* with L2 learners of beginning Spanish (Cerezo et al.,2016). The study employed controlled oral and written production tasks and a multiple-choice written recognition task to assess immediate and delayed (2 weeks after the treatment) learning outcomes. L2 learners in the guided inductive group outperformed the deductive group on all productive post-tests and exhibited higher level of knowledge retention.

In contrast to the previously mentioned studies, Erlam (2003) found an advantage for a deductive rather than an inductive approach for the acquisition of direct object pronouns with teenage L2 learners of French. The effectiveness of the two explicit types of instruction was assessed by means of oral and written production tests, listening and reading comprehension tests. The results revealed that the deductive instructional approach led to greater gain scores across all the measures compared to the inductive approach, indicating that deductive language instruction appears to be more effective than inductive instruction in a teacher-centred classroom with school-age learners.

Further evidence in support of deductive instructional intervention was supplied in a computer-based study by AbuSeileek (2009). AbuSeileek explored the effectiveness of using deductive vs. inductive teaching methods in sentence recognition and production tasks of simple sentences and more complex elaborate sentences with L1 Arabic adult L2 learners of English. Among other findings, it was reported that deductively instructed learners were more likely to make more progress compared to inductively instructed learners in case of more complex types of sentences. Furthermore, it was found that neither inductive nor deductive techniques appear to be more effective with simple sentence types. On the basis of his findings AbuSeileek concludes that more complex structures are more amenable to a deductive approach where the presentation of rules precedes practice activities.

Although effectiveness of deductive vs. inductive approach remains a subject of empirical debate, on the whole explicit instruction facilitates development of global proficiency as well as acquisition of challenging grammatical structures (e.g. AbuSeileek, 2009; Cerezo et al.,2016). Moreover, it may be particularly beneficial for the learning of constructions that lack perceptual salience, are communicatively redundant, and/or are characterized by non-transparent form-meaning mappings. Grammatical morphemes including articles (Akakura 2012; Hu, 2002, 2011; Master, 2002) are among these constructions, typically resulting in high learning difficulty (Goldschneider & DeKeyser, 2001).

4.3.3. Individual differences in cognitive ability: language learning aptitude and working memory

The L2 learning of difficult constructions in particular – in the sense of the development of explicit and implicit knowledge – can be expected to interact with individual differences in cognitive ability, including language learning aptitude and working memory (DeKeyser, 2012; Rodríguez Silva & Roehr-Brackin, 2016; Yalçin & Spada, 2016). Language learning aptitude refers to a specific capacity for learning foreign languages speedily and with ease (Dörnyei & Skehan, 2003). Carroll's (1981) classic model conceptualizes aptitude as a multi-componential construct comprising phonetic coding ability, associative memory, grammatical sensitivity and inductive language learning ability. The latter two components were subsequently subsumed under the label of language-analytic ability (Skehan, 1998; 2002). The relevance of aptitude in L2 learning has been amply demonstrated by studies conducted both in instructed (e.g. Kormos & Sáfár, 2008; Harley & Hart, 2002) and immersion settings (e.g. Abrahamsson & Hyltenstam, 2008; Granena & Long, 2013). Recent meta-analyses (Li, 2015, 2016) based on data from, respectively, 33 and 66 primary studies revealed a moderate association between aptitude and L2 grammar learning and a robust positive association between aptitude and general L2 proficiency. The magnitude of aptitude effects appeared to be sensitive to L2 learners' proficiency level, with stronger correlations in evidence at initial rather than at later stages of L2 development (see also Serafini & Sanz, 2016). Different aptitude components were differentially associated with different L2 skills. Specifically, language-analytic ability was found to be the strongest predictor of morphosyntactic learning (see also Yalçin & Spada, 2016). As none of the primary studies included in the meta-analysis differentiated directly between measures of explicit and implicit L2 knowledge, it is not yet clear whether language-analytic ability in particular and aptitude more generally are differentially involved in the development of these two types of knowledge (Li, 2016). However, as many studies have used discrete-item outcome measures that are likely to encourage the use of explicit knowledge, it is plausible to argue that aptitude as conceptualized in the classic Carrollian sense and language-analytic ability in particular may predict above all the development of explicit knowledge (Robinson, 2002; Granena & Long, 2013).

Li's (2016) meta-analysis revealed a strong association between aptitude and executive working memory (WM). Indeed, several researchers have suggested that WM should be regarded as a component of language learning aptitude (DeKeyser & Koeth, 2011; Sawyer & Ranta, 2001; Wen, Biedroń & Skehan, 2017) as it is implicated in L2 performance and may predict L2 learning (Miyake & Friedman, 1988; Hummel, 2009; Robinson, 2005, Linck et al., 2014). WM is needed for the temporary storage and manipulation of information in the course of online processing (Juffs & Harrington, 2011). The architecture of WM may be conceptualized as either unitary or multi-componential (Conway et al., 2007). According to the multi-componential model which is most widely used in L2 learning research (Wen, Mota & McNeil, 2015), WM comprises a central executive and two short-term storage systems (Baddeley & Hitch, 1974, Baddeley, 2000, 2007). The central executive controls the flow of information, inhibits and focuses attention, while the phonological loop and the visuo-spatial sketchpad handle verbal and visuo-spatial information, respectively. The so-called episodic buffer is responsible for the integration of information into coherent episodes.

In recent years, L2 research has investigated the role of phonological short-term memory as measured by tasks assessing phonological loop capacity and executive WM as measured by tasks involving the central executive. Cumulative findings suggest that individual differences in WM constrain a range of L2 phenomena. For instance, WM has been shown to be implicated in L2 proficiency more generally as well as in the development of L2 vocabulary (Linck et al., 2014; Juffs & Harrington, 2011). Nonetheless, the precise role of WM in the development of different aspects of L2 knowledge and the magnitude of its effects are not yet well understood, with different studies reporting sometimes conflicting results (Juffs & Harrington, 2011).

4.3.4. Aptitude-treatment interaction research

Aptitude-treatment interaction (ATI) research is concerned with the question of whether individual learner differences in cognitive abilities such as aptitude or WM play out differently in different instructional conditions (Wen & Skehan, 2011; Erlam, 2005, Robinson, 1997, 2002). An early study carried out in this paradigm (Wesche, 1981) compared three types of instructional treatment (audio-visual, functional, and analytical) that were either matched or mismatched with adult learners' aptitude and cognitive style profiles. It was found that learners in matched instructional conditions reported higher levels of satisfaction with their L2 program and decreased anxiety experienced in the classroom. Additionally, they scored more highly on three of four measures of achievement in listening comprehension and oral production. In a later study, Robinson (2002) explored the effects of individual differences in general intelligence, aptitude and WM on the incidental acquisition of three structures of L2 Samoan by L1 Japanese university students. Participants' knowledge of Samoan was measured by computerized written and oral grammaticality judgments and a guided sentence production test. Among other results, Robinson (2002) found that incidental learning of Samoan was constrained by individual differences in WM and, to a much lesser extent, aptitude (for a contrasting finding, see VanPatten & Smith, 2015).

Erlam (2005) investigated the effect of aptitude in three instructional conditions (deductive, inductive, and structured input) by L1 English teenage learners of L2 French who received instruction on direct object pronouns. The deductive condition incorporated rule explanation followed by form-focused output activities. The inductive condition did not include overt rule explanation, but exposed learners to output activities that allowed them to test hypotheses about the targeted construction. The structured input condition provided learners with rule explanations followed by consciousness-raising activities, but it did not incorporate output activities. The results indicate that deductive instruction was beneficial for all learners in that it leveled out individual differences in aptitude. In the structured input condition, learners with a greater language-analytic ability and WM capacity did better, and in the inductive condition, learners with greater language-analytic ability benefited most, while WM capacity did not play a role.

Finally, in a more recent study with adult L2 learners of Spanish (Hwu & Sun, 2012), the researchers explored the interaction between aptitude and two types of explicit instruction labeled deductive and explicit-inductive. The targeted construction was the psychological state verb *gustar*, whose accurate use is known to be challenging for L1 English speakers. The findings show that both types of explicit instruction resulted in improved performance. Higher-aptitude learners benefited more from explicit-inductive instruction, while deductive instruction did not result in significantly better performance of lower-aptitude learners. However, the descriptive statistics showed a tendency towards better performance for lower-aptitude learners in this condition. The researchers conclude that two types of explicit instruction can differentially affect L2 learning outcomes of learners with different aptitude profiles.

4.4. Research Issues

In summary, research to date has shown that both explicit and implicit knowledge and learning are implicated in L2 development. Explicit knowledge and learning can potentially speed up L2 development, but learners' cognitive resources will be taxed to a greater extent. Overall, explicit, form-focused instruction is effective because it can provide explicit knowledge and focus learners' attention on non-salient, communicatively redundant, or opaque constructions which might otherwise be ignored in the input. Research in the ATI paradigm has provided evidence that individual differences in cognitive ability may interact differentially with L2 achievement under different instructional conditions. However, there is no published work to date examining how an aptitude-treatment interaction would play out in relation to the development of explicit and implicit L2 knowledge operationalized separately and in a classroom setting. The present study investigated this issue by posing two research questions:

(1) Do learners who have experienced different instructional approaches differ in their explicit and implicit knowledge of L2 English articles?

(2) To what extent do differences in language learning aptitude and executive working memory predict the development of learners' explicit and implicit knowledge of L2 English articles?

4.5. Methodology

The research questions were addressed by means of a quasi-experimental study with a pre-test/immediate post-test/delayed post-test design with L1 Russian classroom learners of L2 English.

4.5.1. Participants

The participants were L1 Russian learners of English (N = 115) at a private secondary school in Russia (mean age = 14.78, SD = 1.10, range = 13-17). The learners were in intact classes that were randomly assigned to one of three instructional conditions: deductive, guided inductive, and incidental (further details below). The learners were at a lower intermediate level of English proficiency according to the school's assessment. We additionally assessed the participants' level of English independently by means of the Oxford Quick Placement Test (UCLES, 2004), as summarized in Table 4.1. Participants' mean scores fell within the lower intermediate band which, according to the test manual, is deemed to be broadly equivalent to Level B1 of the Common European Framework of Reference. A one-way ANOVA showed no statistically significant differences between the treatment groups, although the result approaches significance, $F(2,112) = 2.80$, $p = .065$.

Table 4.1 L2 learners' proficiency level by treatment group (N=115)

	Mean	*SD*	Min	Max
Deductive (N=38)	36.30	1.757	32	40
Guided inductive (N=38)	36.69	2.026	33	40
Incidental (N=39)	35.49	2.855	29	40

English is an obligatory subject for the participants and is taught for four hours a week. The main purpose of the school's language program is to improve L2 communicative skills, but lessons typically incorporate explicit grammar instruction in preparation for the unified state exam that assesses formal grammatical knowledge. At the time of data collection, none of the participants had spent more than two weeks in an English-speaking country.

4.5.2. Target structure

Nine system- and item-based uses of the English definite/indefinite/zero article (see Appendix I for details) were selected from Murphy (2007). Given that the experimental intervention was pedagogical in nature, we drew on a source of pedagogical grammar that offers learner-oriented explanations and exemplification of the targeted article uses. As outlined above, articles exemplify constructions of high learning difficulty, especially for learners whose L1 does not instantiate an article system. Russian expresses (in)definiteness by means of word order, for instance, and speakers additionally draw on contextual information to decide whether a referent is specific or generic.

4.5.3. Instructional treatment

In order to ensure consistent operationalization of the different instructional conditions and following previous research (Erlam, 2005; Yilmaz, 2012, Yilmaz & Granena, 2016), the instructional treatment was delivered by one of the researchers and comprised a total of twelve hours over the course of three weeks. Specifically, learners had three 80-minute lessons per week, which corresponds to the usual amount of L2 input they would receive. All teaching and learning materials were developed specifically for the present study to ensure comparability across the three instructional conditions. In terms of content, lessons focused on various social, cultural and environmental topics. Each lesson was based around a target text, e.g. a story or a report, and followed a three-step approach. Six intact classes were randomly assigned to one of three instructional conditions: deductive (explicit, top-down; N = 38), guided inductive (explicit, bottom-up; N = 38), and incidental (implicit, bottom-up; N = 39).

The deductive instructional treatment followed a traditional sequence of presentation, controlled practice, and free production. In Step 1, learners were presented with pedagogical grammar rules explaining the targeted article uses. This was followed by form-focused oral and written practice activities in Step 2. In Step 3, learners used the targeted constructions in free production activities. The teacher provided corrective feedback, drawing attention to the pedagogical rules underpinning the targeted structures.

The aim of the guided inductive instructional treatment was to enable learners to arrive at the pedagogical grammar rules describing the targeted article uses on their own. The teacher provided scaffolding, as required. In Step 1, learners engaged in practice activities that allowed them to form and test hypotheses about the targeted article uses. In Step 2, the teacher asked guiding questions aimed at rule elicitation. Further practice in the form of free production activities followed in Step 3. Corrective feedback was provided.

In the incidental instructional condition learners were exposed to the same materials as the deductive and guided inductive groups, but all activities were meaning-focused. There was no explicit focus on form, and no reference to pedagogical grammar rules, with additional oral activities used instead. Step 1 involved reading of and listening to the core text and work with a glossary. Step 2 comprised meaning-focused exercises and discussion, and Step 3 focused on individual and pair-work speaking tasks. No corrective feedback on the targeted structure was provided.

As the present study was concerned with deriving implications not only for L2 learning research, but also for L2 pedagogical practice, we opted for a classroom-based setting that would offer maximum ecological validity. We acknowledge that we thus did not have the same control over the learning approaches our participants would use as, for instance, a single treatment session in a laboratory would have provided; we were only able to exercise control over the nature of the instructional treatment and the nature of the tests measuring the outcomes of participants' learning. It is entirely possible that participants in one of the explicitly instructed groups learned implicitly, for example, or that learners in the implicitly instructed group attempted to learn explicitly. This is in keeping with what learners in classrooms do, so in this sense our experimental set-up reflects what takes place in actual instructed L2 learning 'in the real world'. In the context of the present study, it is therefore important to bear in mind the three-way distinction between teaching (controlled), learning (not controlled), and testing (controlled, within limits, as detailed in what follows). In other words, although explicit types of instruction most likely encourage explicit learning and implicit instruction is intended to encourage implicit learning, we do not make any claims about whether learning was in fact explicit or implicit. What we do make claims about is whether teaching and the knowledge subsequently tested were explicit or implicit.

4.5.4. Instruments and procedure

In addition to a background questionnaire asking about biographical information and language learning experience, the participants completed an L2 English proficiency test, a test of language learning aptitude, and a test of executive working memory prior to the instructional treatment. Furthermore, they completed four tests of explicit and implicit L2 knowledge of articles prior to the instructional treatment (pre-test), immediately following the instructional treatment (immediate post-test) and again after a six-month delay (delayed post-test). The L2 measures were an elicited imitation test, an oral production test, a gap-fill test, and a metalinguistic knowledge test, administered in that order. These instruments are described in detail in what follows.

4.5.4.1. L2 English proficiency. The test of L2 English proficiency was the pen-and-paper version of the Oxford Quick Placement Test (UCLES, 2004), which assesses knowledge of vocabulary, grammar and reading skills in a multiple-choice format. The results were reported in Table 1.

4.5.4.2. Language learning aptitude. Participants' aptitude was assessed by means of the LLAMA battery (Meara, 2005; see also Granena, 2013; Rogers et al., 2016), a computer-administered measure broadly based on the classic Carrollian model of aptitude. The LLAMA suite comprises four subtests: LLAMA B assesses the ability to learn new words in a short period of time; LLAMA D assesses sound recognition; LLAMA E assesses the ability to form new sound-symbol associations; LLAMA F assesses grammatical inferencing ability. The computer program automatically scores the subtests.

4.5.4.3. Working memory. Participants' executive WM was measured by means of a backward digit span (BDS) test (Kormos & Sáfár, 2008) administered in L1 Russian. The test requires participants to both store and process information and thus draws on both phonological loop capacity and executive function (Juffs & Harrington, 2011). Participants listened to sequences of digits which they were then required to repeat in reverse order. The test comprised seven sets with four sequences each, with the length of sequences increasing in each set. The shortest sequences comprised 3 digits, the longest 9 digits. Administration and scoring were based on Blackburn and Benton's (1957) BBII procedure. Participants heard each sequence twice. The test was stopped if a participant failed on two consecutive trials. Participants were given 3 points for the first three-digit sequence, and subsequently .25 points for each sequence correctly repeated in reverse order, resulting in a maximum possible score of 9.75.

4.5.4.4. Tests of explicit and implicit L2 knowledge. The measures of explicit and implicit knowledge of the targeted nine article uses were developed on the basis of the criteria of degree of awareness, time available, focus of attention, and use of metalanguage (R. Ellis, 2005, 2006; R. Ellis et al., 2009). We used an untimed metalinguistic knowledge test that focused learners' attention on form and required the use of metalanguage, a timed gap-fill test that focused learners' attention on form, and two measures that were meaning-focused and time-pressured because of their oral/aural modality, that is, an elicited imitation test and an oral production test. The first two measures were aimed at assessing primarily explicit knowledge, the latter two primarily implicit knowledge of the targeted structure. [1]

The metalinguistic knowledge (MLK) test consisted of a sentence correction and explanation subtest (Rodr ǵuez Silva & Roehr-Brackin, 2016; Ziętek & Roehr, 2011) and a rule illustration subtest (Absi, 2014; Scheffler, 2011). In the sentence correction and explanation subtest, participants were required to correct highlighted errors at sentence level and explain their correction in either Russian or English. In the rule illustration subtest, participants were provided with the targeted pedagogical grammar rules in English and asked to write an L2 sentence illustrating each rule. The test was scored dichotomously, with 1 point given for each accurate correction, explanation and illustrative sentence, respectively. Errors in the illustrative sentences that did not pertain to the targeted structure were disregarded.

The gap-fill test presented learners with contextualized sentences containing one gap each which had to be filled with either a definite article, an indefinite article, or an indication that no article was needed. The test was scored dichotomously, with 1 point awarded for each accurate answer.

The elicited imitation test (R. Ellis et al., 2009; Erlam, 2006; Spada, Shiu & Tomita, 2015; see also Suzuki & DeKeyser, 2015) comprised a number of questions incorporating the targeted article uses; half of the questions were grammatically correct and half incorrect, presented auditorily in a fixed pseudo-random order. The test was presented to participants as a beliefs questionnaire. They were required to listen to each question, answer it with either *yes*, *no* or *don't know*, and then repeat it in correct English. Answers were audio-recorded and subsequently scored dichotomously, with each correctly produced targeted article awarded 1 point. Errors that did not pertain to the targeted structure were disregarded.

The oral production test was a story-retelling task (R. Ellis et al. 2009; Bowles, 2011; Spada, Shiu & Tomita, 2015). The participants read and listened to the recording of a story (*The Cambridge Egg*, 615 words) specifically written to incorporate the targeted article uses. They were allowed to listen once and read along while they were listening, and they were then required to retell the story from memory as accurately as possible. The story contained a total of 75 instances of the nine targeted article uses, but given the format of the task, different participants produced different numbers of obligatory occasions for the targeted article uses. A minimum of three obligatory occasions was set for a participant to be given a score for a targeted article use. Performance was scored as the percentage of correct uses out of the obligatory occasions created. As the story-retelling task and the elicited imitation task correlated strongly and significantly on the pre- and post-tests, with coefficients ranging from .75 to .79 and $p < .001$ on all occasions, the scores obtained from the two tasks were combined into a single mean percentage score for oral measures.

4.6. Preliminary analyses

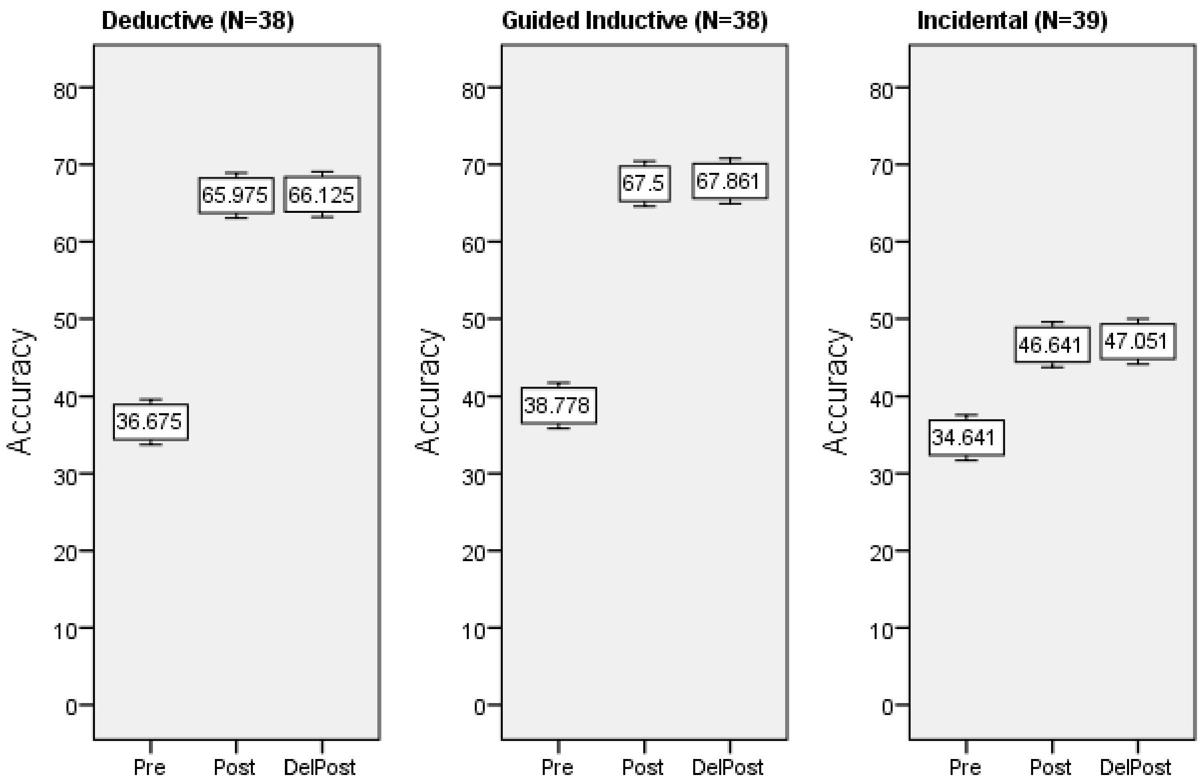
Prior to the study reported here, all measures had been piloted with a similar population of learners (total N = 52) and adjusted where necessary. The finalized L2 tests as used in the present study showed good, very good or excellent internal consistency, with Cronbach's alpha ranging from .711 to .933. A series of one-sample KS tests confirmed that the data did not differ significantly from a normal distribution, so parametric statistical tests were used. The alpha level was set at .05.

4.7. Results

4.7.1. The effect of deductive, guided inductive and incidental instruction on explicit and implicit L2 knowledge

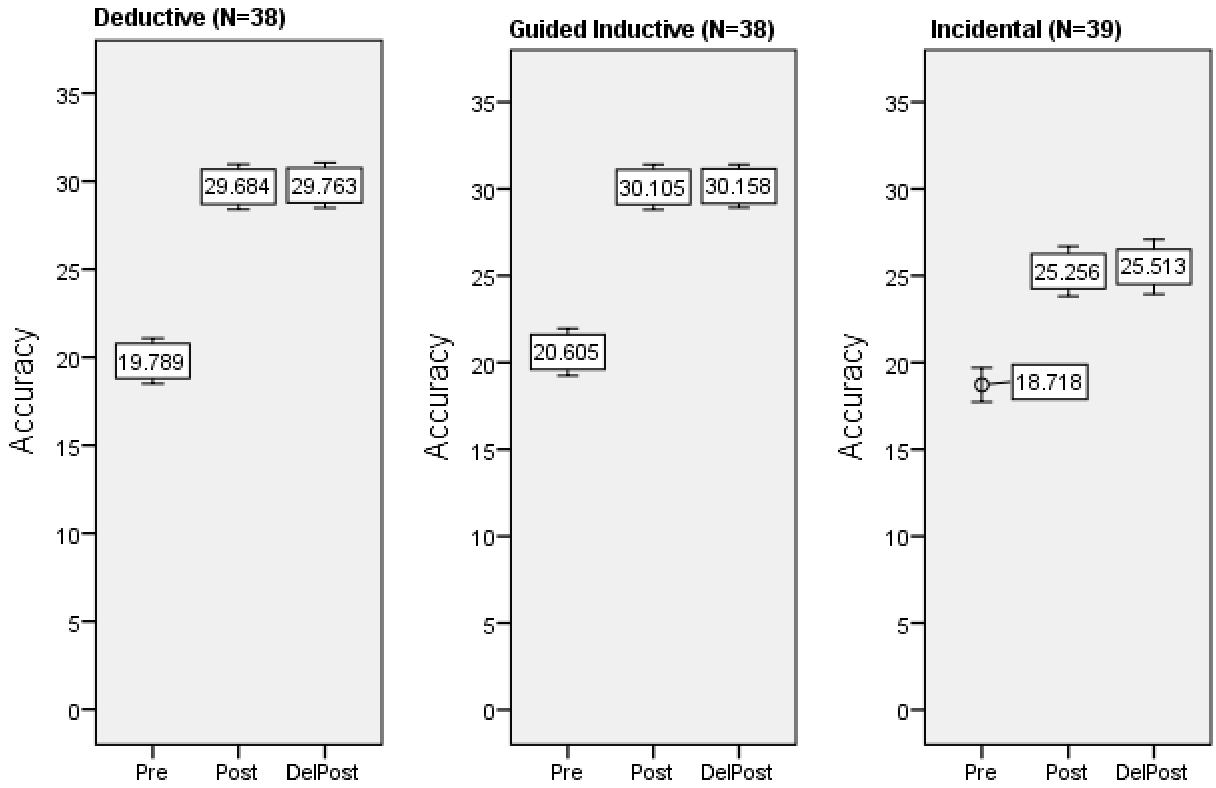
The first research question asked whether L2 learners who had experienced different instructional approaches would differ in terms of their explicit and implicit knowledge of L2 English articles. To answer this question, the performance of the three treatment groups on the MLK test, the gap-fill test and the oral measures was compared at pre-test, post-test and delayed post-test. The error bar graphs in Figures 4.1- 4.3 illustrate learners' performance on the three measures.

Figure 4.1 Learners` performance on the Metalinguistic knowledge (MLK) test at pre-test, post-test and delayed post-test



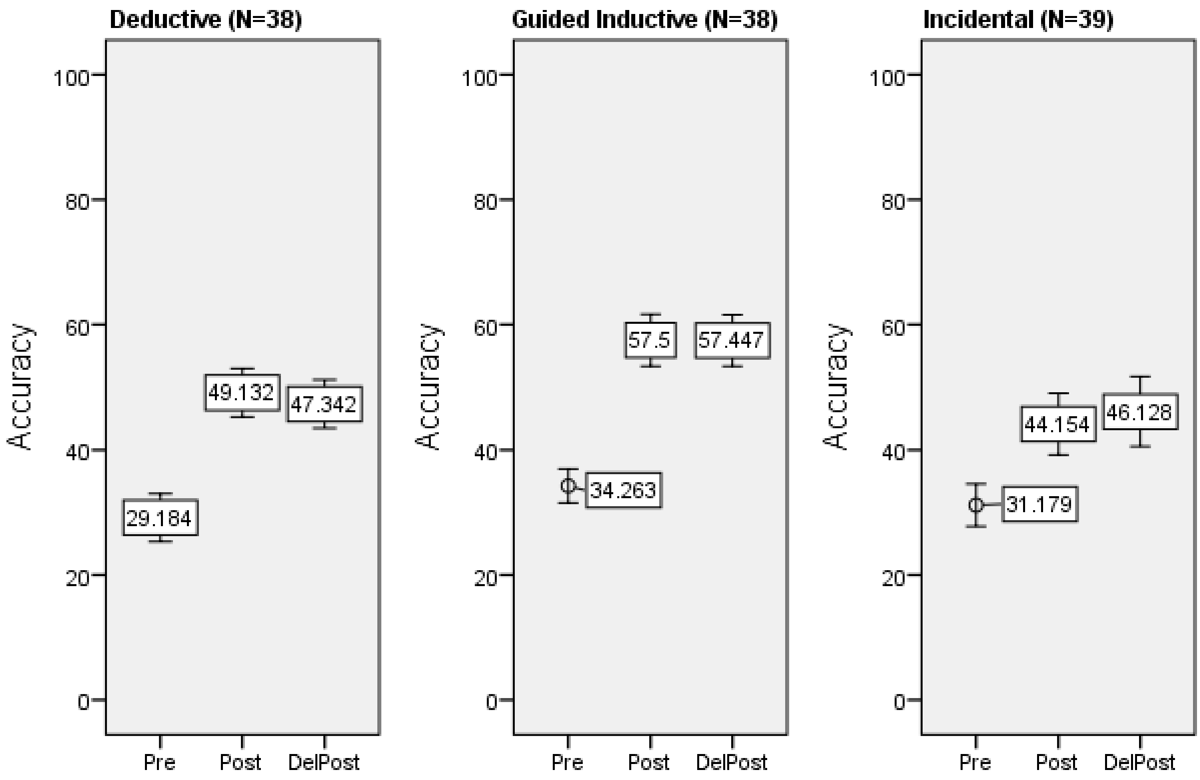
Note: The maximum possible score for the MLK test is 81.

Figure 4.2 Learners` performance on the Gap-fill test at pre-test, post-test and delayed post-test



Note: The maximum possible score for the gap-fill test is 36.

Figure 4.3 Learners` performance on Oral measures at pre-test, post-test and delayed post-test



Note: The maximum possible score for the oral measures is 100.

The graphs shown in Figures 4.1-4.3 suggest similar performance across groups at pre-test. This was confirmed by a one-way ANOVA, which revealed no statistical differences: MLK test, $F(2,112) = 2.92$, p =.058 (homogeneity of variance: Levene`s $F(2,112) = 2.35$, $p$ =.100); gap-fill test, $F(2,112) = 2.22$, $p$ = .114 (homogeneity of variance: Levene`s $F(2,112) = 1.85$, p =.162); oral measures, $F(2, 112) = 2.68$, p = .073 (homogeneity of variance: Levene`s $F(2,112) = 2.45$, $p$ =.091). The graphs further suggest similar performance at immediate and delayed post-test. Repeated-measures ANOVAs comparing participants` scores on the immediate and delayed post-tests confirmed that there was no attrition between these two testing times: MLK test, $F(1,112) = 2.47$, p = .119 (homogeneity of variance: Levene`s immediate post-test: $F(2,112) = 2.17$, $p$ =.119; Levene`s delayed post-test: $F(2,112) = 2.13$, p = .124); gap-fill test, $F(1,112) = 2.35$, p = .128 (homogeneity of variance: Levene`s immediate post-test: $F(2,112) = 1.75$, p

= .178; Levene`s delayed post-test: $F(2,112) = 1.83$, $p = .165$); oral measures, $F(1,112) = .016$, $p = .899$ (homogeneity of variance: Levene`s immediate post-test: $F(2,112) = 2.64$, $p = .076$; Levene`s delayed post-test: $F(2,112) = 6.04$, $p = .003$ [2]). As there were no statistically significant differences between the immediate and delayed post-test, a combined mean post-test score was calculated for each measure and used in subsequent analyses.

A repeated-measures ANOVA on the MLK test revealed a significant main effect of time with a large effect size, $F(2,112) = 1468.52$, $p < .001$, partial $\eta^2 = .93$ (homogeneity of variance: Levene`s combined score: $F(2,112) = 1.88$, $p = .158$), a significant main effect of instructional treatment with a small to medium effect size, $F(2,112) = 43.23$, $p < .001$, partial $\eta^2 = .44$, and a significant interaction between time and instructional treatment with a medium effect size, $F(2,112) = 87.245$, $p < .001$, partial $\eta^2 = .61$. Post-hoc pairwise comparisons (Tukey) showed that there was no difference between the deductive and guided inductive group ($p = 0.41$), but both groups outperformed the incidental group ($p < .001$ for guided inductive-incidental and deductive-incidental comparisons).

A repeated-measures ANOVA on the gap-fill test (homogeneity of variance: Levene`s combined score: $F(2,112) = 1.88$, $p = .158$) yielded a significant main effect of time with a large effect size, $F(2,112) = 741.07$, $p < .001$, partial $\eta^2 = .87$, a significant main effect of instructional treatment with a marginal effect size, $F(2,112) = 8.87$, $p < .001$, partial $\eta^2 = .14$, and a significant interaction between time and instructional treatment with a small effect size, $F(2,112) = 9.93$, p $< .001$, partial $\eta^2 = .15$. Post-hoc pairwise comparisons (Tukey) revealed that the deductive and guided inductive groups did not differ significantly ($p = .864$), but both groups outperformed the incidental group ($p = .001$ for guided inductive-incidental comparison, $p = .003$ for deductive-incidental comparison).

A repeated-measures ANOVA on the oral measures (homogeneity of variance: Levene`s combined score: $F(2,112) = 4.79$, $p = .010$) revealed a significant main effect of time with a large effect size, $F(2,112) = 655.94$, $p < .001$, partial $\eta^2 = .85$, a significant main effect of instructional treatment with a marginal effect size $F(2,112) = 4.80$, $p = .010$, partial $\eta^2 = .08$ and a significant interaction between time and instructional treatment with a small effect size, $F(2,112) = 12.47$, $p < .001$, partial $\eta^2 = .18$. Post-hoc pairwise comparisons (Tukey) indicated that the guided inductive group outperformed both the incidental ($p = .015$) and the deductive group ($p = .031$); there was no statistically significant difference between the deductive and incidental group ($p = .956$).

In summary, the results show that all three instructional approaches led to durable gains on all measures of L2 knowledge, with no attrition between immediate and delayed post-test. All treatment groups made significant gains between pre-test and combined post-test. Explicit instruction resulted in larger gains than implicit instruction on the MLK test and the gap-fill test, i.e. the measures of explicit knowledge. It did not matter whether the instructional approach was deductive or inductive in nature. By contrast, the guided inductive treatment led to significantly greater gains than either the deductive or the incidental treatment on the oral measures, i.e. the measures of implicit knowledge.

4.7.2. Aptitude-treatment interaction in terms of gains in explicit and implicit L2 knowledge

The second research question asked to what extent individual differences in aptitude and WM predict the development of learners’ explicit and implicit knowledge of L2 English articles. As a first step towards addressing this question, participants’ performance on the aptitude and WM tests as shown in Table 4.2 was scrutinized.

Table 4.2 Descriptive statistics for language learning aptitude and WM – whole sample (N=115)

Measure	Mean	*SD*	Min	Max	Maximum possible	Mean %
LLAMA B	61.26	15.32	30	100	100	61
LLAMA D	42.22	12.46	5	75	75	56
LLAMA E	76.52	13.18	30	100	100	77
LLAMA F	55.83	20.76	0	100	100	56
LLAMA total	236.81	42.92	120	330	375	63
BDS	6.66	.97	4.75	9.25	9.75	68

Note: BDS = Backward digit span test

The descriptive results in Table 4.2 show that LLAMA F (grammatical inferencing) and LLAMA D (sound recognition) were the most challenging aptitude subtests for the participants, which for LLAMA F at least is in line with performance trends reported in the test manual (Meara, 2005). LLAMA E (sound-symbol association) was least challenging, which also corresponds with existing findings (Granena, 2013; Rogers et al., 2016).

A one-way ANOVA revealed no significant differences between the three treatment groups on the LLAMA total, $F(2,112) = 2.30$, $p = .105$ (homogeneity of variance: Levene`s $F(2,112) = 2.71$, $p = .071$). For individual subtests, there were no statistically significant differences between the treatment groups on LLAMA B, $F(2, 115) = .41$, $p = .668$ (homogeneity of variance: Levene`s $F(2,112) = 2.40$, $p = .095$), LLAMA D, $F(2,112) = .32$, $p = .726$ (homogeneity of variance: Levene`s $F(2,112) = 2.17$, $p = .119$), or LLAMA E, $F(2,115) = 2.92$, $p = .058$ (homogeneity of variance: Levene`s $F(2,112) = 4.79$, $p = .001$). However, between-group differences emerged on LLAMA F, $F(2,112) = 3.90$, $p = .023$ (homogeneity of variance: Levene`s $F(2,112) = .98$, $p = .379$). Post-hoc pairwise comparisons (Tukey) revealed that the guided inductive group significantly outperformed the incidental group (*p* = .024), while there were no statistically significant differences between the guided inductive and deductive group (*p* = .091) or the deductive and incidental group (*p* = .836).

The descriptive statistics for the BDS test reported in Table 4.2 show a mean in the 6-digits backwards range, which is indicative of a strong performance relative to means obtained in comparable studies (Kormos & Sáfár, 2008; Trebits and Kormos, 2008). A one-way ANOVA revealed statistically significant differences between the treatment groups, $F(2,112) = 3.52$, $p = .033$ (homogeneity of variance: Levene`s $F(2,112) = 5.06$, $p = .008$). Post-hoc pairwise comparisons (Tukey) showed that the guided inductive group significantly outperformed the deductive group ($p = .031$); there were no statistically significant differences between the guided inductive and the incidental group ($p = .731$) or the deductive and the incidental group ($p = .162$).

As a second step towards addressing the second research question, we calculated gain scores (i.e. the difference between pre-test and combined post-test scores) for the measures of explicit and implicit L2 knowledge. Correlations between gain scores and participants' scores on the measures of general L2 proficiency, aptitude and WM are shown in Table 4.3.

Table 4.3 Correlations: Proficiency, aptitude, WM, explicit and implicit L2 knowledge gain scores – whole sample (N=115)

	Proficiency	Aptitude	WM
MLK	.25**	.15	.05
	$p = .007$	$p = .111$	$p = .615$
Gap-fill	.45**	.36**	.19*
	$p < .001$	$p < .001$	$p = .042$
Oral measures	.55**	.53**	.42**
	$p < .001$	$p < .001$	$p < .001$

**Correlation is significant at the 0.01 level (2-tailed); *correlation is significant at the 0.05 level (2- tailed)

The results in Table 4.3 show that participants' general L2 proficiency is associated with gains in explicit and implicit knowledge of L2 articles. Aptitude and WM are weakly to moderately correlated with gains on the gap-fill test, and there are correlations of medium strength with gains on the oral measures. Individual differences in aptitude and WM are not associated with gains on the MLK test. Table 4.4 shows the correlational patterns by treatment group.

Table 4.4 Correlations by treatment group: Proficiency, aptitude, WM, explicit and implicit L2 knowledge gain scores

	Proficiency	Aptitude	WM
Deductive (N=38)			
MLK	-.13	-.30	-.03
	p = .420	*p* = .061	*p* = .870
Gap-fill	.21	.26	.18
	p = .198	*p* = .102	*p* = .261
Oral measures	.36*	.55**	.41**
	p = .021	*p* < .001	*p* =.008
Guided inductive (N=38)			
MLK	-.05	.04	-.03
	p = .775	*p* = .815	*p* = .849
Gap-fill	.26	.30	.17
	p = .127	*p* = .072	*p* = .317
Oral measures	.51**	.50**	.25
	p = .002	*p* = .002	*p* = .145

Incidental (N=39)			
MLK	.40*	.31	.36*
	p = .012	*p* = .057	*p* = .023
Gap-fill	.65**	.45**	.35*
	p < .001	*p* = .004	*p* = .030
Oral measures	.61**	.52*	.60**
	p < .001	*p* = .001	*p* < .001

**Correlation is significant at the 0.01 level (2-tailed); *correlation is significant at the 0.05 level (2- tailed)

The correlations in Table 4.4 show that in the explicitly instructed groups (deductive and guided inductive), L2 proficiency and aptitude are significantly associated with gains on the oral measures only; in the deductive group, WM is also significantly associated with gains on the oral measures. By contrast, in the implicitly instructed group (incidental), L2 proficiency, aptitude and WM are associated with gains on all measures, with the coefficient for aptitude and MLK test gains approaching significance.

In order to investigate the predictive power of aptitude and WM, a set of sequential linear regression analyses was conducted. For each analysis, assumptions of a normal distribution of the data, homogeneity of variances, linearity, and the absence of multicollinearity were checked and found to be met. In each analysis, L2 proficiency, aptitude and WM were entered as predictors, in that order. The variable L2 proficiency was entered first to control for possible confounds with aptitude and/or WM. We in turn examined gains on the MLK test, the gap-fill test, and the oral measures as the dependent variable. Table 4.5 shows the regression model with gains on the MLK test as the dependent variable.

Table 4.5 Regression model summary: MLK test – whole sample (N=115)

Independent variables	R^2	%	R^2 change (in %)	Sign. F change
L2 proficiency	.063**	6		.007
Aptitude	.066	7	+.003	.552
WM	.075	8	+.009	.302

The results reported in Table 4.5 show that L2 proficiency is the only significant predictor of participants' gains on the MLK test, accounting for 6% of the variance. In the absence of significant correlations between MLK test gain scores and the predictor variables in the case of the deductive and guided inductive groups (see Table 4.4), no regression analyses were conducted. Table 4.6 summarizes the regression model for the incidental group.

Table 4.6 Regression model summary: MLK test – incidental group (N=39)

Independent variables	R^2	%	R^2 change (in %)	Sign. F change
L2 proficiency	.160**	16		.012
Aptitude	.160	16	0	.973
WM	.182	18	+2	.337

The results in Table 4.6 show that L2 proficiency is the only significant predictor of the incidental group's gains on the MLK test, accounting for 16% of the variance. The next dependent variable under scrutiny was the gap-fill test. Table 4.7 shows the model summary for the whole sample.

Table 4.7 Regression model summary: Gap-fill test – whole sample (N=115)

Independent variables	R^2	%	R^2 change (in %)	Sign. F change
L2 proficiency	.204**	20		.000
Aptitude	.206	21	+1	.656
WM	.212	21	0	.331

Table 4.7 reveals that again L2 proficiency is the only significant predictor, accounting for 20% of the variance in this case. In the absence of significant correlations between gap-fill test gain scores and the predictor variables in the case of the deductive and guided inductive groups (see Table 4.4), no regression analyses were conducted. Table 4.8 summarizes the regression model for the incidental group.

Table 4.8 Regression model summary: Gap-fill test – incidental group (N=39)

Independent variables	R^2	%	R^2 change (in %)	Sign. F change
L2 proficiency	.422**	42		.000
Aptitude	.430	43	+1	.501
WM	.434	43	0	.608

The results in Table 4.8 show that L2 proficiency is the only significant predictor of the incidental group's gains on the gap-fill test, accounting for 42% of the variance.

In summary, the regression analyses conducted up to this point show that neither aptitude nor WM predict participants' development of explicit L2 knowledge in any of the instructional groups if L2 proficiency is controlled for; L2 proficiency itself is a significant predictor in the incidental group, but not in the deductive and guided inductive groups.

Participants' gains on the oral measures constitute the final dependent variable under scrutiny. Table 4.9 shows the model summary for the whole sample.

Table 4.9 Regression model summary: Oral measures – whole sample (N=115)

Independent variables	R^2	%	R^2 change (in %)	Sign. F change
L2 proficiency	.300**	30		.000
Aptitude	.334**	33	+3	.019
WM	.341	34	+1	.249

The results in Table 4.9 reveal that for the sample as a whole, aptitude significantly explains 3% of the variance in gains on the oral measures once L2 proficiency is controlled for. In order to understand the contribution of individual aptitude components, we examined the correlations between the LLAMA subtests and participants' gains on the oral measures, which are shown in Table 4.10.

Table 4.10 Correlations: Aptitude subtests and oral measures – whole sample (N=115)

	LLAMA B	LLAMA D	LLAMA E	LLAMA F
Oral measures	.31**	.21**	.39**	.53**
	p =.001	p =.025	$p < .001$	$p < .001$

**Correlation is significant at the 0.001 level (2-tailed)

The results in Table 4.10 show that all four LLAMA subtests correlate significantly with participants' gains on the oral measures, but coefficients differ slightly. In order to further investigate the predictive power of the various aptitude components, we conducted a regression analysis with L2 proficiency, LLAMA F, E, B and D entered as predictors, in that order. The variable L2 proficiency was entered first to control for possible confounds with aptitude. The order in which the LLAMA subtests were entered was determined by the strength of association as suggested by the results of correlation analysis. For the regression model, assumptions of a normal distribution of the data, homogeneity of variances, linearity, and the absence of multicollinearity were checked and found to be met. Thus, although the different aptitude subtests correlated with each other (see Appendix J for correlation coefficients), collinearity did not present the problem for the regression model. The results are shown in Table 4.11.

Table 4.11 Regression model summary (LLAMA subtests): Oral measures – whole sample (N=115)

Independent variables	R^2	%	R^2 change (in %)	Sign. F change
L2 proficiency	.300**	30		.000
Llama F	.358**	36	+6	.002
Llama E	.371	37	+1	.125
Llama B	.372	37	0	.769
Llama D	.373	37	0	.607

The results in Table 4.11 show that LLAMA F (grammatical inferencing) significantly predicts 6% of the variance in gains on the oral measures once L2 proficiency is controlled for.

A final set of regression analyses was carried out for each of the treatment groups, with L2 proficiency, aptitude and WM as the predictors, as before. The results are reported in Tables 4.12, 4.13 and 4.14.

Table 4.12 Regression model summary: Oral measures – deductive group (N=38)

Independent variables	R^2	%	R^2 change (in %)	Sign. F change
L2 proficiency	.132**	13		.021
Aptitude	.311**	31	+18	.004
WM	.318	32	0	.527

Table 4.13 Regression model summary: Oral measures – guided inductive group (N=38)

Independent variables	R^2	%	R^2 change (in %)	Sign. F change
L2 proficiency	.255**	26		.002
Aptitude	.281	28	+2	.283
WM	.281	28	0	.993

Table 4.14 Regression model summary: Oral measures – incidental group (N=39)

Independent variables	R^2	%	R^2 change (in %)	Sign. F change
L2 proficiency	.366**	37		.000
Aptitude	.373	37	0	.540
WM	.446*	45	+8	.039

The results reported in Tables 4.12-4.14 reveal that aptitude is a significant predictor in the deductive group, accounting for 18% of the variance in gains on the oral measures. Working memory is a significant predictor in the incidental group, accounting for 8% of the variance in gains on the oral measures. In the guided inductive group, neither aptitude nor WM are significant predictors once L2 proficiency is controlled for.

4.8. Discussion

4.8.1. General instructional effects

The present study set out to investigate whether L1 Russian learners would differ in their explicit and implicit knowledge of L2 English articles after having experienced different instructional approaches. Moreover, we aimed to establish to what extent individual learner differences in language learning aptitude and executive working memory would predict the development of learners' explicit and implicit knowledge of English articles. In the most general terms, we found that all three instructional approaches – deductive, guided inductive, and incidental – led to durable gains on all measures of L2 knowledge, with no attrition between an immediate and a delayed post-test in evidence. All three treatment groups made significant gains between pre-test and combined post-test, regardless of whether they were exposed to explicit or implicit instruction. This finding suggests that L2 English articles are amenable to instruction (see also Akakura 2012; Hu, 2002, 2011), and that both an explicit and an implicit approach can have a positive effect on learners' development.

4.8.2. Development of explicit knowledge of L2 articles

We found that explicit instruction resulted in larger gains than implicit instruction on the MLK test and the gap-fill test, i.e. the measures of explicit knowledge. It did not matter whether the instructional approach was deductive or guided inductive in nature. The finding that explicit instructional approaches facilitate the development of explicit knowledge is in keeping with the overall greater effectiveness of explicit instruction that has been identified in a number of previous studies and confirmed by meta-analytic research (Goo, Granena, Yilmaz, & Novella, 2015; Norris & Ortega, 2001). The fact that no statistical differences emerged between the deductive and guided inductive groups reflects the findings of another study that used a written, grammar-based outcome measure and likewise uncovered similar results for deductively and explicit-inductively instructed learners (Hwu & Sun, 2012).

In the deductive and guided inductive groups, aptitude and executive WM did not correlate with participants' performance on the two measures of explicit knowledge, that is, the MLK and gap-fill tests. Regression analyses confirmed that neither aptitude nor WM predicted participants' development of explicit L2 knowledge. Put differently, higher cognitive ability did not convey any advantages for performance on the explicit measures. This suggests that the two explicit instructional approaches benefited all learners equally when the aim was to develop explicit knowledge of English articles. This finding is consistent with existing ATI research showing that L2 instruction which makes use of pedagogical grammar rules and includes output practice can serve as an equalizer (Erlam, 2005).

In the incidental group, individual differences in aptitude and executive WM did not predict the development of explicit L2 knowledge either, but the control variable of L2 proficiency was a significant predictor in this case. Given that the incidental group likewise made significant gains in terms of explicit knowledge of articles, there is evidence that implicit, meaning-focused instruction did not prevent learners from drawing on their metalinguistic awareness and arriving at metalinguistic generalizations (see also Brooks & Kempe, 2012; Kempe & Brooks, 2011). However, without direct help or guidance from the teacher and the instructional materials, learners with higher levels of general L2 proficiency were at an advantage. As articles are frequent in English, and as none of the learners were beginners, they will have encountered article constructions before; learners with higher overall proficiency may have been better able to recall instances and make links across instances because they had a comparatively larger store of L2 knowledge to draw on.

4.8.3. Development of implicit knowledge of L2 articles

Findings pertaining to the oral measures, which were taken to reflect participants' implicit knowledge in the present study, showed an altogether different pattern of results. In the case of the oral measures, the guided inductive treatment led to significantly greater gains than either the deductive or the incidental treatment. This suggests that, first, not all types of explicit instruction are equally beneficial for the development of implicit L2 knowledge, and second, that form-focused, guided inductive instruction, though explicit in nature, was more facilitative than meaning-focused, incidental instruction which was implicit in nature. A possible explanation for this finding is that the instructional approach taken in the guided inductive condition encouraged learners to follow a path that closely resembles the bottom-up learning trajectory assumed in a usage-based approach to language learning, for instance, according to which learners move from exemplar to schema by gradually abstracting over instances encountered in the input (Eskildsen, 2009, 2012; Spoelman & Vespoor, 2010; Roehr-Brackin, 2014, 2015). The guided inductive approach used in the present study mirrored this learning trajectory and may thus have been most compatible with the development of implicit knowledge. At the same time, and importantly, the instructional treatment offered learners direct assistance, thus accelerating their move along the learning trajectory towards schematic knowledge. This would explain the superiority of the guided inductive over the incidental approach. Although the latter condition was meaning-focused and thus arguably reflected most directly a naturalistic environment in which implicit learning might be considered the default approach, time on task was not sufficient for unassisted learning to take effect. By contrast, the guided inductive approach offered the best of both worlds: assisted learning that led learners along a path associated with implicit learning and the development of implicit knowledge, yet encouraged them to notice and retain a focus on form alongside a focus on meaning.

This argument also seems to be consistent with the results arising from the regression analysis, which showed that in the guided inductive group, neither aptitude nor WM were significant predictors of gains on the oral measures once L2 proficiency was controlled for. In other words, when the type of instruction (assisted bottom-up) is ideally matched with the target outcome (development of implicit knowledge), individual differences in cognitive ability may play little role. Nevertheless, while this line of argument may offer a plausible explanation for the observed pattern of findings, we must bear in mind that the guided inductive group significantly outperformed the incidental group on LLAMA F and the deductive group on the BDS test, so the guided inductive group included the highest-ability learners in these respects.

The regression analysis revealed that in the sample as a whole, LLAMA F (grammatical inferencing) significantly predicted 6% of the variance in gains on the oral measures once L2 proficiency was controlled for. The predictive power of grammatical inferencing ability, a component of language-analytic ability (Skehan, 1998, 2002), is broadly consistent with existing findings in L2 learning research (Li, 2016, Yalçın & Spada, 2016), although it should be borne in mind that at 6% only a small proportion of the variance was accounted for in our study.

The regression analyses by treatment group showed that aptitude was a significant predictor in the deductive group, accounting for 18% of the variance in gains on the oral measures, and WM was a significant predictor in the incidental group, accounting for 8% of the variance in gains on the oral measures. The predictive power of aptitude in the deductive group may suggest that high-aptitude learners can more readily exploit any interface between explicit and implicit knowledge and processes. High-aptitude learners may be able to put their metalinguistic knowledge of the challenging target structure to maximum use, potentially noticing more and creating more accurate auto-input during practice activities. This in turn allows for gains in implicit knowledge to materialize. In the context of such an interpretation, the finding that aptitude predicts improvements in implicit knowledge, as measured by performance gains on the oral measures, in learners who had experienced top-down, form-focused, explicit instruction appears plausible. Finally, the predictive power of executive WM in the incidental group suggests that greater resources in terms of online storage and processing are advantageous for the development of implicit knowledge when learning takes place without assistance. The facilitative role of executive WM in an implicit condition encouraging incidental learning is in keeping with existing research (Robinson, 2002).

4.9. Conclusion

In the tradition of ATI research, the present study sought to establish how the aptitude-treatment interaction would play out in relation to the development of explicit and implicit knowledge of L2 English articles in learners for whom this is a challenging target structure. Not unexpectedly, it was found that explicit instruction resulted in larger gains in explicit knowledge than implicit instruction. However, when the aim was to develop implicit knowledge, learners derived most benefit from explicit instruction based on a guided inductive approach. We argued that this perhaps surprising facilitative effect may be explained by the fact that guided induction not only mirrors the implicit learning path from exemplar to schema that is posited in usage-based theories of L2 learning, for instance, but also offers learners direct assistance along this path.

Moreover, we found that individual differences in aptitude and executive WM predicted observed gains in implicit knowledge in two of the three treatment groups respectively, but none of the observed gains in explicit knowledge. This indicates that instruction, and in particular explicit instruction, can level out individual differences in cognitive ability if the aim is the development of explicit knowledge. By contrast, if the aim is the development of implicit knowledge, only the guided inductive approach resulted in a leveling effect.

4.10. Limitations and suggestions for future research

While every effort was made to develop valid and reliable measures of learners' explicit and implicit L2 knowledge, it is acknowledged that classroom-based tests will not normally tap one type of knowledge only at the total exclusion of the other. The development of 'pure' measures is particularly challenging when the aim is to assess implicit knowledge. A measure such as our MLK test can arguably 'force' the use of explicit knowledge quite reliably by asking learners to articulate their knowledge in metalinguistic terms, for instance. However, measures of language use such as our gap-fill test and the elicited imitation and oral production tasks cannot guarantee that participants will only ever draw on one type of knowledge only while completing the tests.

Another limitation of the present study is the fact that only a single L2 structure was targeted, albeit a challenging one with multiple uses. Further research investigating more than one target structure and different language combinations within an ATI paradigm may render a different pattern of results. Finally, given that the individual difference variables included in the present study only accounted for a relatively small proportion of the variance in the outcome measures, it seems desirable to include other possible predictors in future studies, such as learners' affective responses to the instructional treatment experienced, as expressed in beliefs or attitudes, for instance, or their motivation for learning the L2.

Notes

[1] The use of classroom-based measures means that we cannot guarantee that learners accessed only one type of knowledge at the total exclusion of the other type of knowledge when completing the various tasks. In particular, we acknowledge that measures aimed at tapping primarily implicit knowledge may in fact draw on automatized explicit knowledge (Suzuki & DeKeyser, 2017). However, for the sake of brevity and clarity, we refer to explicit and implicit knowledge throughout the paper.

[2] In cases where Levene's test was statistically significant, we additionally ran a non-parametric alternative. In all instances results remained unchanged.

CHAPTER FIVE EVALUATING THE CONTRIBUTIONS OF AGE, TYPE OF INSTRUCTION AND INDIVIDUAL DIFFERENCES IN COGNITIVE ABILITY: DEVELOPMENT OF EXPLICIT AND IMPLICIT KNOWLEDGE OF L2 ENGLISH ARTICLES

(Article 3 - Irina Tomak)

5.1. Abstract

The study focuses on the effects of age, type of instruction and individual differences in the development of explicit and implicit knowledge of L2 English articles. Six intact classes of younger (ages 12-14) and older (ages 15-17) teenage L2 learners (N total =115) were randomly assigned to one of three instructional conditions. A deductive and a guided inductive condition made use of explicit, form-focused instruction, and an incidental condition made use of implicit, meaning-focused instruction. The participants completed a battery of written and oral tests aimed at eliciting explicit and implicit knowledge of the targeted article uses as well as the LLAMA aptitude test and a test of working memory. The analyses showed that both types of explicit instruction were more effective than implicit instruction for the development of both explicit and implicit knowledge. Furthermore, an advantage for older learners was found on the measure of metalinguistic knowledge. Aptitude predicted gains on the test of implicit knowledge in younger learners only. It is argued that explicit instruction may level out individual differences in cognitive ability in the development of explicit knowledge for either age group by offering learners direct assistance with a challenging structure. However, when the aim is to develop implicit knowledge, individual differences in cognitive ability are still important for younger teenage learners who have not yet reached the state of cognitive development comparable to that of the older learners, with higher-aptitude learners at advantage.

5.2. Introduction

The effects of age on the acquisition of a second language (L2) constitute one of the most frequently investigated topics in the field of Second Language Acquisition (SLA). Initially, age was the object of research primarily in a naturalistic setting which typically compares L2 learners who started acquiring the target language in the context of full immersion in the language community at different ages of exposure. Results have consistently shown the advantage of earlier starters over later starters in terms of their L2 proficiency, mainly in morphosyntax (e.g. Birdsong and Molis, 2001, DeKeyser, 2000, Johnson and Newport, 1989), and in pronunciation (Flege, 1991; Flege and MacKay, 2004). In contrast, age-related findings from instructed contexts (García Mayo & García Lecumberri, 2003; Muñoz, 2006; Jaekel et al. 2017) showed that later starters (starting age of instruction 11-13) outperform earlier starters (starting age of instruction 8-9) in different language dimensions.

Instructed SLA holds substantial evidence showing the overall effectiveness of explicit, form-focused instruction compared with implicit, meaning-focused instruction (Goo, Granena, Yilmaz, & Novella, 2015; Norris & Ortega, 2001). However, little is known whether L2 learners` age profiles interact with instruction type and produce variability in L2 learning outcomes.

Individual differences in cognitive ability, i.e. language aptitude and working memory (WM) are widely assumed to be implicated in L2 learning (Li, 2015, 2016; Hummel, 2009; Serafini & Sanz, 2016). While a wealth of studies have reported a facilitative role of high aptitude and WM for adult learners (Li, 2015, 2016), evidence that it is likewise implicated in children`s and adolescents` linguistic development is less widely available, though there is some (Kiss and Nikolov, 2005; Muñoz, 2014; Tellier & Roehr-Brackin, 2013,2016).

The present study investigated the effects of age, individual differences in aptitude and WM and type of instruction on the development of explicit and implicit L2 knowledge of English articles by instructed teenage learners of English divided into two age groups in accordance with their starting age of instruction: younger learners (age at testing 12-14; starting age of instruction 8-10) and older learners (age at testing 15-17;starting age of instruction 13-15). In doing so, the study explored whether younger and older learners assigned to the same instructional conditions would differ in terms of the gains made on the measures of explicit and implicit knowledge and whether aptitude and WM interact with age factor and have differential contributions to their development of explicit and implicit knowledge.

5.3. Background

5.3.1. Explicit and implicit knowledge and learning

Explicit knowledge refers to the declarative knowledge of language accessible to conscious awareness, learnable and verbalizable (N. Ellis, 2015; Rebuschat, 2013). In contrast, implicit knowledge is defined as intuitive and non-verbalizable type of knowledge (Hulstjin, 2015; N. Ellis, 2015) lying at the core of automated language processing. Explicit learning relies on attention-driven cognitive processes (N. Ellis, 2015; Rebuschat, 2013) and is characterised by learners` conscious efforts to engage in linguistic problem solving or acquiring new material. Implicit learning, on the other hand, is an automatic process of induction that does not require conscious operations (N. Ellis, 2015). Explicit learning is a relatively efficient process which can result in fast learning even in the context of limited input; however given its resource-intensive nature it can be cognitively taxing (Roehr-Brackin, 2014, 2015). Implicit learning is a powerful mechanism resulting in highly systematic and accessible knowledge; however, it depends on ample exposure to input over time to be effective (DeKeyser & Larson-Hall, 2005; Muñoz & Singleton, 2011).

By the same token, explicit instruction is defined as any instructional intervention that relies on explanation of pedagogical rules or incorporates induction encouraging L2 learners to engage in analytical reasoning and hypotheses-testing to subsequently infer metalinguistic generalisations of their own. In contrast with explicit instruction, implicit instruction exposes L2 learners to meaningful input, but does not involve overt pedagogical rule explanation or rule induction (Norris & Ortega, 2001). Substantial research in the area of instructed L2 learning has lent support to the overall effectiveness of explicit, form-focused instruction which results in larger and more durable gains when compared to implicit, meaning-focused instruction (Goo, Granena, Yilmaz, & Novella, 2015; Spada & Tomita, 2010; Norris & Ortega, 2001). Nonetheless one should bear in mind that this is a cumulative finding averaged over many studies which mostly drew on adult L2 learners.

5.3.2. Previous research on age effects in instructed L2 learning

A number of studies (García Lecumberri & Gallardo, 2003; García Mayo, 2003; Lazagabaster and Doiz, 2003; Cenoz, 2003) were conducted with explicitly instructed Basque/Spanish bilingual L2 learners of English split into early starters (ages 8-9) and later starters (ages 11-12). The studies measured a variety of language skills and reported later starters` advantage on the measures of morphosyntactic knowledge (García Mayo, 2003), perception skills (García Lecumberri and Gallardo, 2003), receptive skills (Cenoz, 2003), oral production (Cenoz, 2003), and written production (Cenoz, 2003; Lazagabaster and Doiz, 2003).

In the Barcelona Age Factor project (Muñoz, 2006) Spanish/Catalan classroom learners of English with different starting ages (4, 8, 11, 14 and 18+ years) were compared on a range of L2 achievement measures: dictation, cloze, listening comprehension, grammar, written composition, oral narrative, oral interview, phonetic imitation and discrimination and role play after 200, 416 and 726 hours of instruction. Older starters consistently and significantly outperformed younger starters on most measures with the largest inter-group differences observed in the domain of morphosyntactic learning. Nonetheless, younger learners were found to gradually catch up with older learners in listening comprehension after 726 hours of instruction. By way of explanation, it was argued that those skills may be less affected by older age and more by the amount of instructional input L2 learners receive. Later starters` superiority was attributed to their more advanced cognitive development enabling them to take advantage of more efficient explicit learning mechanisms which facilitate L2 learning in the context of limited input.

Larson-Hall (2008) examined advantage of an early start with Japanese college learners of English (N=200) by employing a research design which controlled for total amount of exposure, age at the time of testing and language learning aptitude. All the participants had studied English for six years under form-focused instruction, but started either early (ages 3-12) or late (ages 12-13). Learners were assessed on a grammaticality judgement test (GJT), a phonemic discrimination test and an aptitude test. The analysis yielded only modest advantage of an earlier start for both the phonemic and morphosyntactic measure which was input dependent. Earlier starters scored higher on the GJT once they had amassed between 1,600 and 2,200 hours of input. Advantages for an early start on the phonemic discrimination test became evident in the range of 1,200-2,200 hours. Overall it was argued that although early start can enhance morphosyntactic abilities, its facilitative effect becomes evident only after substantial input exposure which goes well beyond the amount of input provided in a typical foreign language classroom over a learner`s school career.

In their longitudinal study, Jaekel et al. (2017) examined receptive skills of German L1 early starters and later starters (N total = 5.130) in Year 5 (beginning of secondary education) and two years later in Year 7. Earlier starters (starting age of instruction 6-7) had received 3.5 years (245 hours) of English as a foreign language instruction, whereas later starters (starting age of instruction 8-9) had received 2 years (140 hours) of instruction. Learners` receptive skills were assessed by means of standardized reading and listening tests. Additionally, learners completed a measure of cognitive abilities operationalised by the Figural Analogy subtest of the Cognitive

Abilities Test (Heller & Perleth, 2000). The results indicated that although earlier starters outperformed later starters on all the measures in Year 5, later starters surpassed their early starting peers in Year 7. Furthermore, the analysis revealed that learner cognitive abilities were the most significant predictor of L2 receptive skills in Year 5 and remained significant for Year 7, although at a third of its initial impact. The results of the study confirmed the advantage of a later start (in the long run) in learning a foreign language in minimal input contexts.

Conventionally, it is widely assumed that children engage primarily in implicit learning, while adolescents and adults rely on explicit learning (Muñoz, 2006; Larson-Hall, 2008). However, as pointed out by Lichtman (2013, 2016) a bias towards explicit or implicit learning may be determined not exclusively by learner age but also by the type of instruction they have experienced. In a study conducted with classroom L2 learners of Spanish, Lichtman (2013) compared three groups of learners, i.e. implicitly instructed children (ages 8-12) and explicitly and implicitly instructed adolescents (ages 14-17) on a time-pressured story-rewriting task tapping implicit knowledge and a verb conjugation task tapping explicit knowledge. Results indicated that implicitly instructed children favoured implicit knowledge. Adolescents under implicit instruction patterned like the children, performing better on tasks tapping implicit knowledge. In contrast, explicitly instructed adolescents performed better on tasks tapping explicit knowledge. Lichtman concluded that instruction may have a greater influence on explicit vs. implicit knowledge than age does.

To summarize, older learners` greater state of cognitive maturity allows them to outperform younger learners in a minimal-input setting since they rely on more efficient explicit learning. Nonetheless, age differences in implicit vs. explicit learning mechanisms are not exclusively maturation dependent but may be influenced by instruction. Apart from the factors of age and instruction, individual differences in cognitive ability are likely to be implicated in L2 learners` success in linguistic development in instructed conditions.

5.3.3. Individual differences in cognitive ability: foreign language learning aptitude and working memory

In SLA, language learning aptitude is understood as a set of abilities that determines an individual`s rate of progress in learning a foreign language (Caroll, 1981; Dörnyei & Skehan, 2003). According to Carroll's (1981) classic multi-componential model, aptitude is made up of phonetic coding ability, associative memory, grammatical sensitivity and inductive language learning ability. In more recent conceptualisations of aptitude, grammatical sensitivity and inductive language learning ability have been subsumed under the label of language-analytic ability (Skehan, 2002). A number of studies have confirmed the relevance of aptitude in L2 learning in instructed (e.g. Kormos & Sáfár, 2008; Erlam, 2005; Hummel, 2009) and immersion settings (e.g. Abrahamsson & Hyltenstam, 2008; Granena & Long, 2013). Recent meta-analytic research (Li, 2016) drawing on the data provided by 66 studies with adolescent and adult L2 learners identified robust positive associations between aptitude and general L2 proficiency. However, the magnitude of aptitude effects was found to be constrained by learners' proficiency level, with correlation coefficients higher at initial stages of linguistic development (see also Serafini & Sanz, 2016). Furthermore, aptitude components were found to have different predictive validity for different aspects of learning. Specifically, morphosyntactic learning was better predicted by language-analytic ability than other aptitude components (see also Li, 2015, 2016; Yalçin & Spada, 2016).

Compared with substantial aptitude research in adults, empirical investigations with younger learners are less readily available. Studies that have examined unique contributions of language learning aptitude to younger learners` language attainment reported significant associations between higher aptitude and a range of L2 skills (Kiss & Nikolov, 2005; Rosa and Muñoz, 2013; Tellier & Roehr-Brackin, 2013; Muñoz, 2014) with aptitude being a significant predictor of achievement. Furthermore, different aptitude components were found to be differentially associated with success on different aspects of L2 proficiency. Existing findings hold that younger children may rely on memory more generally for the development of various L2 skills (Muñoz, 2014; Kiss & Nikolov, 2005), however, higher language-analytic ability appears to be a distinguishing feature of high achievers (Muñoz, 2014). Importantly, aptitude in children is assumed to be a dynamic rather than a fixed quality. Recent research comparing younger learners` performance on aptitude tests at different ages (Suárez & Muñoz, 2011; Milton & Alexiou, 2006; Tellier & Roehr-Brackin, 2013, 2016) points towards dynamic nature of aptitude indicating that performance on aptitude tests develops in conjunction with growing cognitive maturity.

There is an increasing acknowledgement that cognitive abilities that are not directly assessed by aptitude tests may contribute to the understanding of variation in individuals` L2 learning outcomes (e.g. Hummel, 2009; Li, 2016). Several researchers consider working memory (WM) as a component of language learning aptitude (DeKeyser & Koeth, 2011; Sawyer & Ranta, 2001; Dörnyei, 2005) in the sense that it is likewise implicated in L2 performance (Miyake & Friedman, 1988; Hummel, 2009; Robinson, 2005, Linck et al., 2014). WM is assumed to be an active system for temporary storage and manipulation of information in the course of online processing (Juffs & Harrington, 2011). In recent years, studies have provided compelling evidence for the importance of WM for L2 acquisition. For example, WM has been shown to make an important contribution to L2 learning in terms of the development of L2 proficiency more generally (Juffs & Harrington, 2011) as well as oral narrative production skills (O`Brien et al., 2006) and development of L2 vocabulary (Linck et al., 2014; Juffs & Harrington, 2011).

Findings to date indicate that individual differences in cognitive ability are implicated in the development of both younger and older instructed learners` language skills with language analytic ability playing an important role. However, since most primary studies did not differentiate between explicit and implicit knowledge, the question regarding possibly different contributions of cognitive ability to the two types of linguistic knowledge remains open.

5.4. Research issues

Instructed SLA holds substantial evidence on later starters` rate advantage in a variety of language skills facilitated by their more advanced cognitive development. While the existing research has focused on age factor in the development of global proficiency, there is no empirical evidence available on the role of age in the development of explicit and implicit knowledge of a single challenging grammatical structure like L2 English articles which are frequently cited to be problematic even for highly proficient L2 learners (Hu, 2011; Akakura, 2012).

Explicit form-focused instruction results in larger and more durable gains compared to implicit instruction. However, it may be on par with age in terms of its effect on learning mechanisms L2 learners use. Since none of the existing studies examined the contributions of age and instruction and possible interaction between them, research exploring these issues is desirable.

Finally, individual differences in cognitive ability are widely assumed to facilitate L2 acquisition. However, a large volume of studies has examined mostly adult L2 learners and the research with younger learners remains limited. Additionally, there appear to be no studies investigating possibly differential contributions of aptitude and WM to the development of explicit and implicit knowledge by learners with different starting age of instruction. The present study aims to contribute to filling the identified gaps by posing two research questions:

(1) Do younger and older teenage learners who have been exposed to different instructional approaches differ in their explicit and implicit knowledge of L2 English articles?

(2) To what extent do differences in language learning aptitude and working memory capacity predict younger and older teenage learners` development of explicit and implicit knowledge of L2 English articles?

5.5. Methodology

The research questions were addressed by means of a quasi-experimental study with a pre-test/immediate post-test/delayed post-test design with L1 Russian classroom learners of L2 English.

5.5.1. Participants

115 native Russian L2 learners of English at a private secondary school in Russia took part in the study. The participants` age ranged from 12 to 17, with the average age at testing overall of 14.80 (SD = 1.09). Younger learners (mean age = 13.84; SD = .63) began their study at the age of 8-10 and had studied English for four years. For older learners (mean age = 15.68; SD = .58) the age of first exposure to English was 11-13, and they had likewise studied English for four years. The participants had received the same amount of instruction: the year average of 240 minutes per week distributed into three sessions. None of the learners had studied English outside of school and none of them had been exposed to the target language in naturalistic setting prior to testing. At the school of testing younger and older learners were assigned to separate classes in accordance with their age profile: younger learners (12-14) and older learners (15-17). The learners were at a lower intermediate level of English proficiency according to the school's assessment. For the purposes of the study the participants' level of English was assessed independently by means of the Oxford Quick Placement Test (UCLES, 2004). Participants' mean scores fell within the lower intermediate band according to the test manual, which is deemed to be broadly equivalent to Level B1 of the Common European Framework of Reference. A one-way ANOVA run on L2 learners` proficiency scores showed that there were statistically

significant differences between the groups: $F(5, 109) = 5.73$, $p < .001$. Post-hoc pairwise comparisons (Tukey) revealed that L2 learners assigned to inductive older ($p < .001$), deductive older ($p = .002$) and incidental older ($p = .012$) groups outperformed incidental younger group. Given proficiency differences between the instructional groups, L2 proficiency was entered as a covariate in all relevant analyses.

5.5.2. Target structure

For the purposes of the study nine uses of the English definite/indefinite/zero article (see Appendix I) were selected from Murphy (2007). Articles represent constructions of high learning difficulty since they exemplify highly abstract non-salient grammatical features; they are hard to infer either explicitly or implicitly from exposure to language input only (Goldschneider & DeKeyser, 2001). Furthermore, they pose particular acquisition problems for those learners whose native languages do not instantiate an article system. Russian lacks an article system and expresses (in)definiteness by means of word order, for instance, and speakers additionally draw on contextual information to decide whether a referent is specific or generic.

5.5.3. Instructional treatment

The instructional treatment was delivered by the author over a three-week period. L2 learners received three 80-minute lessons per week, which corresponds to the standard number of lessons they would normally have. Each session focused on one targeted article use. All teaching and learning materials were designed specifically for the present study to ensure comparability across various instructional conditions in terms of content, vocabulary and grammatical material. Each L2 lesson was built around a core text, e.g. a story or a report, and followed a three-step approach that fitted with participants` instructional condition. Six intact classes were randomly assigned to one of three instructional conditions: deductive younger (N=19)/ deductive older

(N=19), guided inductive younger (N=17)/ guided inductive older (N=21), and incidental younger (N=19)/ incidental older (N=20).

The deductive instructional treatment was in line with a traditional sequence of presentation, controlled practice, and free production. In Step 1, learners were provided with pedagogical grammar rules explaining the targeted article uses. The explanation was followed by form-focused oral and written practice activities in Step 2. In Step 3, learners incorporated the targeted constructions in free oral production activities. Throughout the lesson learners were given corrective feedback, focusing their attention on the pedagogical rules underpinning the targeted structures.

The guided inductive instructional treatment was designed to enable learners to arrive at the targeted pedagogical grammar rules on their own. The teacher provided scaffolding, as required. In Step 1, learners were encouraged to engage in practice activities that allowed them to build and test hypotheses about the targeted article uses. In Step 2, the teacher presented learners with guiding questions to encourage rule elicitation until the targeted rule was arrived at. In Step 3, learners practised targeted constructions in free oral production activities. Corrective feedback was provided.

In the incidental instructional condition learners were supplied with the same materials as the deductive and guided inductive groups; however all activities were meaning-focused. The overt explanation and form-focused practice of pedagogical grammar rules was excluded from exercises and replaced with additional oral activities. Step 1 focused on reading of and listening to the core text and work with a glossary. Step 2 involved meaning-focused exercises and discussion activities. Step 3 focused on individual and pair-work speaking tasks. No corrective feedback on the targeted structure was provided.

5.5.4. Instruments and procedure

Prior to the instructional treatment the participants completed a background questionnaire which included entries for the number of hours studying English at school and outside school at language courses or with a tutor, participation in immersion or study-abroad programmes and additional languages spoken. The participants also completed an L2 English proficiency test, a test of language learning aptitude, and a test of executive working memory. They took four tests of explicit and implicit L2 knowledge of articles prior to the instructional treatment (pre-test), immediately after the instructional treatment (immediate post-test) and again after a six-month delay (delayed post-test). The administered L2 measures were an elicited imitation test, an oral production test, a gap-fill test, and a metalinguistic knowledge test, administered in that order. These instruments are described in detail in what follows.

5.5.4.1. L2 English proficiency. The test of L2 English proficiency was the pen-and-paper version of the Oxford Quick Placement Test (UCLES, 2004) assessing knowledge of vocabulary, grammar and reading skills in a multiple-choice format.

5.5.4.2. Language learning aptitude. Participants` language aptitude measured by means of the Llama aptitude battery (Meara, 2005), a computer-administered aptitude test based loosely on the MLAT (Caroll & Sapon, 1959). The Llama is comprised of four sub-components: LLAMA B, a vocabulary learning test assessing ability to learn new words in a short period of time; LLAMA D, a test of sound recognition assessing ability to recognize patterns in a spoken language; LLAMA E, a test of sound-symbol correspondence assessing ability to form new sound-symbol associations; and LLAMA F, a test of grammatical inferencing, assessing ability to induce the rules governing an unknown language.

5.5.4.4. Working memory. Participants` executive WM was assessed by means of a backward digit span test (BDST) (Kormos & Sáfár, 2008) administered in L1 Russian. The BDST is assumed to tap into executive function and phonological loop, since it requires simultaneous storage and processing of information (Juffs & Harrington, 2011). In the BDST participants were asked to listen to sequences of digits and then repeat them in the inverse order. The test incorporated seven sets of four strings in each which gradually increased in length. The shortest sequences comprised 3 digits, the longest 9 digits. The administration and scoring of the test drew Blackburn and Benton`s (1957) BBII procedure according to which participants could listen to each string twice, the failure on both trials of the string marked the end of the testing. Participants were awarded .25 credits for each string recalled correctly after the first string which attracted three points as recalling the first string correctly served as a baseline for the test. The maximum possible score for the test was 9.75.

5.5.4.5. Tests of explicit and implicit L2 knowledge. The measures of participants` explicit and implicit L2 knowledge were designed in accordance with R. Ellis`s conceptual framework (R. Ellis, 2005, 2006; R. Ellis et al., 2009) manipulating four criteria for dissociating between explicit and implicit knowledge: that is degree of awareness, time available, focus of attention and metalinguistic knowledge. The measures aimed at eliciting primarily explicit knowledge of the targeted structures were an untimed metalinguistic knowledge test that focused learners' attention on form and required the use of metalanguage and a timed gap-fill test that focused learners' attention on form. The measures aimed at eliciting primarily implicit knowledge were an elicited imitation test and an oral production which were meaning-focused and time-pressured because of their oral/aural modality.

The metalinguistic knowledge (MLK) test used here consisted of an error explanation (Rodr ǵuez Silva & Roehr-Brackin, 2016; Ziętek & Roehr, 2011) and a rule illustration subtest (Absi, 2014; Scheffler, 2011). In the error explanation subtest, participants were required to provide explanations for highlighted errors at sentence level either in Russian or English. In the rule illustration subtest, participants were given the targeted pedagogical grammar rules in

English and asked to illustrate each rule with an appropriate L2 sentence. The test was scored dichotomously, with 1 point awarded for each accurate explanation and illustrative sentence respectively. In the rule illustration subtest, errors that did not pertain to the targeted article uses were disregarded.

In the gap-fill test L2 learners were presented with contextualized sentences containing gaps and asked to fill in the gaps at a sentence level with either a definite article, an indefinite article or an indication that no article is required. The test was scored dichotomously with 1 point given for each accurate answer.

The elicited imitation test (EI) (R. Ellis et al., 2009; Erlam, 2006; Spada, Shiu & Tomita, 2015) was presented to the participants auditorily as a beliefs questionnaire incorporating the targeted article uses; half of the questions were grammatically correct and half incorrect. The participants were asked to listen to each question, answer it with either yes, no or don’t know, and then repeat it in correct English. Answers were audio-recorded for subsequent analysis and scored dichotomously, with each correctly produced targeted article being awarded 1 point. Errors that did not pertain to the targeted structure were disregarded.

The oral production test (OP) was administered as a story-retelling task (R. Ellis et al. 2009; Spada, Shiu & Tomita, 2015). The participants were asked to read and listen to the recording of a story (The Cambridge Egg, 615 words) seeded with the targeted article uses. They were allowed to listen and read along once, and then asked to retell the story as accurately as possible. The total number of instances of the targeted article uses in the story was 75; however different participants supplied different numbers of obligatory occasions for the targeted article uses. In terms of scoring, the participants had to produce a minimum of three obligatory instances to receive a score for a targeted article use. Performance was scored as the percentage of correct uses out of the obligatory occasions created. For the purpose of analysis, the scores the participants were given for the elicited imitation test and the story-retelling task were combined into a single mean percentage score for oral measures.

5.6. Preliminary analyses

Prior to the study all the measures were piloted with a similar population of learners (N= 52) and were revised as necessary. The quality of the measures used in the present study was assessed by estimating their internal consistency. The internal consistency of the finalized tests as used in the present study ranged from good to excellent, with Cronbach`s α ranging from .711 to .934.

A series of one-sample KS tests did not show any significant deviation from the normal data distribution, thus the use of parametric statistics was warranted. The alpha level was set at .05.

5.7. Results

5.7.1. Age and instruction

The first research question asked whether younger and older teenage learners who have been exposed to different instructional approaches differ in their explicit and implicit knowledge of L2 English articles. Tables 5.1-5.3 show descriptive statistics for the performance of instructional groups on the MLK test, the Gap-fill test and the Oral measures at pre-test, post-test and delayed post-test.

Table 5.1 Descriptive statistics for the performance of each instructional group on the MLK test at pre-test, post-test and delayed post-test (N total = 115).

Instructional groups	Mean	SD	Min	Max	Max. possible	Mean %
MLK: pre-test						
Deductive younger (N=19)	8.58	2.75	3	14	45	19
Deductive older (N=19)	12.32	5.49	3	21	45	27
Guided Inductive younger (N=17)	8.53	3.48	3	15	45	19

Instructional groups	Mean	SD	Min	Max	Max. possible	Mean %
Guided Inductive older (N=21)	13.05	7.26	1	24	45	29
Incidental younger (N=19)	5.53	2.41	1	10	45	12
Incidental older (N=20)	10.80	4.75	1	19	45	24
MLK: post-test						
Deductive younger (N=19)	33.00	2.83	27	38	45	73
Deductive older (N=19)	34.42	7.79	28	41	45	76
Guided Inductive younger (N=17)	32.41	3.78	26	40	45	72
Guided Inductive older (N=21)	36.43	4.76	28	44	45	81
Incidental younger (N=19)	17.95	4.48	10	27	45	40
Incidental older (N=20)	17.70	4.94	9	27	45	39
MLK: delayed post-test						
Deductive younger (N=19)	32.84	2.59	29	38	45	73
Deductive older (N=19)	34.89	3.28	28	40	45	77
Guided Inductive younger (N=17)	32.47	4.65	26	42	45	72
Guided Inductive older (N=21)	37.05	4.71	29	45	45	82
Incidental younger (N=19)	18.79	4.42	11	27	45	42
Incidental older (N=20)	18.30	4.93	10	27	45	41

Table 5.2 Descriptive statistics for the performance of each instructional group on the Gap-fill test at pre-test, post-test and delayed post-test (N total = 115).

Instructional groups	Mean	SD	Min	Max	Max. possible	Mean %
Gap-fill: pre-test						
Deductive younger (N=19)	18.63	2.50	14	23	36	52
Deductive older (N=19)	20.95	2.46	17	25	36	58
Guided Inductive younger (N=17)	20.29	4.69	13	28	36	56
Guided Inductive older (N=21)	20.85	3.76	15	28	36	58
Incidental younger (N=19)	17.00	3.00	11	22	36	47
Incidental older (N=20)	20.35	2.08	16	24	36	57

Instructional groups	Mean	SD	Min	Max	Max. possible	Mean %
Gap-fill: post-test						
Deductive younger (N=19)	28.11	1.85	25	31	36	78
Deductive older (N=19)	31.26	3.28	26	36	36	87
Guided Inductive younger (N=17)	28.41	4.12	20	35	36	79
Guided Inductive older (N=21)	31.48	3.31	24	36	36	87
Incidental younger (N=19)	22.68	4.05	16	31	36	63
Incidental older (N=20)	27.70	3.31	21	34	36	77
Gap-fill: delayed post-test						
Deductive younger (N=19)	28.26	2.71	23	31	36	79
Deductive older (N=19)	31.26	4.05	24	36	36	87
Guided Inductive younger (N=17)	28.41	3.57	21	35	36	79
Guided Inductive older (N=21)	31.57	3.43	24	36	36	88
Incidental younger (N=19)	22.79	4.60	16	32	36	63
Incidental older (N=20)	28.10	3.58	21	35	36	78

Table 5.3 Descriptive statistics for the performance of each instructional group on the Oral measures at pre-test, post-test and delayed post-test (N total =115).

Instructional groups	Mean %	SD	Min	Max	Max. possible
Oral measures: pre-test					
Deductive younger (N=19)	25	4.27	18	32	100
Deductive older (N=19)	33	8.07	22	46	100
Guided Inductive younger (N=17)	30	6.68	21	43	100
Guided Inductive older (N=21)	38	8.02	21	50	100
Incidental younger (N=19)	28	8.93	14	45	100
Incidental older (N=20)	34	11.09	11	56	100
Oral measures: post-test					
Deductive younger (N=19)	43	8.86	27	56	100
Deductive older (N=19)	55	9.08	39	71	100

Instructional groups	Mean	SD	Min	Max	Max. possible
Guided Inductive younger (N=17)	51	11.64	34	75	100
Guided Inductive older (N=21)	63	11.09	39	83	100
Incidental younger (N=19)	37	12.55	20	61	100
Incidental older (N=20)	51	15.07	20	79	100
Oral measures: delayed post-test					
Deductive younger (N=19)	41	9.30	20	57	100
Deductive older (N=19)	54	9.34	38	70	100
Guided Inductive younger (N=17)	51	10.89	34	73	100
Guided Inductive older (N=21)	63	11.36	40	81	100
Incidental younger (N=19)	39	14.59	16	67	100
Incidental older (N=20)	53	16.51	18	84	100

Descriptive statistics provided in Tables 5.1 – 5.3 suggest that all instruction groups improved their performance on the measures of explicit and implicit knowledge from pre-test to post-test and delayed post-test, but also that there also appear to be differences between the groups at pre-test with older learners outperforming younger learners across all the measures. The latter was confirmed by the results of a series of one-way ANOVAs summarised in Table 5.4.

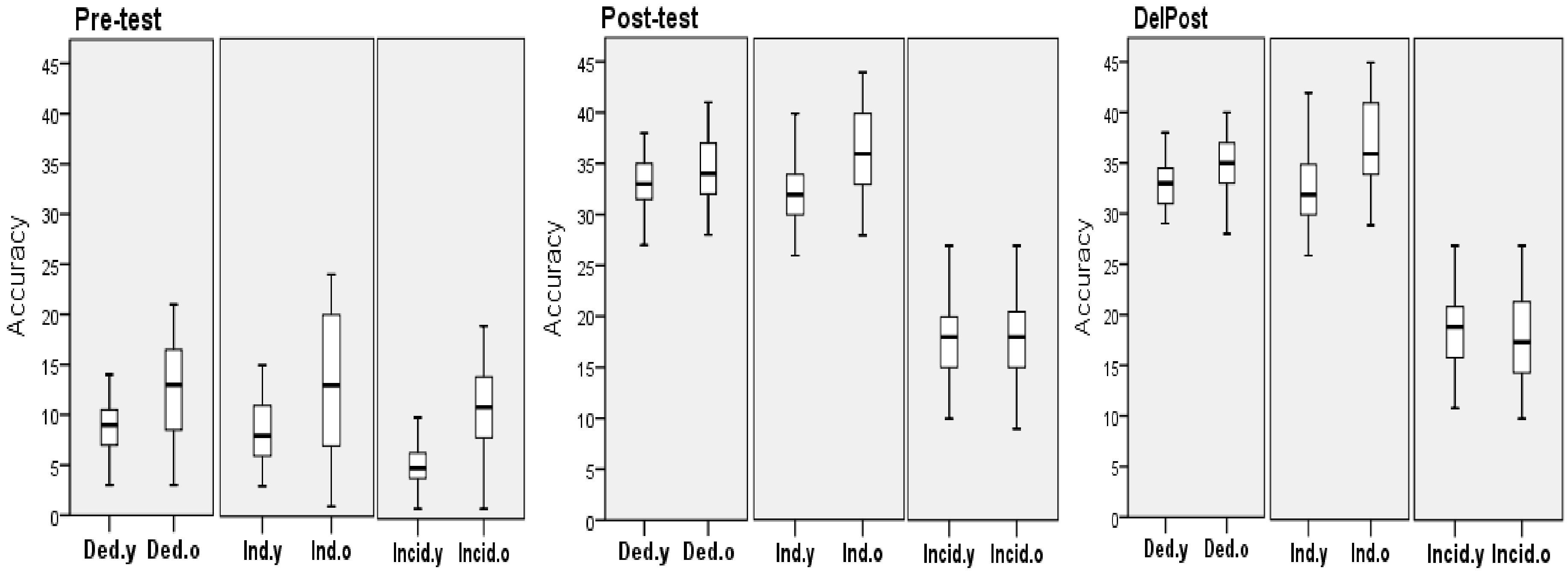
Table 5.4 Results of one-way ANOVAs on pre-test scores and post-hoc pairwise comparisons (N=115)

	One-way Anova	Pairwise comparisons (Tukey)
MLK test	F (5, 109) = 5.31, $p < .001$	Inductive + deductive older >incidental younger ($p < .001$) Incidental older > incidental younger (p =.031)

Gap-fill test	*F* (5,109) = 3.65, *p* =.004.	Inductive + deductive older> incidental younger (*p* =.011)
		Incidental older > incidental younger (p =.046)
Oral measures	*F* (5,109) = 4.98, *p* < .001	Inductive older >deductive younger (*p* < .001)
		Inductive older >incidental younger (*p* =.014)
		Incidental older >incidental younger (*p* =.025)

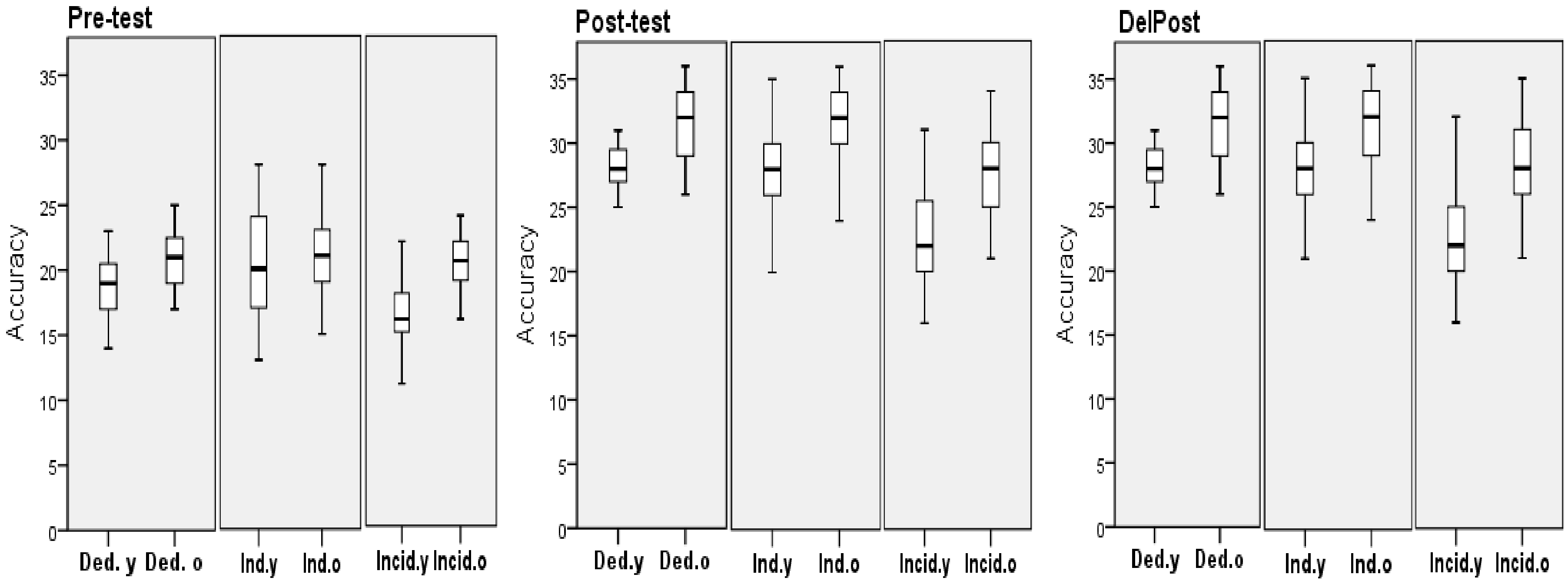
Descriptive statistics further suggest somewhat similar performance at immediate and the delayed post-test. A repeated measures ANOVA taking the participant sample as a whole and comparing their scores on the immediate and delayed post-tests showed that there was a difference in L2 learners` performance from immediate to delayed post-test for the MLK test: $F(5,109) = 4.19$, $p = .043$; but no difference between immediate and delayed post-tests on the gap-fill test: $F(5,109) = 2.15$, $p = .146$ or the oral measures: $F(5,109) = .004$, $p = .952$ for any of the instructional conditions. The boxplots in Figures 5.1-5.3 illustrate performance of instructional groups on the MLK test, the Gap-fill test and the Oral measures at pre-test, post-test and delayed post-test.

Figure 5.1 L2 learners` performance on the MLK test at pre-test, post-test and delayed post-test



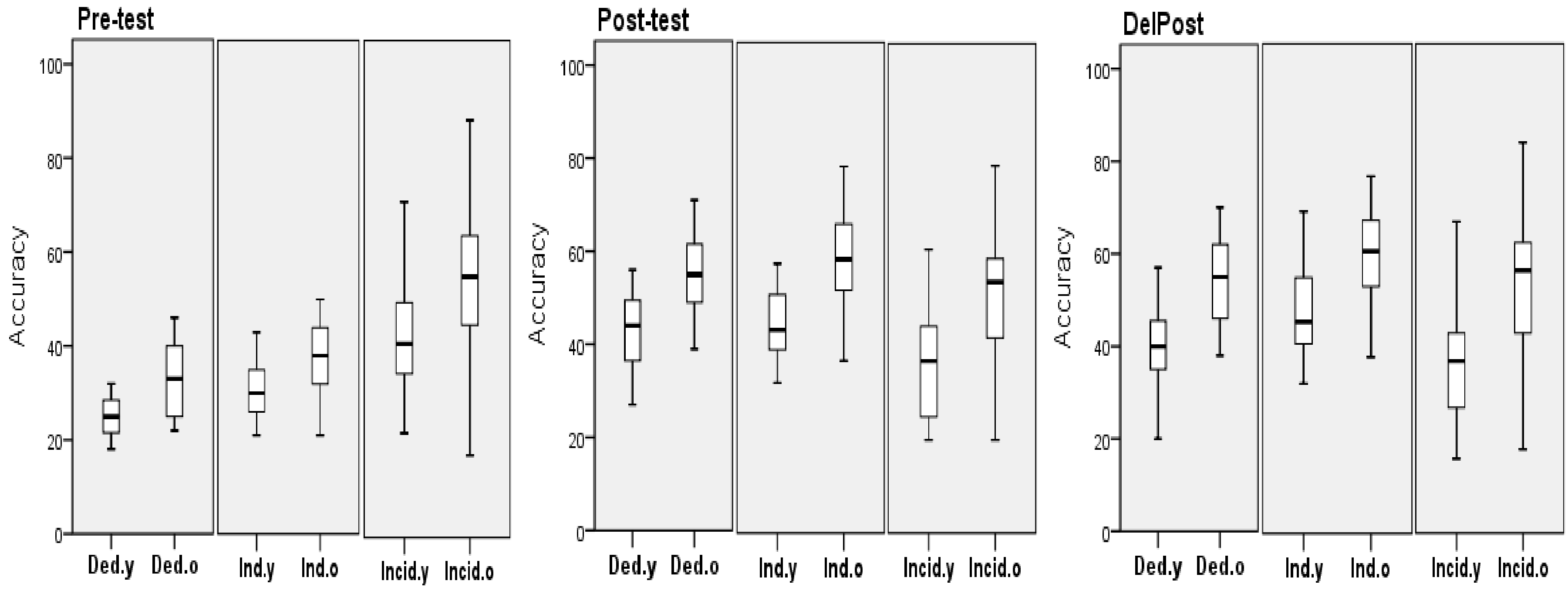
Note: The maximum possible score for the MLK test is 45

Figure 5.2 L2 learners` performance on the Gap-fill test at pre-test, post-test and delayed post-test



Note: The maximum possible score for the Gap-fill test is 36

Figure 5.3 L2 learners` performance on the Oral measures at pre-test, post-test and delayed post-test



Note: Maximum possible score for the Oral measures is 100%

In the light of pre-test differences all subsequent analyses were run on participants` gain scores, that is, difference between pre-test and combined post-test scores, and immediate and delayed gain scores for the MLK test, that is, difference between pre-test and immediate post-test scores and pre-test and delayed post-test scores respectively. Furthermore, to control for proficiency differences, a series of ANCOVAs were conducted with proficiency entered as a covariate and age and instruction as a fixed factor.

A one-way ANCOVA performed on the immediate MLK gain scores (homogeneity of variance: Levene`s $F(5,109) = 1.53$, $p = .186$) revealed a significant main effect of instruction: $F(2,112) = 69.28$, $p < .001$ with a medium effect size, partial $\eta^2 = .56$ (all post-hoc comparisons for type of instructional treatment are summarised in Table 5.2 below); a significant main effect of age: $F(1,113) = 5.95$, $p = .016$ with a marginal effect size, partial $\eta^2 = .05$ with older learners (M = 20.38) outperforming younger learners (M = 17.48); and no interaction between age and instruction: $F(2,109) = 1.80$, $p = .170$.

A one-way ANCOVA performed on the delayed MLK gain scores (homogeneity of variance: Levene`s $F(5,109) = 1.01$, $p = .413$) revealed a significant main effect of instruction: $F(2,112) = 61.97$, $p < .001$ with a medium effect size, partial $\eta^2 = .53$; a significant main effect of age: $F(1,113) = 7.24$, $p = .008$ with a marginal effect size, partial $\eta^2 = .06$, with older learners (M = 20.92) obtaining significantly higher gain scores on the delayed post-test compared to younger learners (M = 17.74), and no interaction between age and instruction: $F(2,109) = 2.71$, $p = .071$.

A one-way ANCOVA conducted on the gap-fill gain scores (homogeneity of variance: Levene`s $F(5,109) = .72$, $p = .607$) revealed a significant main effect of instruction: $F(2,112) = 7.61$, $p < .001$ with a small effect size, partial $\eta^2 = .15$; but no effect of age: $F(1,113) = 1.66$, $p = .201$ and no interaction between age and instruction: $F(2,109) = .33$, $p = .718$.

A one-way ANCOVA conducted on the oral measures gain scores (homogeneity of variance: Levene`s $F(5,109) = .54$, $p = .749$) revealed a significant main effect of instruction: $F(2,112) = 9.86$, $p < .001$ with a small effect size, partial $\eta^2 = .15$; a nonsignificant effect of age: $F(1,113) = 3.44$, $p = .066$ and no interaction between age and instruction: $F(2,109) = .504$, $p = .606$.

Table 5.5 summarises the results of pairwise comparisons by instruction for all the measures.

Table 5.5 Ancova post-hoc pairwise comparisons for instruction (N=115)

Gain scores	Pairwise comparisons
MLK immediate gain	Deductive = Inductive (p =.822)
	Deductive > Incidental (p <.001)
	Inductive > Incidental (p < .001)
MLK delayed gain	Deductive = Inductive (p =.682)
	Deductive > Incidental (p <.001)
	Inductive > Incidental (p < .001)
Gap-fill gain	Deductive = Inductive (p =.334)
	Deductive > Incidental (p <.001)
	Inductive > Incidental (p = .008)
Oral measures gain	Deductive = Inductive (p =.066)
	Deductive > Incidental (p =.008)
	Inductive > Incidental (p < .001)

To summarise, as shown by the results of ANCOVAs, L2 learners assigned to different instructional conditions performed differently. The explicitly instructed groups made comparable gains on the measures of explicit and implicit knowledge and outperformed L2 learners under incidental instructional condition on all the measures. Thus, explicit instruction resulted in larger gains in terms of explicit and implicit knowledge compared to incidental instruction. The results also indicated that the factor of age was significant for L2 learners' gains on the MLK test. The absence of interaction between the age and type of instruction for all the measures indicates that age-related differences do not affect the performance of L2 learners experiencing different instructional approaches.

5.7.2. Age and individual differences

The second research question asked to what extent individual differences in aptitude and WM predict the younger and older teenage learners' development of explicit and implicit knowledge of L2 English articles. As a first step towards addressing this question, learners` performance on the aptitude and WM tests as shown in Table 5.6 was scrutinized.

Table 5.6 Descriptive statistics for language aptitude and WM by age group (N total = 115)

	Mean	SD	Min	Max	Max possible	Mean %
Younger learners (N=55)						
Llama total	217.27	38.17	120	290	375	58%
Llama B	56.91	14.09	30	100	100	57%
Llama D	39.90	10.99	15	55	75	53%
Llama E	73.45	12.94	40	90	100	74%
Llama F	46.55	19.62	0	90	100	47%
WM	6.39	.83	4.75	8.25	9.75	66%
Older learners (N=60)						
Llama total	254.72	39.29	133	330	375	68%
Llama B	65.25	15.42	30	100	100	65%
Llama D	44.33	13.42	5	75	75	59%

Llama E	79.33	12.87	30	100	100	79%
Llama F	64.33	18.07	10	100	100	64%
WM	6.9	1.03	4.75	9.25	9.75	71%

The descriptive statistics suggest that older learners seem to have obtained higher scores for Llama total and subtests and WM capacity compared to younger learners.

Independent samples t-tests revealed that there were statistically significant differences between older and younger learners with older learners outperforming younger learners on WM: $t(113) = -2.975$, $p = .004$; the Llama total: $t(113) = -5.175$, $p < .001$, Llama B: $t(113) = -3.02$, $p = .003$; Llama E: $t\ (113) = -2.44$ and Llama F: $t(113) = -5.06$, $p < .001$. The difference between younger and older learners on Llama D was marginally significant: $t(113) = -.1.92$, $p = .057$.

As a second step towards addressing the second research question, the correlations between participants' gain scores and the measures of general L2 proficiency, aptitude and WM were run. The results are shown in Table 5.7.

Table 5.7 Correlations by age group: Proficiency, aptitude, WM, explicit and implicit L2 knowledge gain scores (N total = 115)

	Proficiency	Aptitude	WM
Younger learners (N=55)			
MLK			
Immediate gain	.26	.29*	.12
	p =.053	*p* = .029	*p* = .369
Delayed gain	.32*	.35*	.17
	p = .018	*p* = .009	*p* = .214

Gap-fill	.41**	.28*	.25
	p = .002	*p* =.036	*p* =.070
Oral measures	.60**	.61**	.53**
	p < .001	*p* <.001	*p* <.001
Older learners (N=60)			
MLK			
Immediate gain	.13	.02	-.01
	p = .312	*p* = .895	*p* = .934
Delayed gain	.21	.06	.03
	p = .107	*p* = .639	*p* = .805
Gap-fill	.39**	.29*	.049
	p =.002	*p* =.023	*p* =.708
Oral measures	.39**	.31*	.24
	p =.002	*p* =.018	*p* = .067

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

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

The correlations in Table 5.7 show that for younger learners L2 proficiency is significantly correlated with the gains on the measures of explicit and implicit knowledge with an exception of the immediate MLK gains. Aptitude is significantly associated with all the gains, while WM is associated with the gains on the oral measures only. For older learners neither L2 proficiency nor individual differences in aptitude or WM are associated with the gains on the MLK test. L2 proficiency and aptitude are significantly correlated with the gains on the gap-fill test and the oral measures. WM does not correlate with any of the measures; however its coefficient is approaching significance for the gains on oral measures.

In order to examine the predictive power of aptitude and WM for each age group, a set of sequential linear regression analyses was conducted. For each analysis, assumptions of a normal distribution of the data, homogeneity of variances, linearity, and the absence of multicollinearity were checked and found to be met. L2 proficiency, aptitude and WM were entered as predictors in that order, with L2 proficiency entered first to control for differences between groups as well as possible confounds with aptitude and/or WM. The gains on the MLK test, the gap-fill test and the oral measures were entered as the dependent variable. Table 5.8 shows the regression model for younger learners` immediate gains on the MLK test.

Table 5.8 Regression model summary: MLK test: immediate gains – younger learners (N=55)

Independent variables	R^2	%	R^2 change (in %)	Sign. F change
L2 proficiency	.07	7		.053
Aptitude	.09	9	+2	.240
WM	.10	10	+1	.518

The results summarised in Table 5.8 show that none of the predictors reached statistical significance with L2 proficiency being a marginally significant predictor of younger learners' immediate gains on the MLK test. Table 5.9 summarises the regression model for delayed post-test gains on the MLK test for younger learners.

Table 5.9 Regression model summary: MLK test: delayed gains – younger learners (N=55)

Independent variables	R^2	%	R^2 change (in %)	Sign. F change
L2 proficiency	.10*	10		.018

Aptitude	.13	13	+.3	.162
WM	.14	14	+.1	.581

The results in Table 5.9 show that L2 proficiency is the only significant predictor of younger learners' delayed gains on the MLK test, accounting for 10% of the variance. In the absence of significant correlations between MLK test gain scores and the predictor variables in the case of older learners, no regression analyses were conducted.

The next dependent variable under scrutiny is gain scores on the gap-fill test. Table 5.10 summarises the regression model for younger learners.

Table 5.10 Regression model summary: Gap-fill test – younger learners (N=55)

Independent variables	R^2	%	R^2 change (in %)	Sign. F change
L2 proficiency	.17*	17		.002
Aptitude	.17	17		.993
WM	.18	18	+.1	.407

The results reveal that L2 proficiency is the only significant predictor of younger learners` gains on the gap fill test which explains 17% of variance in the distribution of scores. Table 5.11 shows the model summary for older learners.

Table 5.11 Regression model summary: Gap-fill test – older learners (N=60)

Independent variables	R^2	%	R^2 change (in %)	Sign. F change
L2 proficiency	.15*	15		.002

Aptitude	.15	15	+0	.759
WM	.20	20	+5	.094

The results in Table 5.11 show that L2 proficiency is the only significant predictor of older learners` gains on the gap-fill test, accounting for 15% of the variance. In summary, the regression analyses so far show that neither aptitude nor WM predict younger or older learners' development of explicit L2 knowledge when L2 proficiency is controlled for. L2 proficiency itself significantly predicts gains on the gap-fill test for both age groups and younger learners` delayed gains on the MLK test.

Younger and older learners` gains on the oral measures constitute the final dependent variable under scrutiny. Table 5.12 shows the model summary for younger learners.

Table 5.12 Regression model summary: Oral measures – younger learners (N=55)

Independent variables	R^2	%	R^2 change (in %)	Sign. F change
L2 proficiency	.36**	36		.000
Aptitude	.43**	43	+7	.013
WM	.47	47	+4	.068

The results in Table 5.12 reveal that for younger learners, aptitude significantly explains 7% of the variance in gains on the oral measures once L2 proficiency is controlled for. Furthermore, the results suggest a trend towards WM explaining 4 % of variance on the gains made on the measure. Table 5.13 shows model summary for older learners.

Table 5.13 Regression model summary: Oral measures – older learners (N=60)

Independent variables	R^2	%	R^2 change (in %)	Sign. F change
L2 proficiency	.15*	15		.002
Aptitude	.15	15	+0	.657
WM	.15	15	+0	.852

The results in Table 5.13 indicate that neither aptitude nor WM predict older learners` gains on the oral measures. L2 proficiency is the only statistically significant predictor explaining 15% of the variance in learners` scores.

In order to evaluate the contribution of individual aptitude components to younger learners` implicit gains, the correlations between the LLAMA subtests and participants' gains on the oral measures were examined with results shown in Table 5.14.

Table 5.14 Correlations: Aptitude subtests and oral measures – younger learners (N=55)

	LLAMA B	LLAMA D	LLAMA E	LLAMA F
Oral measures	.33*	.34*	.38**	.50**
	p =.013	*p* =.010	*p* =.004	*p* < .001

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

**Correlation is significant at the 0.001 level (2-tailed)

The results in Table 5.14 show that all four LLAMA subtests correlate significantly with participants' gains on the oral measures; however the strength of correlations varies. A further regression analysis was conducted with L2 proficiency, Llama F, E, B, D and WM entered as predictors, in that order. The variable L2 proficiency was entered first to control for possible confounds with aptitude. The order in which the LLAMA subtests were entered was determined by the strength of associations shown by the results of the correlation analysis. For the regression model, assumptions of a normal distribution of the data, homogeneity of variances, linearity, and the absence of multicollinearity were checked and found to be met. Therefore, although aptitude subtests correlated with each other (see Appendix J for correlation coefficients), collinearity did not present the problem for the regression model. The results are shown in Table 5.15.

Table 5.15 Regression model summary (LLAMA subtests): Oral measures – younger learners (N=55)

Independent variables	R^2	%	R^2 change (in %)	Sign. F change
L2 proficiency	.36**	36		.000
Llama F	.40	40	+4	.050
Llama E	.41	41	+1	.356
Llama B	.42	42	+1	.550
Llama D	.43	43	+1	.226
WM	.47	47	+4	.072

The results in Table 5.15 show that LLAMA F (grammatical inferencing) marginally predicts 4% of the variance in gains on the oral measures once L2 proficiency is controlled for. WM shows a trend towards predicting younger learners` gains and adds 4% to the explanatory power of the model.

5.8. Discussion

5.8.1. Development of explicit and implicit L2 knowledge of articles

In most general terms the analysis revealed that all three instructional approaches – deductive, guided inductive, and incidental – resulted in durable gains for the two types of knowledge. This finding indicates that L2 English articles are amenable to instruction (Akakura 2012; Hu, 2011) and that both explicit and implicit instructional interventions facilitate acquisition of a challenging grammatical structure. All types of instruction led to significant gains, but explicit types led to greater gains than the implicit approach. Furthermore, while the effect of instruction was evident for L2 learners` performance on the tests of explicit and implicit knowledge, age-related differences were found to affect L2 learners` development on the measure of metalinguistic knowledge (MLK) only. Finally, none of the measures yielded significant interaction between age and type of instruction, thus suggesting that age-related differences of the sort investigated in the study do not play out differently in different instructional conditions.

5.8.2. Effects of instruction

The statistical analysis showed that regardless of whether instructional intervention was deductive or guided inductive in nature, explicit instruction led to larger gains than implicit instruction on the measures of explicit and implicit knowledge. The facilitative effect of either type of explicit instruction for the development of explicit knowledge is in the alignment with the overall greater effectiveness of explicit instruction reported by a number of previous studies and corroborated by meta-analytic research (Goo, Granena, Yilmaz, & Novella, 2015; Norris & Ortega, 2001). Furthermore, explicit intervention facilitated the development of L2 learners` implicit knowledge, thereby supporting findings reported by Akakura (2012), who likewise found that explicit instruction can contribute to the development of implicit knowledge of articles and that such gains are both durable and robust. The absence of interaction between age and the type of instruction indicates that explicit instruction benefitted both age groups. Thus, it can be assumed that 12-year-old learners can benefit in equal measure to 17-year-olds provided they have been exposed to an explicit instruction environment. This finding supporting claims expressed by Lichtman (2013; 2016), who argued that explicit instruction affects children and adults in the same way and that inclination towards implicit or explicit learning is not exclusively caused by age differences, but also influenced by instruction.

5.8.3. Effects of age

As suggested by the analysis, in the context of the narrow age gap between the participants, being a slightly older teenage learner is an advantage for the development of L2 learners` performance exclusively on the measure of metalinguistic knowledge; however the effect size was only modest. It seems that older learners` greater state of cognitive maturity gave them the edge over younger learners on the measure that requires learners to comprehend and articulate metalinguistic descriptions and explanations (rule explanation subtest) as well as produce appropriate illustrative L2 examples (rule illustration subtest). Put differently, older teenage learners appear to be better equipped when it comes to successful performance on the measure prompting L2 learners to retrieve and formulate their linguistic knowledge in metalinguistic terms. Furthermore, given that the 15 to 17-year-old learners were actively preparing towards university entrance exams comprised of the tests assessing among other aspects their metalinguistic knowledge, teaching they had been exposed to prior to the experimental intervention was tailored towards helping them pass such tests and provided them with more practice activities targeting articulation of metalinguistic knowledge. The 12 to 14-year-old learners, by contrast, did not receive the same amount of similar practice activities and consequently were lacking sufficient experience in formulating their metalinguistic knowledge. Information on the type of practice activities younger and older teenage L2 learners typically receive as a part of their curriculum was obtained following a discussion with teachers at the school in question.

Overall, the identified patterns show that in the context of the relatively narrow age gap between the learners, age-related differences do not affect the development of L2 learners` performance on the gap-fill test and the oral measures. Nonetheless, age influences the gains L2 learners achieve on the measure of metalinguistic knowledge. Thus, successful performance on a test requiring retrieval and formulation of pedagogical grammar rules may be enhanced by older learners` overall higher language proficiency as well as greater experience in performing on tests similar to the MLK.

5.8.4. Age and individual differences in cognitive ability

The first finding of note concerns the potential dynamicity of language learning aptitude in the participating L2 learners. Older learners outperformed younger learners on the measures of aptitude and WM capacity which provides further evidence for dynamic rather than stable nature of cognitive ability in younger participants. This finding is in keeping with existing arguments (Milton & Alexiou, 2006; Suárez & Muñoz, 2011) that performance on aptitude tests will develop in conjunction with growing cognitive maturity. Older teenage learners are at a more advanced state of cognitive development, whereas younger learners are still developing as reflected by their lower aptitude and WM scores. When they attain the state of cognitive maturity similar to that of the older learners they have been compared to, younger learners are expected to close the gap.

In terms of the development of explicit knowledge, regression analyses showed that neither aptitude nor WM significantly contributed to younger or older learners` development of explicit L2 knowledge of articles. In other words, higher cognitive ability did not convey any advantages for performance on the explicit measures for either age group. L2 proficiency was the only significant predictor of gains on explicit knowledge. It seems that development of explicit knowledge in a form-focused dimension may pose fewer acquisition challenges since L2 learners are provided with teachers' guidance as well as explicit corrective feedback; therefore individual differences in aptitude and WM are no longer relevant for explicit achievement.

Findings pertaining to the development of implicit knowledge showed a different pattern of results. In younger learners, aptitude explained 7% and WM marginally predicted an additional 4% in the gains made on the oral measures. Thus, higher levels of aptitude and working memory were needed for younger learners` implicit gains to materialise. Predictive value of aptitude for the development of younger learners` implicit knowledge supports findings of existing studies (Muñoz, 2014; Rosa and Muñoz, 2013) which also reported significant correlations between aptitude and oral comprehension and production skills for younger instructed learners (10-11 years old). What is more, all aptitude components were significantly associated with participants` gains on the measure of implicit knowledge. Nonetheless, regression analyses elucidated that only grammatical inferencing ability as measured by LLAMA F marginally predicted 4% of the variance in implicit gains when the aptitude sub-tests were entered separately into the analysis. Further analysis found that memory ability as measured by LLAMA B had the lowest correlation with the oral measure. This is in contrast with findings reported by Muñoz (2014) who found that the rote memory ability as measured by Number Learning on MLAT-E showed the strongest association with speaking scores above other measures in 10 to 12-year-old children. Tellier & Roehr-Brackin (2013) also identified Number Learning as the strongest predictor of overall achievement in a multiple regression analysis with 8 to 9-year-old children. Nonetheless, in a later study with a larger sample of participants (N=111) comparable to that of the present study, Tellier & Roehr-Brackin (2016) likewise discovered that grammatical sensitivity as measured by Matching Words on the MLAT-E was a significant predictor of younger learners` L2 French proficiency gain scores uniquely explaining 6% of the variance. This finding provided an opposing perspective to the claim that young children draw above all on memory abilities. Such contrasting findings allow several tentative conclusions regarding the role played by memory and language analytic ability in younger learners` linguistic development. First, younger children may indeed rely on memory more generally, whereas older children make use of grammatical inferencing ability enhanced by their more advanced cognitive development. Second, as argued by Lichtman (2013; 2016) and Tellier & Roehr-Brackin (2016) the type of instruction L2 learners are experiencing may be as important as the factor of age in terms of its effect on L2 learning mechanisms. If L2 learners are exposed to explicit form-focused instruction, then language analytic ability becomes relevant even for younger learners. However, if the instructional context is more meaning-focused, then younger children may above all draw on their memory ability in the first place.

Since the present study examined L2 learners whose regular instruction was primarily form-focused, grammatical inferencing ability was more pertinent for their L2 learning, enabling higher aptitude younger learners to construct implicit knowledge of a challenging grammatical structure more efficiently compared to their lower-aptitude peers.

Finally, the present study brought into focus the potentially facilitative effect of WM for the development of younger learners` implicit knowledge. This is broadly consistent with existing research (see overview by Juffs & Harrington, 2011) showing an overall positive contribution of WM to linguistic development.

As far as older learners are concerned, neither aptitude nor WM had a role to play in the development of their implicit knowledge with proficiency-related differences accounting for 15% of variance. This suggests that a certain level of aptitude and WM capacity may be required by younger but not older teenage learners to develop implicit gains in instructed setting. As indicated above the latter may have already achieved a certain threshold of cognitive maturity and in turn invested it in the development of general L2 proficiency, which explains the predictive value of proficiency for implicit development. In contrast, only some younger learners may have reached this threshold, while others are on the path towards it. Consequently, in younger learners, differences in cognitive ability are still important, with higher-aptitude learners at advantage.

5.9. Conclusion

By assigning younger and older teenage L2 learners to controlled instructional conditions, the present study sought to establish whether the type of instruction L2 learners experienced would interact with their age profile and have differential contributions to the development of their knowledge of L2 English articles. It was found that explicit instruction resulted in larger gains in explicit and implicit knowledge than implicit instruction, showing that L2 learners as young as 12 can benefit from explicit instruction to a similar extent to older teenage learners. Modest age effects emerged only on the measure of metalinguistic knowledge. It was argued that older learners` greater state of cognitive maturity and sufficient practice of verbalization of explicit knowledge may give them advantage over younger learners.

Individual differences in aptitude and executive WM predicted gains in implicit knowledge for younger learners, but none of the older learners` observed gains. It was suggested that since form-focused instruction offers L2 learners direct assistance with a challenging structure, it lowers the cognitive threshold necessary for explicit gains to materialize and thus equalises individual differences in cognitive ability in the development of explicit knowledge for both age groups. Nonetheless, individual differences still have a role to play for the more cognitively taxing measure of implicit knowledge in younger learners, who have not yet achieved the level of cognitive ability comparable to that of older teenage learners and rely on aptitude in implicit achievement.

5.10. Limitations and suggestions for future research

It needs to be acknowledged that this study has a number of limitations, among them the fact that the age gap between the groups was relatively narrow. Ideally, a larger age difference between learners is desirable to assess the impact of age effects as well as possible interactions between age and type of instruction experienced by learners. However, in practice that it is difficult to achieve given the challenge of finding participants who differ substantially in age yet have the same or similar levels of L2 proficiency. In other words, in practice age and L2 proficiency are typically confounded.

Since individual difference factors accounted for a small proportion of the variance in L2 learners` gain scores, this warrants the need to include a range of other possible predictors in future studies, such as learners' attitude towards instructional treatment or their motivation for learning the L2.

CHAPTER SIX LEARNERS` PERCEPTIONS AND BELIEFS ABOUT DEDUCTIVE, INDUCTIVE AND INCIDENTAL INSTRUCTION

Understanding variability in L2 learning involves comprehensive examination of a variety of factors. Learner perceptions and beliefs related to the process of L2 learning, i.e. their feelings, likes, dislikes and attitudes are assumed to constitute an important contributor to the acquisition of a target language (Wesely, 2012; Horwitz, 1988; Mills et al., 2006, 2007; Yoshida, 2008; Thepseenu & Roehr, 2013). It is thought that more positive and supportive beliefs may facilitate L2 achievement by sustaining interest and motivation to overcome acquisition problems, while negative beliefs associated with decreased interest and motivation may impede it (Wesely, 2012; Hosseini & Pourmandnia, 2013).

6.1. Previous research on the effects of learner perceptions and beliefs on L2 learning

A number of empirical investigations on learner perceptions and beliefs examined how those concepts can be related to L2 learning outcomes. Learners' attitudes, perceptions, and beliefs about themselves as language learners were found to be related to enjoyment and satisfaction with their learning environment (Brantmeier, 2005) and achievement on proficiency measures or grades (Brantmeier, 2005; Mills et al., 2006, 2007). Several of these studies focused on the principle of self-assessment, where the learners offered evaluations of their own ability in a language class, (Brantmeier, 2005), assessment of difficulty of the language material (Thepseenu & Roehr, 2013; Rodríguez Silva & Roehr-Brackin, 2016; Rodríguez Silva, 2017), usefulness of corrective feedback (Yoshida, 2008) and instruction (Thepseenu & Roehr, 2013). Several recent studies examined associations between the difficulty of the target structures as perceived by L2 learners (Rodríguez Silva & Roehr-Brackin, 2016), perceived usefulness of instruction (Thepseenu & Roehr, 2013) and their L2 performance.

Thepseenu & Roehr (2013) investigated L1 Thai university-level learners` metalinguistic knowledge about L2 English and beliefs associated with it. The participants (n=64) completed a metalinguistic knowledge test (MLK) as well as a beliefs questionnaire that required them to indicate the perceived level of difficulty of the twelve grammar points featured in the MLK test on a five-point scale ranging from ‘very easy’ to ‘very difficult’. Additionally, they were asked to assess usefulness of instruction on these grammar points on a five-point scale ranging from ‘very useful’ to ‘not useful at all’. Finally, a sub-sample of nine participants took part in semi-structured interviews probing their beliefs about metalinguistic knowledge in the context of their L2 learning. Findings revealed a correspondence between learners` beliefs and actual performance, i.e. participants performed better on grammar points they endorsed with lower learning difficulty than on the points they associated with higher learning difficulty. Interestingly, instruction was deemed to be more useful for easier grammar points than for more difficult ones. Results pertaining to learners` beliefs indicated that the participating students held more positive views about the explicit instruction and grammar learning than negative ones. Studying grammar was considered important for successful L2 learning. Negative beliefs mainly focused on overall complexity of pedagogical grammar rules, the potential confusion they entail as well as the challenging nature of memorising a large number of rules.

In another study Rodr ǵuez Silva & Roehr-Brackin (2016) explored perceived learning difficulty and learners` actual performance on the measures of explicit and implicit knowledge of thirteen L2 English structures (e.g. simple past tense, indefinite article, modal verbs etc.). The participants were university level Spanish L2 learners of English (n=30), university teachers of English (n=11) and applied linguists (n=3). L2 learners and teachers completed a specially designed difficulty judgement questionnaire which presented them with the textbook label given to each grammar point (e.g. ‘Simple past tense’), a pedagogical grammar rule associated with it, a sentence illustrating the use of the grammar point, and an example of a typical learner mistake.

They were then asked to indicate how difficult each targeted grammar point was on a simple five-point scale (very easy – easy – moderate – difficult – very difficult). L2 learners additionally completed a metalinguistic knowledge test measuring learner explicit knowledge and an EI test measuring their implicit knowledge. The applied linguists assessed learning difficulty as implicit and explicit knowledge in accordance with the taxonomy listing the criteria believed to influence explicit and implicit learning difficulty of L2 grammar points (Roehr & Gánem-Gutiérrez, 2009) by assigning a value of 'high', 'medium' or 'low' to each variable in the taxonomy for each targeted grammar point. The results indicated that experts` judgements of perceived learning difficulty did not predict L2 learners` performance, while L2 learners` difficulty judgements were significantly associated with their performance on the measure of explicit knowledge. The latter point suggested that the learners may have been primarily concerned with explicit knowledge when addressing the issue of learning difficulty. Although correlations based on teachers' holistic assessment of difficulty did not reach statistical significance, their judgements exhibited a trend towards the best overall prediction of L2 learners` performance on the measures of explicit and implicit knowledge.

Overall, the findings suggest that there is a correspondence between L2 learners' holistic difficulty rankings and their L2 performance. This implies that learners` knowledge is influenced by individual variation in L2 beliefs and perceptions assumed to be a part of an individual`s metacognition.

6.2. Research issues

Studies which examined associations between learner perceptions and beliefs point towards a link between learner holistic perceptions and beliefs about instruction they are exposed to and L2 learning outcomes. Thus, it seems plausible to consider contributions of learner perceptions and beliefs about instruction to acquisition of explicit and implicit knowledge of English articles.

Furthermore, since the results described in Chapter 5 showed that the factor of age was relevant only for the development of learner metalinguistic knowledge, while explicit instruction was equally beneficial for the development of explicit and implicit knowledge in both age groups, it is worth examining whether any age-related differences will emerge in learner perceptions of instructional treatment.

6.3. Participants and instruments

115 Russian L2 learners of English who received instructional intervention described in detail in the relevant sections of the Methodology chapter filled in an instruction satisfaction questionnaire upon completion of the treatment and administration of the measures of explicit and implicit knowledge. The instruction satisfaction questionnaire comprised ten statements. For the first eight statements participants were required to indicate the extent to which they agreed with the statements on a six-point scale (strongly agree-agree-agree somewhat-disagree somewhat-disagree-strongly disagree). These pertained to the structure and content of instructional sessions, presentation and usefulness of the material covered in class, amount of work learners were asked to do in class, and learner enjoyment of sessions. It should be noted that L2 learners did not always provide satisfaction ratings for each statement, omitting from 1 to the maximum of 3 ratings. Statements 9 and 10 asked learners to write three things they liked about the treatment and three things they did not like. A full description of the instruction satisfaction questionnaire (for full instruction satisfaction questionnaire see Appendix G) along with scoring and analysis is provided in section 2.5.5.

6.4. Results

6.4.1. Type of instruction, age and learner satisfaction with instruction

For the purposes of the analysis, the scores learners received for the first eight statements were added up to arrive at an aggregate instruction satisfaction score. Descriptive statistics run on the whole sample indicated that overall L2 learners appear to be satisfied with the instruction with mean satisfaction score of 80% (M = 38.43; SD = 5.06). As a next step an analysis of instruction satisfaction by age group and instruction group is presented. Table 6.1 provides an overview of descriptive statistics for overall instruction satisfaction by age group.

Table 6.1 Descriptive statistics for instruction satisfaction by age group (N = 115).

	Mean	Mean %	SD	Min	Max	Max. possible
Older learners (N=55; age range 15-17)	38.98	81	4.95	27	48	48
Younger learners (N=60; age range 12-14)	37.82	79	5.16	28	48	48

Descriptive statistics in Table 6.1 indicate that overall both younger and older teenage learners were satisfied with the instruction they received. Independent samples t-test run on the instruction satisfaction scores showed that there was no statistical difference between older and younger learners: $t(113) = -1.24$, $p = .219$. Thus, no observable age differences in instruction satisfaction rates were detected.

Table 6.2 summarises descriptive statistics for overall instruction satisfaction by instruction group.

Table 6.2 Descriptive statistics for instruction satisfaction by instruction group (N = 115)

	Mean	Mean %	SD	Min	Max	Max. possible
Deductive (N=38)	39.18	81%	3.81	30	48	48

Guided inductive (N=38)	41.80	87%	4.33	34	48	48
Incidental (N=39)	34.59	72%	4.31	27	45	48

Descriptive statistics suggest that those L2 learners who experienced guided inductive instruction had the highest satisfaction scores followed by the learners in the deductive group. L2 learners under the incidental approach appear to be less satisfied with the treatment compared to their explicitly instructed peers.

A one-way ANOVA conducted on the participants` satisfaction scores showed that there was a statistically significant difference between the treatment groups, $F(2,112) = 28.88$, $p < .001$ (homogeneity of variance: Levene`s $F(2,112) = 1.23$, $p = .296$). Post-hoc pairwise comparisons (Tukey) indicated that the guided inductive group had higher satisfaction scores than the deductive ($p = .022$) and the incidental group ($p < .001$) and that there was also a statistically significant difference between the deductive and incidental group ($p < .001$).

To summarise, the findings suggest that both younger and older teenage learners reported similarly high levels of satisfaction with the instructional treatment. Given that the age gap between L2 learners was relatively narrow it did not significantly effect their satisfaction ratings, a circumstance entirely expected. The analysis by instruction group showed that learners under explicit instruction were more satisfied with the treatment compared to learners in implicit condition. The examination of course satisfaction scores by instructional condition showed that guided induction resulted in the highest course satisfaction scores across the instructional conditions. Thus, it is plausible that instructional intervention that involves the process of guided induction by encouraging learners to attend to a particular construction and arrive at metalinguistic generalizations of their own is viewed by L2 learners as more satisfying and rewarding than a more traditional deductive approach or an incidental condition that is completely novel to the participating learners. Furthermore, it seems that the approach which does not incorporate overt rule explanation or guided process of rule induction is less appealing to L2 learners trained in an explicit instructional environment focusing on the development of explicit metalinguistic knowledge and its subsequent implementation for the development of comprehension and production skills.

6.4.2. Type of instruction, age, instruction satisfaction and the development of explicit and implicit knowledge

As a next step, the correlations between participants' gain scores on the measures of explicit and implicit knowledge, which is the difference between pre-test and combined post-test scores and satisfaction scores, were run. The results are shown in Table 6.3.

Table 6.3 Correlations: instruction satisfaction scores, explicit and implicit L2 knowledge gain scores – whole sample (N=115)

	Instruction satisfaction
MLK	.48**
	p <.001
Gap-fill	.37**
	p < .001
Oral measures	.63**
	p < .001

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

The results in Table 6.3 show that participants' instruction satisfaction scores are significantly associated with gains in explicit and implicit knowledge of L2 articles. The correlation is strongest between overall instruction satisfaction and the gains L2 learners made on the measures of implicit knowledge, while explicit knowledge gain scores and course satisfaction are moderately correlated. Table 6.4 shows the correlational patterns by age group.

Table 6.4 Correlations by age group: instruction satisfaction, explicit and implicit L2 knowledge gain scores (N total = 115)

	Instruction satisfaction
Younger learners (N=55)	
MLK	.52**
	p < .001
Gap-fill	.26*
	p = .047
Oral measures	.68**
	p < .001
Older learners (N=60)	
MLK	.44**
	p < .001
Gap-fill	.47**
	p < .001
Oral measures	.58**
	p < .001

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

The correlations in Table 6.4 show that satisfaction scores are significantly correlated with the gains on all the measures at medium to high level of strength in both younger and older teenage learners. It is worth noting that in both age groups correlation is the strongest for the gains made on the measure of implicit knowledge. Table 6.5 summarizes correlation patterns by instruction group.

Table 6.5 Correlations by instruction group: instruction satisfaction, explicit and implicit L2 knowledge gain scores (N= 115)

	Instruction satisfaction
Deductive (N=38)	
MLK	-.19
	p = .248
Gap-fill	.16
	p = .318
Oral measures	.54**
	p < .001
Guided inductive (N=38)	
MLK	.09
	p = .579
Gap-fill	.30
	p = .079
Oral measures	.45**
	p = .006
Incidental (N=39)	
MLK	.31
	p = .051
Gap-fill	.19
	p =.254

Oral measures	.56**
	$p < .001$

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

Correlations by instruction group revealed that instruction satisfaction is significantly associated with the gains participants made on the measure of implicit knowledge and marginally significantly with the gains on the measure of metalinguistic knowledge in the incidental group. Interestingly, the strength of association for the measure of implicit knowledge is higher in the deductive and incidental group than in the guided inductive group, suggesting that positive perception of the treatment course is slightly more important for the gains made by the deductive and incidental groups than by the guided inductive group.

Overall, instruction satisfaction rates are significantly correlated with the gains made on the two types of knowledge in both younger and older learners. This is in concordance with previous research which documented the association between learner perceptions and beliefs about the instructional treatment and L2 learning outcomes (Brantmeier, 2005; Mills et al., 2006, 2007; Rodríguez Silva & Roehr-Brackin, 2016; Thepseenu & Roehr, 2013). However, the analysis of associations by instruction group indicated that satisfaction scores are significantly associated with the development of implicit knowledge only. Satisfaction rates were marginally significant for the development of metalinguistic knowledge in the incidental group only, suggesting that the latter may have been driving the significant association between the development of metalinguistic knowledge and course satisfaction in the sample as a whole. This finding implies that a more positive attitude towards the instruction may facilitate the development of metalinguistic knowledge in the instructional condition which does not offer L2 learners direct assistance with a challenging structure as opposed to explicit instructional environment. Overall, it seems plausible to suggest that in an explicit form-focused environment providing learners with relevant metalinguistic descriptions and sufficient output practices, more positive perceptions and beliefs about instruction convey no benefit for the development of explicit knowledge. By contrast in implicit learning conditions which do not provide learners with any guidance, more positive perceptions and beliefs are relevant for the development of metalinguistic knowledge. Nonetheless, if the aim is the development of implicit knowledge, learners in both explicit and implicit instructional conditions may equally benefit from a more positive outlook to instruction.

6.4.3. Qualitative results of positive and negative perceptions of different types of instruction

The L2 learners` attitude towards the instructional treatment could be seen in more detail from their responses to statements asking them to list up to three things they liked and disliked about the course. Content analysis of participants` responses detailing positive features identified two main themes from the data: teacher`s encouragement/support and the structure and content of the sessions. These were frequent themes within the responses and highly salient for the majority of L2 learners.

6.4.3.1. Teacher`s encouragement/support

A positive attitude towards the teacher who administered the instructional treatment was one of the most frequently indicated themes with a majority of participants highlighting encouragement, support and feedback they received from the teacher as positive sides of the course. Examples of such comments included: “The teacher encouraged me to work hard”, “The teacher helped me with difficult parts”, and “The teacher explained my mistakes and it helped a lot”.

6.4.3.2. The structure and content of classes

The majority of participants stated that they enjoyed the content of sessions, and practice activities involving games, e.g. “Simon says”, a snowball game, a hang man.

In terms of course structure, while the students in the deductive group did not comment on the structure of the classes, L2 learners in the guided inductive group highlighted the feature "the teacher allowed me to discuss difficult material with my friends". Furthermore, a number of inductively instructed learners liked the fact that they could work out the rules themselves without the teacher`s intervention. More than half of the learners in the inductive group appreciated the fact that they were encouraged to search for rules. As one student commented: "It was difficult but different from what we do at school. I liked it". L2 learners under the incidental approach indicated that they enjoyed the classes. Among positive sides of the instruction they most frequently mentioned opportunities to practise their speaking skills in a variety of production exercises and the absence of metalinguistic descriptions along with written and oral drills. Several participants in the incidental group commented: "We did not learn rules", and "We didn`t do grammatical exercises and talked a lot. It was strange".

Overall, it seems plausible that the inclusion of games facilitates a more positive perception of instructional intervention since they introduce an element of competition into language-learning activities and provide learners with opportunities to practise language in a more fun-filled and relaxing atmosphere. Positive perceptions of the story-based approach are hardly surprising since a special emphasis was made to make them more interesting and engaging for the learners and thereby foster more genuine learner interaction and participation in the classroom. The developed stories offered a wide range of styles and vocabulary, allowing learners to develop multiple interpretations and opinions along with focusing on matters that concern them personally.

A large number of learners did not respond to the statement asking them to list negative aspects of the course. Many learners commented that they did not have any particular dislikes or complaints about the course. Of those L2 learners who responded, the majority mentioned the challenging nature of the assessment measures.

6.5. Summary of main findings and conclusion

In most general terms the analysis revealed that learners' perceptions and beliefs about the instructional intervention regardless of the type of instruction they experienced were positive. Both younger and older teenage learners were equally satisfied with the instructional intervention. As indicated by the results of the qualitative analysis it was the teacher`s encouragement/support, the structure and content of the sessions that were perceived most positively across all three instructional conditions.

The analysis by instruction group revealed that the guided inductive instruction was perceived more positively than the deductive instruction. This suggests that different types of explicit form-focused instruction do not result in the same satisfaction rates and that learners see a more student-centred approach giving them greater autonomy as more rewarding compared to a more traditional teacher-led deductive approach.

Scrutiny of associations between the satisfaction scores and learner gains on the measures of explicit and implicit knowledge yielded significant correlations between positive perceptions and beliefs about instruction and the development of implicit and explicit knowledge in a sample as a whole as well as in the analysis by age group. Subsequent analysis by instructional condition indicated that positive perceptions and beliefs about instruction were important for the development of implicit knowledge in all treatment groups, suggesting that learners in both explicit and implicit instructional conditions benefit from a more positive outlook to instruction. Nonetheless, while higher satisfaction rates were not relevant for the development of explicit knowledge in the deductive and the guided inductive groups, they were marginally significant for the gains made on the measure of metalinguistic knowledge in the incidental group. Thus, it was argued that more positive perceptions and beliefs about instruction have no role to play in the development of explicit knowledge for learners acquiring an L2 under explicit form-focused instruction. However, the development of metalinguistic knowledge under implicit instruction that does not provide L2 learners direct assistance with a challenging structure benefits from a more positive outlook on the instruction.

CHAPTER SEVEN GENERAL DISCUSSION AND CONCLUSION

Second language learning outcomes in terms of the development of explicit and implicit knowledge are highly variable due to a variety of factors, including instruction, age, individual differences in cognitive ability, learner perceptions and beliefs and interactions among them. Whilst examination of these factors in isolation allows us to gain insight into the nature of L2 acquisition, investigation of how multiple factors interact to mediate the process and outcomes of L2 learning can enhance our understanding even further. This study addressed the aforementioned sources of variation individually as well as jointly to assess their contributions to the development of explicit and implicit knowledge of L2 English articles by Russian learners of English. The main research questions were as follows:

RQ 1: Which tests measure explicit and which tests measure implicit knowledge of L2 English articles?

RQ 2: How do source attributions and confidence ratings employed in a gap-fill test contribute to our understanding of the type(s) of knowledge measured?

RQ 3: What is learners' explicit and implicit knowledge of different article uses targeted in the study?

RQ 4: Do learners who have experienced different instructional approaches differ in their explicit and implicit knowledge of L2 English articles?

RQ 5: To what extent do differences in language learning aptitude and executive working memory predict the development of learners’ explicit and implicit knowledge of L2 English articles?

RQ 6: Do younger and older teenage learners who have been exposed to different instructional approaches differ in their explicit and implicit knowledge of L2 English articles?

RQ 7: To what extent do differences in language learning aptitude and working memory capacity predict younger and older teenage learners` development of explicit and implicit knowledge of L2 English articles?

RQ 8: Are there associations between L2 learners` perception and beliefs about instruction they have experienced and the development of explicit and implicit knowledge of L2 English articles?

The formulated research questions were discussed in detail in the relevant chapters of this thesis. Research questions 1-3 were addressed in Chapter 3; questions 4-5 were examined in Chapter 4; questions 5-7 were addressed in Chapter 5 and question 8 was examined in Chapter 6. The general discussion presents an overview of the findings and explores associations between them.

7.1. The measures of explicit and implicit knowledge

In terms of construct validity of the designed suite of tests it was predicted that the untimed form-focused MLK test that required the use of metalanguage, and the untimed form-focused gap-fill test would elicit explicit knowledge of the targeted structure. By contrast the EI test and the OP test that were meaning-focused and time-pressured because of their oral/aural modality would elicit implicit knowledge of the targeted structure. Overall, the results of the analysis provided evidence that the measures tapped relatively separate pools of knowledge, thus supporting the prediction. Principal component analysis showed that the EI and the OP sub-tests load heavily on one component labelled “implicit knowledge”, while the sentence explanation and rule illustration sub-tests of the MLK test loaded on a second component labelled “explicit knowledge”. The obtained pattern of results is broadly consistent with existing research (R. Ellis, 2005; Bowles, 2011, Spada, Shiu & Tomita, 2015, Zhang, 2015). Importantly, the sentence correction sub-test of the MLK test and the gap-fill test loaded on both components, however the gap-fill test had larger loadings on the component of explicit knowledge. This finding suggests that the sentence correction and the gap-fill test might measure both types of knowledge to some extent.

Subsequent examination of evidence provided by source attributions and confidence ratings introduced for the gap-fill test showed that the L2 learners` who performed successfully on the test reported drawing on explicit knowledge. High intercorrelations between rule and memory source attributions representing participants` explicit knowledge and accuracy on the gap-fill test along with and an inverse relationship between guess and intuition representing participants` implicit knowledge endorsed this interpretation. What is more, the analysis of confidence ratings showed that accuracy on the gap-fill test and greater reported confidence were significantly correlated. This indicates that participating L2 learners had good judgement of their own knowledge and assigned higher confidence ratings to correctly resolved items and lower confidence ratings to erroneous items. Importantly, the use of rule was associated with increased confidence, while the reported use of guess and intuition was associated with decreased confidence. The uncovered association between the self-reported use of metalinguistic knowledge and a higher degree of confidence is in concordance with findings by Roehr (2006) who found that the use of metalinguistic knowledge co-occurred more often with certain than with uncertain decisions. It further disconfirms predictions made by R. Ellis (2005) who hypothesised that measures of implicit knowledge will attract more certain responses than measures of explicit knowledge. Thus, results of the analyses support the prediction that accuracy on the gap-fill test would be associated with the self-reported use of explicit knowledge and that the use of metalinguistic knowledge (rule) would attract higher confidence ratings.

7.2. Explicit and implicit knowledge of individual article uses

With respect to L2 learners` explicit and implicit knowledge it was predicted that given high learning difficulty of articles and absence of formal instruction on articles at the school of testing, L2 learners would have limited explicit and implicit knowledge of articles. Examination of learners` performance on the measures of explicit and implicit knowledge prior to instructional treatment indicated that they had constructed both implicit and explicit knowledge of the targeted article uses. Thus, although the participating learners had not received any formal instruction on articles at the school of testing they still developed a certain degree of explicit and implicit knowledge of a challenging grammatical structure. Therefore, the prediction was not supported. By way of explanation it is argued that since articles are frequent in English, and as none of the learners were beginners, they had encountered article constructions before, and had some knowledge of them. This suggests that cumulative experience of exposure and use of an L2 may be an important factor in L2 learning and potentially determine the extent of knowledge one acquires especially in the context when no metalinguistic knowledge that could aid acquisition is provided. This is in line with previously reported findings emphasising contributions of cumulative experience in L2 use to learner linguistic development (Roehr & Gánem-Gutiérrez, 2009b; Ackerman, 2007; Rodríguez Silva, 2017). Nonetheless, since the measures of implicit knowledge were more challenging for the participating learners compared to the measures of explicit knowledge, it can be argued that the learners seem to have built up greater explicit than implicit knowledge of articles. This result is hardly surprising given that the instruction learners are typically exposed to at the school of testing is essentially deductive and directed towards passing school achievement exams and university entrance exams which require a high degree of explicit knowledge. Learners are actively encouraged to spend more time developing explicit knowledge about the language than practising it in various communication contexts – a consequence that may have formed a bias towards study about the language (explicit knowledge) than the use of the language in spontaneous communication contexts (implicit knowledge). Additionally, since none of the participants had experience of living in English-speaking countries, had either no or very limited communication with native speakers, and limited exposure to input outside classroom, they essentially developed more explicit than implicit knowledge. This fact implies that foreign language programmes in Russia may not provide the necessary conditions (e.g. employing native English-speaking teachers to facilitate learner exposure to high quality native or near-native input or enabling learners to participate in an English-speaking environment outside the classroom) which could foster the development of implicit knowledge of English. Similar conclusions were drawn by Zhang (2015) who likewise found that instructed Chinese learners of English develop a higher degree of explicit knowledge, which he attributed to the form-focused instruction they receive and their English learning environment that offers limited opportunities to practise L2 in spontaneous communication.

Importantly, whilst L2 learners had built up some explicit knowledge of articles, in the absence of formal instruction and sufficient practice activities they could not successfully retrieve and verbalise it in metalinguistic terms; low accuracy scores obtained by learners for the error explanation and rule illustration sub-tests of the MLK test compared to the means obtained for the gap-fill test endorses this interpretation. Greater difficulty experienced by instructed learners on the rule-explanation component of the MLK test is in concordance with previous research examining learner metalinguistic knowledge (R. Ellis, 2006; Rodríguez Silva & Roehr-Brackin, 2016; Spada, Shiu & Tomita, 2015). Overall, it seems plausible that although cumulative experience of L2 allows learners to develop explicit knowledge of a difficult grammatical structure in the contexts when no formal instruction is provided, it does not result in more generalizable rule-like knowledge. Additionally, in the absence of formal instruction learners may lack necessary metalanguage to describe the knowledge they possess.

A comparison of the pre-test scores and difficulty rankings for implicit knowledge and for explicit knowledge by article use showed that learning difficulty of individual article uses varies and is different depending on the type of knowledge considered, therefore supporting the prediction that individual article uses would differ in their difficulty. This finding concurs with the results of a large-scale study by R. Ellis (2006) focusing on 17 grammatical structures drawn from a typical EFL curriculum, which reports that difficulty of grammatical structures varied depending on the type of knowledge considered, i.e. some grammatical structures were easy explicitly but difficult implicitly and vice versa. Consequently, given the variation in explicit/implicit difficulty of the targeted article uses, it was argued that they behave like different grammatical structures altogether and in this sense, may well be equivalent to a range of L2 constructions. The latter is worth noting, since the majority of studies concerned with the investigation of English articles (e.g. Muranoi, 2000; Hu, 2011; Bitchener & Knoch, 2010) did not distinguish between various article uses, but provided total accuracy scores, thus neglecting potential differences between them.

Subsequent analysis by article use revealed that there was no significant correlation between implicit and explicit knowledge, indicating that learners may have constructed explicit knowledge of certain article uses and implicit knowledge of other uses, but not necessarily both implicit and explicit knowledge of the same use. This pattern of results suggests that either explicit or implicit knowledge for each targeted article use is developed first and then the other type of knowledge is constructed.

Several explanations have been put forward to account for the differences in the explicit/implicit difficulty of the targeted article uses, which are the generic/non-generic article uses proposed by Akakura (2012), the assumptions of the Fluctuation Hypothesis put forward by Ionin, Ko & Wexler (2004, 2008), and the system-based vs item-based distinction offered by usage-based perspective on L2 learning. However, as none of the considered explanations could fully account for the observed difficulty pattern, it was speculated that several factors may jointly affect the development of article knowledge, including learner use of L2 as well as total amount of input received inside and outside the classroom. The finding that individual articles vary in their explicit/implicit difficulty and behave like a range of L2 constructions implies that some article uses are less amenable to explicit instruction than others and that some uses maybe better acquired implicitly and some explicitly. Thus, there do not seem to be silver bullets when it comes to effective teaching of articles. What is more, one may ask whether it is better to work with learners` natural strengths or whether teaching should try to compensate for learners` weaknesses. If the first point of view is adopted, then article uses characterised by high implicit difficulty should be taught explicitly, i.e. by providing learners with more sophisticated metalinguistic explanations and corrective feedback along with substantial controlled practice activities. By contrast, article uses of high explicit difficulty should be taught implicitly, i.e. by incorporating them in free production activities allowing for use of the targeted structure in a less controlled and more spontaneous communication environment. If the second point of view is adopted, then more explicit assistance should be provided for article uses characterised by high explicit learning difficulty, while article uses of high implicit difficulty should be targeted by encouraging implicit learning. For now, this question remains open and awaits a thorough empirical examination that could provide insight into the matter.

7.3. Contributions of different types of instruction

In terms of contributions of different types of instruction to the development of explicit and implicit knowledge or articles it was expected that explicitly instructed learners would develop higher explicit and implicit knowledge of L2 English articles compared to learners exposed to implicit instruction. With respect to the effectiveness of different types of explicit form-focused instruction for the development of explicit and implicit L2 knowledge, no directional hypothesis had been formulated as to which approach would be more effective since empirical research comparing deductive and inductive instructional approaches has provided mixed findings. Overall, the analysis indicated that L2 learners can develop explicit and implicit knowledge under both explicit form-focused and implicit meaning-focused instruction. Furthermore, the gains they made are durable regardless of the instructional condition they were assigned to as shown by the results of the delayed post-test conducted six months after the instructional treatment. Thus, it can be concluded that any type of instruction facilitates the development of explicit and implicit knowledge of a challenging grammatical structure like English articles. This suggests that articles if treated as a single linguistic target, are amenable to instruction corroborating previously reported findings (e.g. Akakura, 2012; Hu, 20111; Bitchener & Knoch, 2008), and that both explicit and implicit instruction have a positive effect on learner development.

Importantly, both types of explicit instruction were more effective than implicit type, resulting in larger gains on the measures of explicit knowledge, which is in concordance with previous research showing the advantage of explicit instruction in the development of explicit grammatical knowledge (e.g. Goo, Granena, Yilmaz, & Novella, 2015; Norris & Ortega, 2001). This result supported the prediction pertaining to greater effectiveness of explicit form-focused instruction for the development of explicit L2 knowledge. It is important to note that explicitly instructed learners reported higher course satisfaction rates compared to learners in the implicit condition. It is plausible that either prior experience of explicit form-focused instruction may foster a bias towards more positive beliefs about similar approaches overall or learners may realize that explicit instruction is more effective, and thus prefer it over implicit instruction.

The finding concerning the equal effectiveness of the deductive and the guided inductive approaches for the development of explicit knowledge is in keeping with the results of other study (Hwu & Sun, 2012) that likewise reported equal effectiveness of the deductive and guided inductive approaches on a written, grammar-based outcome measure. The latter implies that instructional approaches characterized by a comparable level of explicitness in the sense that they equip learners with relevant explicit knowledge about the targeted structures and allow them to practise and produce them, have a similar effect on the development of explicit knowledge.

Whilst grammatical structures of high linguistic difficulty may show similar sensitivity to the deductive and guided inductive approaches in respect of the acquisition of explicit knowledge, the two types of explicit instruction made differential contributions to the development of implicit knowledge. It was found that the guided inductive approach led to significantly larger gains on the measures of implicit knowledge than the deductive or the incidental approaches. This suggests that not all types of explicit instruction are equally beneficial for the development of implicit L2 knowledge, therefore providing only partial support to the prediction that explicitly instructed learners would develop higher implicit knowledge of articles compared to implicitly instructed learners.

It was argued that since the guided inductive approach as used in the present study mirrored the bottom-up learning trajectory from exemplar to schema assumed in the usage-based approach to L2 learning (Eskildsen, 2009, 2012; Spoelman & Vespoor, 2010; Roehr-Brackin, 2014, 2015) compatible with the development of implicit knowledge and offered learners direct assistance along this path, it accelerated learner progression towards more schematic knowledge. This could explain the advantage of the guided inductive approach over the deductive and incidental approaches in relation to the development of implicit knowledge. The deductive approach offering learners metalinguistic descriptions as a first step arguably fosters greater reliance on the use metalinguistic knowledge - a consequence that may be detrimental in certain contexts of language use, e.g. spontaneous communication (Roehr-Brackin, 2014). When L2 learners try to attend to both form and meaning simultaneously, they may encounter processing difficulty. This results in a subsequent increase in the number of mistakes learners make in free speech since metalinguistic knowledge cannot be applied successfully. The incidental approach is less effective since its effectiveness depends to a greater extent on ample exposure to the input which is hardly attainable in the instructed setting.

Importantly, it should be noted that L2 learners in the guided inductive condition held more positive views on instructional treatment than learners in the deductive condition, indicating that guided induction fostered a more positive outlook on the learning process. The latter could be attributed to the novelty of guided induction in the sense that it encourages greater learner autonomy compared to a more traditional teacher-led deductive approach typically realized through a presentation-practice-production sequence.

Furthermore, equal benefits provided by the guided inductive approach for the development of explicit knowledge and its superiority over the deductive approach in the development of implicit knowledge along with the highest satisfaction rates reported for this instructional condition suggest that the participating learners seem to be well suited to it in the sense that they may have a natural tendency to try to work things out on their own and enjoy greater autonomy rendered by this approach. This bias towards more individualized and independent language learning implies that the participating learners possess sufficient ability to engage with self-discovery of rules and subsequently induce generalizations on their own. This in turn may explain how they developed explicit and implicit knowledge of articles (as shown by the results of the pre-test assessment) without the provision of formal instruction.

Overall, the findings show that non-salient grammatical features like English articles are amenable to instruction which results in large and durable gains on the measures of explicit and implicit knowledge. Not surprisingly, explicit form-focused instruction operationalised by the deductive and the guided inductive instructional approaches led to larger gains on the measures of explicit knowledge than implicit instruction. By contrast, when the aim was to develop implicit knowledge, the guided inductive approach that mirrors the implicit learning path from exemplar to schema was more effective than the deductive and the incidental approaches. This finding corroborates previous research which documented the advantage of explicit instruction on learning of more difficult structures in general (de Graaff, 1997; Housen, Pierrard, & Van Daele, 2005) and acquisition of English articles in particular (Akakura, 2012; Hu, 2011).

7.4. The relationship between age and type of instruction

While either type of explicit form-focused instruction resulted in significant gains on all the measures of article knowledge, the effects of age were found on the test of metalinguistic knowledge only with older teenage learners outperforming younger teenage learners. Therefore, the prediction that older teenage learners would have an advantage over younger teenage learners on all the measures of explicit and implicit L2 article knowledge received only partial support. By way of explanation, it was proposed that older learners` greater state of cognitive maturity gave them an advantage over younger learners on the measure prompting L2 learners to retrieve and interpret their linguistic knowledge in metalinguistic terms. Both younger and older L2 learners were equally satisfied with the instructional intervention they experienced, with both age groups reporting higher satisfaction rates with explicit form-focused instruction than implicit instruction. Thus, in the context of a narrow age gap between the learners age-related differences do not have a major role to play in learner linguistic development or their perceptions about the instructional intervention they experienced.

The absence of interaction between age and the type of instruction indicated that explicit form-focused instruction is equally beneficial for the development of explicit and implicit knowledge in both younger and older teenage learners. The fact that 12-year-old learners can benefit in equal measure to 17-year-olds suggests that bias towards explicit learning typically attributed to more mature learners is not exclusively produced by age-related differences in cognitive processing but is also fostered by instruction. Thus, it seems plausible that learning under explicit form-focused instruction allows younger learners to make a switch from relying on the mechanisms of implicit learning to more explicit learning mechanisms relevant in the contexts of formal language acquisition and to benefit from the provision of metalinguistic descriptions and feedback. This result crucially supports a growing body of empirical evidence (e.g. Lichtman, 2013, 2016; Tellier & Roehr-Brackin, 2016) that observed differences in learners of different ages in implicit vs. explicit L2 learning are not exclusively constrained by maturation, but also influenced by instruction L2 learners are exposed to. Greater exposure to explicit form-focused instruction may facilitate reliance on explicit learning mechanisms in both younger and older learners to a similar extent provided that a minimum threshold of cognitive development has been reached.

Importantly, one should bear in mind that these results cannot be extrapolated to very young children (e.g. under the age of 7) since at that age they are still at the pre-operational stage of cognitive development in accordance with Piaget`s developmental stage theory (1929) which reflects the increasing sophistication of children's thought. Piaget posited four stages in the development of operations: 1. the sensorimotor stage (ages 0 to 2 years), 2. pre-operational stage (ages 2 to 7 years), 3. concrete operational stage (ages 7 to 11 years), 4. formal operational stage (ages 11-12 to 14-15). As children become more cognitively mature, they become increasingly more able to construct more sophisticated mental representation and move from more concrete to more schematic representations independent of specific context (e.g. Gombert, 1992). Progress in metalinguistic awareness is associated with the onset of concrete-operational stage (ages 7 to 11 years) which enables children to reflect on the properties of language and engage in deliberate problem-solving, and consequently to benefit from explicit instruction (Hakes, 1980).

7.5. Contributions of age, type of instruction and cognitive abilities to the development of explicit knowledge

In terms of the role played by individual differences in cognitive ability for the development of explicit knowledge of English articles, it was expected that they would interact with the type of instruction L2 learners have experienced. More specifically, it was expected that explicit form-focused instruction would neutralize the effect of individual differences in aptitude and WM but these cognitive factors would still be relevant for the development of explicit knowledge in the incidental group. The findings indicated that higher cognitive ability did not convey any advantages to the development of learners` explicit knowledge in any of the instruction groups. Therefore, these results provided only partial support to the prediction. Whereas some previous research suggests that individual differences in cognitive ability have a greater role to play in explicit conditions fostering the development of explicit knowledge in the first place (e.g. de Graaff, 1997; Gebauer & Mackintosh, 2007), several other studies (Tagarelli et al., 2016; Erlam, 2005) have found no relationship between learner performance on the measures of explicit knowledge and individual differences in cognitive ability. This result is possibly due to the provision of metalinguistic descriptions along with sufficient output practices, which appear to be particularly effective in levelling out individual differences in aptitude and WM in the development of explicit knowledge.

Importantly, the fact that the incidental group likewise made significant gains in terms of explicit knowledge of articles indicates that implicit, meaning-focused instruction did not prevent learners from drawing on their metalinguistic awareness and arriving at metalinguistic generalizations (Brooks & Kempe, 2012; Kempe & Brooks, 2011). However, it is important to note that without direct help or guidance from the teacher and the instructional materials, learners with higher levels of general L2 proficiency were at an advantage.

As suggested by results of the present study, instruction, and in particular explicit form-focused instruction, neutralises individual differences in explicit linguistic development and does so in both younger and older teenage learners. Therefore, the prediction that individual differences would influence acquisition of explicit knowledge in both age groups did not receive empirical support.

Interestingly, while the levelling effect has been reported mainly for deductive instruction offering learners direct assistance in the form of relevant metalinguistic descriptions (e.g. Erlam, 2005; Tagarelli, 2016), the results of the present study suggest that guided induction that encourages learners to infer metalinguistic generalizations on their own is equally effective in levelling out individual differences in the development of explicit knowledge at least in the case of high-ability learners. Since the guided inductive group outperformed the deductive and incidental groups on the measures of LLAMA_F and the BDS, it included the highest-ability learners assumed to be best suited for this approach (Hwu & Sun, 2012). Thus, while the deductive approach realised through the presentation-practice-production sequence appears to be equally effective with all ability learners, learners with higher cognitive profiles appear to be better suited to the guided inductive approach. This argument concurs with previous suggestions (Hwu & Sun, 2012; Robinson, 1997) that inductive instruction may be particularly relevant for those L2 learners who are better cognitively equipped to engage in active hypothesis-testing and, thus, are more able to successfully infer rules underpinning context.

7.6. Contributions of age, type of instruction and cognitive abilities to the development of implicit knowledge

Predictions pertaining to the relevance of individual differences to the development of implicit knowledge stated that aptitude and WM would be important for the development of implicit knowledge in all ages and instruction groups. Results concerning the relevance of individual differences in aptitude and WM for the development of implicit knowledge in the sample as a whole showed that they predicted gains obtained for the measures of implicit knowledge only, although it should be borne in mind that these individual differences accounted only for a small proportion of the variance when proficiency was controlled for. Thus, it seems that higher cognitive ability conveys advantages when it comes to the development of a more challenging type of linguistic knowledge, therefore supporting the general prediction. Since learners were acquiring their L2 in the setting characterised by limited exposure to high quality input along with scarce opportunities to practise language skills in spontaneous communication, higher cognitive abilities were helpful in constructing implicit knowledge of a non-salient structure.

With respect to the predictive power of various aptitude sub-components, the findings for the sample as a whole revealed that LLAMA F (grammatical inferencing) significantly predicted learners' gains on the measure of implicit knowledge, though the amount of variance explained (6%) was small. These results are in keeping with Li's (2016) findings that different sub-components of language aptitude show different predictive validity for different aspects of learning. The relevance of grammatical inferencing ability is in concordance with existing findings in L2 learning research (Li, 2015, 2016, Yalçın & Spada, 2016), which highlighted its relevance for morphosyntactic learning.

In relation to learner age, it was found that individual differences in cognitive ability predicted the acquisition of implicit knowledge in younger but not older teenage learners. Therefore, the prediction that individual differences in cognitive ability would be important for the development of implicit knowledge in both younger and older teenage learners was not fully supported. As suggested by our results, although, explicit form-focused instruction levelled out individual differences in aptitude and WM in the acquisition of explicit knowledge for both age groups, it had no such levelling effect in the arguably more cognitively taxing acquisition of implicit knowledge in younger learners who had not yet reached the same level of cognitive maturity as older teenage learners. By way of explanation it was argued that performance on the measures of implicit knowledge challenged younger teenage learners to the extent that they needed higher aptitude to cope with them. By contrast the older learners no longer had to operate at maximum capacity since they had already reached the required threshold of cognitive maturity; thus higher aptitude did not convey any additional advantages.

The results revealed that only grammatical inferencing ability predicted 4% of the variance in implicit gains when proficiency was controlled for. This finding suggests that predictive power of grammatical inferencing ability evidenced for the whole sample may have been driven by the younger teenage learners. Thus, it is plausible that younger teenage learners may rely above all on grammatical inferencing ability enhanced by explicit form-focused instruction they typically experience to obtain implicit gains comparable to those of the older learners.

In terms of instruction it was found that individual differences in aptitude and WM predict the development of implicit knowledge in the deductive and the incidental conditions respectively but not in the guided inductive approach which levelled out individual differences in cognitive ability. Thus, our prediction that individual differences in aptitude and/or WM would influence acquisition of implicit knowledge in all instructional conditions received only partial support. Pertaining to the levelling effect of the guided inductive approach it was argued that when the type of instruction (assisted bottom-up) is ideally matched with the target outcome (development of implicit knowledge), individual differences in cognitive ability may no longer be relevant. Although this argument seems to offer a plausible explanation for the observed pattern of results, we need to bear in mind that the guided inductive group was comprised of the highest ability learners.

The predictive power of aptitude in the deductive group may suggest that higher-ability learners who had experienced explicit form-focused instruction can more readily exploit their metalinguistic knowledge, which in turn enables them to notice more and create more accurate auto-input during practice activities. This in turn allows for gains in implicit knowledge to materialize. In contrast, lower-ability learners cannot utilise their explicit knowledge to the same extent, as reflected by their lower implicit gains.

The finding that acquisition of articles is mediated by the cognitive variable of WM in implicit condition is worth noting. It indicates that greater resources in terms of online storage and processing compensates for the absence of relevant metalinguistic descriptions along with corrective feedback and output practices in this condition. While WM has been shown to be linked to mainly controlled, explicit language processing (Linck & Weiss, 2011; Roehr, 2008), the results of the present study show that it predicts the development of implicit knowledge. This finding is in keeping with existing research showing the relevance of WM to less monitored speaking and listening (Erçetin & Alptekin, 2013; Robinson, 2002).

7.7. Contributions of learners` perceptions and beliefs to the development of explicit and implicit knowledge

In terms of the contributions of L2 learners` perceptions and beliefs about instructional treatment to L2 learning outcomes, it was predicted that more positive perceptions and beliefs about instruction would be associated with the development of explicit and implicit knowledge. In most general terms it was found that learners' perceptions and beliefs about the instructional intervention regardless of the type of instruction they experienced were positive. Examination of associations between the treatment satisfaction scores and the gains obtained by L2 learners on the measures of explicit and implicit knowledge yielded significant correlations between L2 learners` perceptions and beliefs about instruction and the development of implicit and explicit knowledge in a sample as a whole and by age group. Therefore, our prediction was supported. This finding is in keeping with previous research which documented the association between learner perceptions and beliefs about the instructional treatment and L2 learning outcomes (Brantmeier, 2005; Mills et al., 2006, 2007; Thepseenu & Roehr, 2013).

A series of analyses by instructional condition revealed a more complex picture. It was found that higher satisfaction rates did not convey any advantage to the acquisition of explicit knowledge in the deductive and the guided inductive groups, but they were marginally significant for the development of metalinguistic knowledge in the incidental group. Therefore, it was concluded that more positive perceptions and beliefs about instruction are not important for the development of explicit knowledge for learners exposed to explicit form-focused instruction. Nonetheless, the development of metalinguistic knowledge in unassisted incidental condition benefits from a more positive outlook on the instruction.

By contrast, it was found that positive perceptions and beliefs about instruction influenced the development of implicit knowledge in both explicitly and implicitly instructed learners. This suggests that when the aim is the development of implicit knowledge, learners in both explicit and implicit instructional conditions may equally benefit from a more positive outlook on instruction.

7.8. Overall conclusion

Taking everything above mentioned into consideration it can be concluded that when it comes to teaching articles, explicit form-focused instruction that provides learners with necessary assistance with English articles by means of pedagogical grammar rules results in the development of larger gains on the measures of explicit and implicit knowledge compared to implicit meaning-focused instruction. Furthermore, it is equally beneficial for the development of the two types of knowledge for either age group since it allows younger teenage learners to make a switch from implicit to explicit learning and benefit from the provision of metalinguistic descriptions to develop explicit and implicit knowledge of English articles. L2 learners as young as 12 can benefit from explicit instruction to a similar extent as 17-year-old teenage learners at least with regard to the development of explicit knowledge of articles.

The observed pattern of results suggests that the guided inductive approach which mirrors the implicit learning path from exemplar to schema and offers learners assistance on the way may be particularly effective when it comes to teaching articles. The guided inductive approach is as effective as the deductive approach for the development of explicit knowledge resulting in equally large and durable gains and levelling out individual differences in cognitive ability. It surpasses the deductive approach in the implicit dimension by fostering larger gains and levelling out individual differences and leads to the highest satisfaction rates. Nonetheless, we should bear in mind that these findings were obtained with the highest-ability learners who outperformed the incidental group on the sub-test of grammatical inferencing ability and the deductive group on the measure of WM and thus appear to be the best fit for this approach. These findings have important pedagogical implications suggesting that the guided inductive approach leads to success in L2 learning outcomes if administered to more able students with higher levels of grammatical inferencing ability and WM along with a natural inclination to more individualized learning. Furthermore, in the context of more mixed groups it seems plausible that teachers could alternate deductive and inductive approaches to appeal to a range of abilities and interests rather than use one instructional approach benefitting some learners at the exclusion of others.

7.9. Limitations of the study and suggestions for further research

The present study is not exempt from limitations. One of them pertains to the development and administration of valid and reliable classroom-based measures of learners' explicit and implicit L2 knowledge. While the use of measures such as the MLK test 'forces' learners to access their explicit knowledge quite reliably by asking them to articulate it in metalinguistic terms, it is particularly challenging to capture 'pure' implicit knowledge by means of the elicited imitation and oral production tests. Although these measures as used in the present study were time constrained, reconstructive in nature and required L2 learners to attend to meaning, it was impossible to guarantee that participants would only draw on implicit knowledge at the total exclusion of the other. Possibly better ways of capturing learners` implicit knowledge would be administration of the elicited imitation and oral production tests together with more lab-style tasks such as eye-tracking/visual-world paradigm. While this was not attainable in the present study because of the practical limitations such as access to participants and absence of necessary equipment at the school of testing, future classroom-based research would benefit from the inclusion of such lab-style measures.

Furthermore, it must be acknowledged that given that the study was conducted in a classroom setting, I had no strict control over the learning mechanisms employed by participants who could freely exchange information pertaining to the instruction they received with one another as well as access additional sources of information after each teaching session. Nonetheless, this is an inherent feature of any ecologically valid classroom experiment attempting to closely approximate real classroom setting.

One more limitation pertains to the lack of verbal reports to assess the extent and quality of the knowledge that L2 learners had built up prior to the instructional treatment in the absence of formal instruction on articles and compare it with the knowledge they constructed after the intervention. Verbal reports would be of particular relevance for the examination of explicit knowledge in the incidental group that did not receive any metalinguistic descriptions but made significant gains on the measures of the two types of knowledge. This procedure would have allowed me to gain better understanding of the quality of explicit knowledge developed by learners in the incidental group along with their ability to provide verbal descriptions of the knowledge they possessed. Following the lack of verbal reports, another limitation is the lack of debriefing sessions to clarify what article uses learners perceived to be easier/more challenging and why they thought so.

Furthermore, since article uses are notoriously difficult to acquire, it would be useful to include a difficulty judgement questionnaire asking learners to make holistic judgement on the difficulty of the targeted article uses according to their experience in learning the L2. Learners` difficulty rankings could be consequently correlated with the gains they make on the measures of explicit and implicit knowledge to see whether they lead to significant predictions of learner development. Likewise, it seems relevant to ask L2 teachers to provide similar holistic judgements on the learning difficulty of article uses based on their teaching experience and their intuitions to determine whether such judgements may predict gains made by learners on the measures of explicit and implicit knowledge.

To the best of my knowledge, the current study represents the first empirical attempt to examine contributions of type of instruction, individual differences in aptitude and WM, age and learner perceptions and beliefs to the development of explicit and implicit knowledge of L2 English articles. One suggestion for future research pertains to the finding that individual article uses essentially behave like a range of grammatical structures in the sense that they vary in terms of their explicit and implicit difficulty. This warrants the need for a more thorough examination of individual article uses since some uses appear to be more amenable to instruction than others.

Furthermore, as mentioned previously, it is important to explore the most effective approach to teaching article uses of high explicit difficulty (i.e. by either giving more explicit assistance or avoiding explicit instruction) and uses of high implicit difficulty (i.e. by either encouraging implicit learning or avoiding implicit learning) since such research will have important pedagogical implications for instruction on articles.

The current study focused on the examination of L2 learners` explicit and implicit knowledge at the lower-intermediate level of proficiency. Further empirical investigations with lower and higher levels of proficiency in a similar L2 learning context might produce different pattern of results with respect to the effect of the examined variables on learner linguistic development. What is more, it seems desirable to explore the effectiveness of different types of explicit and implicit instruction and possible interaction between them and learner age-profiles at beginner and elementary levels. By the same token, it would be of interest to investigate whether individual differences in aptitude and WM may be better predictors of explicit and implicit development at these levels, and whether the provision of metalinguistic descriptions would lead to levelling effect in the development of learner explicit knowledge.

As noted earlier, the results of the study showed that explicit form-focused instruction facilitates the development of explicit and implicit knowledge in both younger and older teenage learners, therefore suggesting that learners as young as 12 can benefit in equal measure to older teenage learners. It seems necessary to examine whether explicit instruction will render equal benefits to linguistic development in learners younger than 12. Additionally, since it was found that differences in learners of different ages in implicit vs. explicit L2 learning are not exclusively caused by maturation, but also influenced by instruction they experience, more research examining the role of instruction and age in explicit and implicit language learning is desirable.

The last suggestion relates to the effectiveness of the guided inductive approach that resulted in the largest gains on the measures of implicit knowledge and levelled out individual differences in aptitude and WM in high-ability learners. Further research focusing on the relevance of this approach to lower-ability learners may have different results. Crucially, studies including lower-ability learners would help to clarify whether guided induction is equally effective when it comes to the development of implicit knowledge in instructed contexts characterised by limited input and learner opportunities to engage in spontaneous communication.

REFERENCES

Abrahamsson, N., & Hyltenstam, K. (2008). The robustness of aptitude effects in near native second language acquisition. *Studies in Second Language Acquisition*, 30, 481– 509.

Absi, Z. (2014). Metalinguistic knowledge and speaking proficiency in Syrian university-level learners of English (Unpublished doctoral thesis). University of Essex.

AbuSeileek, A. F. (2009). The effects of using an online-based course on the learning of grammar inductively and deductively. *ReCall*, 21(3), 319-336.

Ackerman, P. L. (2007). New developments in understanding skilled performance. Current Directions in Psychological Research, 16, 235-239.

Akakura, M. (2012). Evaluating the effectiveness of explicit instruction on implicit and explicit L2 knowledge. *Language Teaching Research*, 16, 9 –37.

Anderson, N. J. (2012). Metacognition: Awareness of language learning. In S. Mercer, S. Ryan & M. Williams (Eds.), *Psychology for language learning: Insights from research, theory and practice* (pp. 169-187). London: Palgrave Macmillan UK.

Andringa, S., & Rebuschat, P. (2015) New directions in the study of explicit and implicit learning. *Studies in Second Language Acquisition*, 37, 185– 196.

Baddeley, A. D. (1996). Exploring the central executive. *Quarterly Journal of Experimental Psychology*, 49 (1), 5-28.

Baddeley, A. D. (2000). The episodic buffer: A new component of working memory? *Trends in Cognitive Sciences*, 4(11), 417- 423.

Baddeley, A. D. (2003a). Working memory and language: An overview. *Journal of Communication Disorders,* 36, 189-209.

Baddeley, A. D. (2003b). Working memory: Looking back and looking forward. *Nature Reviews Neuroscience,* 4, 829-839.

Baddeley, A. D. (2007). *Working memory, thought, and action*. Oxford: Oxford University Press.

Baddeley, A. D. (2012). Working memory: theories, models and controversies. *Annual Review of Psychology*, 63 (1), 1-29

Baddeley, A. D., Gathercole, S. E. & Papagno, C. (1998). The phonological loop as a language learning device. *Psychological Review*, 105, 158–173

Baddeley, A. D. & Hitch, G. J. (1974). Working memory. In G. Bower (Ed.), *The psychology of learning and motivation.* (pp. 47-89). New York: Academic Press.

Behrens, H. (2009). Usage-based and emergentist approaches to language acquisition. *Linguistics*, 47 (2), 383– 411.

Bell, S. M., & McCallum, R. S. (2012). Do foreign language learning, cognitive, and affective variables differ as a function of exceptionality status and gender? *International Education*, 42, 86 – 106.

Bitchener, J. & Knoch, U. (2008). The value of written corrective feedback for migrant and international students. *Language Teaching Research* 12, 409–431.

Birdsong, D., Molis, M. (2001). On the evidence for maturational constraints in second-language acquisition. *Journal of Memory and Language*, 44, 235–249.

Blackburn, H. L. & Benton, A. L. (1957) Revised administration and scoring of the digit span test. *Journal of Consulting Psychology*, 21(2), 139– 143.

Bowles, M. A. (2011). Measuring implicit and explicit linguistic knowledge: What can heritage language learners contribute? *Studies in Second Language Acquisition*, 33, 247 – 271.

Bowles, M. A., & Leow, R. P. (2005). Reactivity and type of verbal report in SLA research methodology: Expanding the scope of investigation. *Studies in Second Language Acquisition*, 27, 415–440.

Brantmeier, C. (2005). Nonlinguistic variables in advanced second language reading: Learners' self-assessment and enjoyment. *Foreign Language Annals*, 38, 494–504.

Brooks, P. J., & Kempe, V. (2012). Individual differences in adult foreign language learning: The mediating effect of meta-linguistic awareness. *Memory & Cognition, 41*, 281-296.

Brown, A. V. (2009). Students' and teachers' perceptions of effective foreign language teaching: A comparison of ideals. *Modern Language Journal*, 93, 46–60.

Brown, R. (1973). *A first language: The early stages*. Cambridge, MA: Harvard University Press.

Bulté, B., & Housen, A. (2012). Defining and operationalising L2 complexity. In A. Housen, F. Kuiken, & I. Vedder (Eds.), *Dimensions of L2 performance and proficiency* (pp. 21-46). Amsterdam: John Benjamins.

Carroll, J. B. (1962). The prediction of success in intensive foreign language training. In R. Glaser (ed.), *Training research and education*. Pittsburgh, PA: University of Pittsburgh Press, 87–136.

Carroll, J. B. (1973). Implications of aptitude test research and psycholinguistic theory for foreign language teaching. *International Journal of Psycholinguistics*, 2, 5–14.

Carroll, J. B. (1981). Twenty-five years of research on foreign language aptitude. In K. C. Diller (Ed.), *Individual differences and universals in language learning aptitude* (pp. 83-118). Rowley, MA: Newbury House.

Carroll, & Sapon. (1959). *Modern language aptitude test*. New York: The Psychological Corporation/Harcourt Brace Jovanovich.

Cenoz, J. (2003) The influence of age on the acquisition of English: general proficiency, attitudes and code-mixing. In Garcia Mayo, M. and Garcia Lecumberri, M., (Eds.), *Age and the acquisition of English as a foreign language*. Clevedon: Multilingual Matters, 77–93.

Cerezo, L., Caracas, A., & Leow, R. (2016). The effectiveness of guided induction versus deductive instruction on the development of complex Spanish gustar structures: An analysis of learning outcomes and processes. *Studies in Second Language Acquisition*, 38, 265-291.

Chesterman. A. (1991). *On definiteness: A Study with Special Reference to English and Finnish*. Cambridge: Cambridge University Press.

Chesterman. A. (2005). On definiteness: A Study with Special Reference to English and Finnish. *Language,* 68(3).

Collins, L., Trofimovich, P., White, J., Cardoso, W., & Horst, M. (2009). Some input on the easy/difficult grammar question: An empirical study. *Modern Language Journal*, 93(3), 336-353.

Conway, A. R. A., Jarrold, C., Kane, M. J., Miyake, A., & Towse, J. (2007). Variation in working memory: An introduction. In A. R. A. Conway, C. Jarrold, M. J. Kane, A. Miyake, & J. Towse (Eds.), *Variation in working memory* (pp. 3 – 17). Oxford: Oxford University Press.

Cowan, N. (2005). *Working memory capacity*. Hove, UK: Psychology Press.

Daneman, M., & Carpenter, P. A. (1980). Individual differences in working memory and reading. *Journal of Verbal Learning and Verbal Behavior*, 19(4), 450-466.

De Graaff, R., & Housen, A. (2009). Investigating the Effects and Effectiveness of L2 Instruction. In M. H. Long, & C. J. Doughty (Eds.), *The Handbook of Language Teaching* (pp. 726-775). Wiley-Blackwell, Oxford, UK.

DeKeyser, R. M. (1998). Beyond focus on form: Cognitive perspectives on learning and practicing second language grammar. In C. Doughty, & J. Williams (Eds.), *Focus on form in classroom second language acquisition* (pp. 42-63). Cambridge, England: Cambridge University Press.

DeKeyser, R. M. (2000). The robustness of critical period effects in second language acquisition. *Studies in Second Language Acquisition*, 22, 499-533.

DeKeyser, R. M. (2003). Implicit and explicit learning. In C. J. Doughty, & M. H. Long, (Eds.). *The handbook of second language acquisition*. Oxford: Blackwell.

DeKeyser, R. M. (2005). What makes learning second-language grammar difficult? A review of issues. *Language Learning*, 55, 1–25.

DeKeyser, R. M. (2007). Skill acquisition theory. In B. VanPatten, & J. Williams (Eds.), *Theories in second language acquisition: An introduction* (pp. 91-113). Mahwah, NJ: Erlbaum.

DeKeyser, R., & Koeth, J. (2011). Cognitive aptitudes for L2 learning. In E. Hinkel (Ed.), *Handbook of research in second language teaching and learning*: Volume II (pp. 395-406). New York, NY: Routledge.

DeKeyser, R., & Larson-Hall, J. (2005) What Does the Critical Period Really Mean? In: Kroll, JF, De Groot AMB, (Eds.) *Handbook of Bilingualism: Psycholinguistic Approaches*. Oxford: Oxford University Press. pp 88–108.

DeKeyser, R. M. (2012). Interactions between individual differences, treatments, and structures in SLA. *Language Learning,* 62 (S2), 189-200.

DeKeyser, R.M. (2018). Input is not a panacea. *International Journal of Bilingualism,* 1-3. doi:10.1177/1367006918768371.

De la Fuente, M. (2006). Classroom L2 vocabulary acquisition: investigating the role of pedagogical tasks and form-focused instruction. *Language Teaching Research,* 10(3), pp. 263-295.

Dienes, Z. (2012). Conscious versus unconscious learning of structure. In P. Rebuschat & J.N. Williams (Eds.), *Statistical learning and language acquisition* (pp. 337-364). Berlin, Germany: Mouton de Gruyter.

Dienes, Z., & Scott, R. (2005). Measuring unconscious knowledge: Distinguishing structural knowledge and judgement knowledge. *Psychological research*, 69, 338-351.

Diesendruck, G. (2005). The Principles of Conventionality and Contrast in Word Learning: An Empirical Examination. *Developmental Psychology*, 41(3).

Dörnyei, Z., & Skehan, P. (2003). Individual differences in second language learning. In C., Doughty & M. H. Long (Eds.), *The handbook of second language acquisition* (pp. 589 – 630). Oxford, UK: Blackwell.

Dörnyei, Z. (2005). *The psychology of the language learner*. London: Lawrence Erlbaum.

Dörnyei, Z. (2009). *The psychology of second language acquisition*. Oxford: Oxford University Press.

Doughty, C. J. (2013). Optimizing post-critical-period language learning. In G. Granena & M. H. Long (eds.), *Sensitive periods, language aptitude, and ultimate L2 attainment*. Amsterdam: John Benjamins, 153–175.

Doughty, C. J. (2014). Assessing aptitude. In A. Kunnan (ed.), *The companion to language assessment*. Oxford, UK: Wiley-Blackwell, 25–46.

Doughty, C. J., S. G. Campbell, M. A. Mislevy, M. F. Bunting, A. R. Bowles & J. T. Koeth (2010). Predicting near-native ability: The factor structure and reliability of Hi-LAB. In M. T. Prior, Y. Watanabe & S-K. Lee (eds.), *Selected proceedings of the 2008 Second Language Research Forum*. Somerville, MA: Cascadilla Proceedings Project, 10–31.

Elder, K. (2009). Validating a test of metalinguistic knowledge. In R. Ellis, S. Loewen, C. Elder, R. Erlam, J. Philp, & H. Reinders (Eds.), *Implicit and explicit knowledge in second language learning, testing and teaching* (pp. 113–138). Bristol, UK: Multilingual Matters.

Ellis, N. C. (2005). At the interface: Dynamic interactions of explicit and implicit language knowledge. *Studies in Second Language Acquisition*, 27, 305-352.

Ellis, N. C. (2011). Implicit and explicit SLA and their interface. In C. Sanz and R. P. Leow (Eds.), *Implicit and explicit language learning: Conditions, processes, and knowledge in SLA and bilingualism* (pp. 35-47). Washington, D.C.: Georgetown University Press.

Ellis, N. C. (2015). Implicit AND explicit language learning: Their dynamic interface and complexity. In P. Rebuschat (Ed.), *Implicit and explicit learning of languages* (pp. 3– 23). Amsterdam: John Benjamins.

Ellis, N. C., & Cadierno, T. (2009). Constructing a second language [Special section]. *Annual Review of Cognitive Linguistics*, 7, 111–290.

Ellis, R. (2001). *Form-Focused Instruction and Second Language Learning*. University of Michigan: Blackwell Publishers.

Ellis, R. (2004). The definition and measurement of L2 explicit knowledge. *Language Learning*, 54, 227-275.

Ellis, R. (2005). Measuring implicit and explicit knowledge of a second language: A psychometric study. *Studies in Second Language Acquisition*, 27(2), 141-172.

Ellis, R. (2006). Modelling learning difficulty and second language proficiency: The differential contributions of implicit and explicit knowledge. *Applied Linguistics*, 27(3), 431-463.

Ellis, R., & Barkhuizen, G. (2005). *Analysing learner language*. Oxford: Oxford University Press.

Ellis, R. & Loewen, S. (2007). Confirming the operational definitions of explicit and implicit knowledge in Ellis (2005): Responding to Isemonger. *Studies in Second Language Acquisition*, 29, 119-126.

Ellis, R., Sheen, Y., Murakami, M. & Takashima, H. (2008). The effects of focused and unfocused written corrective feedback in English as a foreign language context. *System* 36, 353–371.

Ellis, R., Loewen, S., Elder, C., Erlam, R., Philp, J. & Reinders, H. (2009*). Implicit and explicit knowledge in second language learning, testing and teaching*. Bristol: Multilingual Matters.

Ellis, R. (2010). Does Explicit Grammar Instruction Work? *Ninjal Project Review*, 2, 3-22.

Ellis., R. (2015). Form-focused Instruction and the Measurement of Explicit and Implicit Knowledge. In P. Rebuschat (Ed.), *Implicit and explicit learning of languages* (pp. 117-138). Amsterdam: John Benjamins.

Erçetin, G. & Alptekin, C. (2013). The explicit/implicit knowledge distinction and working memory: Implications for second-language reading comprehension. *Applied Psycholinguistics*, 34 (4), 727-753.

Erlam, R. (2003). The Effects of Deductive and Inductive Instruction on the Acquisition of Direct Object Pronouns in French as a Second Language. *The Modern Language Journal*, 87(2), 242-260.

Erlam, R. (2005). Language aptitude and its relationship to instructional effectiveness in second language acquisition. *Language Teaching Research*, 9(2), 147-171.

Erlam, R. (2006). Elicited imitation as a measure of L2 implicit knowledge: An empirical validation study. *Applied Linguistics*, 27(3), 464-491.

Eskildsen, S. W. (2009). Constructing another Language - Usage-Based Linguistics in Second Language Acquisition. *Applied Linguistics*, 30 (3), 335-357.

Eskildsen, S. W. (2012). L2 Negation Constructions at Work. *Language Learning*, 62 (2), 335–372.

Flavell, J. H. (1976). Metacognitive aspects of problem solving. In L. B. Resnick (Ed.), *The nature of intelligence* (pp. 231-236). Hillsdale, NJ: Erlbaum

Flege, J. E. (1991). Age of learning affects the authenticity of voice onset time (VOT) in stop consonants produced in a second language. *Journal of the Acoustic Society of America*, 89, 395–441.

Flege, J. E., MacKay, I. R. A. (2004). Perceiving vowels in a second language. *Studies in Second Language Acquisition*, 26(1), 1–34.

Fodor, J. D., & Sag, I. A. (1982). Referential and quantificational indefinites. *Linguistics and Philosophy*, 5, 355–398.

French, L. M. (2006). *Phonological working memory and L2 acquisition: A developmental study of children learning French in Québec*. Lewiston, NY: Edwin Mellen Press.

French, L. M. & I. O'Brien (2008). Phonological memory and children`s second language grammar learning. *Applied Psycholinguistics*, 29, 463-487.

García Lecumberri, M. & Gallardo, F. (2003). English FL sounds in school learners of different ages. In García Mayo, M. and García Lecumberri, M. (Eds), *Age and the acquisition of English as a foreign language*. Clevedon: Multilingual Matters, 115–135.

García Mayo, M. (2003). Age, length of exposure and grammaticality judgements in the acquisition of English as a foreign language. In García Mayo, M. and García Lecumberri, M. (Eds), *Age and the acquisition of English as a foreign language*. Clevedon: Multilingual Matters, 94–114.

García Mayo, M., & García Lecumberri, M. (2003), (Eds). *Age and the acquisition of English as a foreign language*. Clevedon: Multilingual Matters.

Gass, S. M. (1997). *Input, interaction, and the second language learner*. Mahwah, NJ: Lawrence Elrbaum.

Gebauer, G., F., & Mackintosh, N., J. (2007). Psychometric intelligence dissociates implicit and explicit learning. *Journal of Experimental Psychology: Learning, Memory and Cognition*, 33(1), 34-54.

Georgiadou. E. & Roehr-Brackin, K. (2016). Investigating Executive Working Memory and Phonological Short-Term Memory in Relation to Fluency and Self-Repair Behaviour in L2 Speech. *Journal of Psycholinguistic Research.* doi 10.1007/s10936-016-9463-x.

Gilabert, R., & Muñoz, C. (2010). Differences in attainment and performance in a foreign language: The role of working memory capacity. *International Journal of English Studies*, 10(1), 19-42.

Godfroid, A. (2015). Timed and untimed grammaticality judgements measure distinct types of knowledge. Evidence from eye-movement patterns. *Studies in second language acquisition*, 37, 269-297.

Goldschneider, J., & DeKeyser, R. (2001). Explaining the "natural order of L2 morpheme acquisition" in English: A meta-analysis of multiple determinants. *Language Learning*, 51, 1-50.

Gombert, J. E. (1992). *Metalinguistic Development*. Hemel Hempstead: Harvester.

Goo, J., Granena, G., Yilmaz, Y., & Novella, M. (2015). Implicit and explicit instruction in L2 learning: Norris & Ortega (2000) revisited and updated. In P. Rebuschat (Ed.), *Implicit and explicit learning of languages* (pp. 443 – 482). Amsterdam: John Benjamins.

Granena, G. (2012). *Age differences and cognitive aptitudes for implicit and explicit learning in ultimate L2 attainment* (Unpublished doctoral dissertation). University of Maryland.

Granena, G. (2013). Cognitive aptitudes for second language learning and the Llama language aptitude test. In G. Granena & M. H. Long (Eds.), *Sensitive periods, language aptitude, and ultimate L2 attainment* (pp. 105–129). Amsterdam: John Benjamins.

Granena, G. (2016). Cognitive aptitudes for implicit and explicit learning and information processing styles: An individual differences study. *Applied Psycholinguistic*, 37(3), 577-600.

Granena, G., & Long, M. (2013). Age of onset, length of residence, language aptitude, and ultimate L2 attainment in three linguistic domains. *Second Language Research*, 29, 311–343.

Grigorenko, E. L., Sternberg, R. J., & Ehrman, M. (2000). A theory-based approach to the measurement of foreign language learning ability: The Canal-F theory and test. *The Modern Language Journal*, 84(3), 390-405.

Gutiérez, X. (2013). The construct validity of grammaticality judgement tests as measures of implicit and explicit knowledge. *Studies in second language acquisition*, 35, 423-449.

Haight, C.E., Herron, C. & Cole, C.P. (2007). The Effects of Deductive and Guided Inductive Instructional Approaches on the Learning of Grammar in the Elementary Foreign Language Classroom. *Foreign Language Annals*, 40 (2), 288-310.

Hakes, D. T. (1980). *The Development of Metalinguistic Awareness in Children*. Berlin: Springer.

Harley, B., & Hart, D. (1997). Language aptitude and second language proficiency in classroom learners of different starting ages. *Studies in Second Language Acquisition*, 19, 379 – 400.

Harley, B., & Hart, D. (2002). Age, aptitude and second language learning on bilingual exchange. In P. Robinson (Ed.), *Individual differences and instructed language learning* (pp. 301–330). Amsterdam: John Benjamins.

Harrington, M. W., & Sawyer, M. (1992). L2 working memory capacity and L2 reading skills. *Studies in Second Language Acquisition*, 14(1), 25-38.

Hawkins J. A. (1978). *Definiteness and Indefiniteness*. Guildford, London and Worcester, UK.

Hawkins, R., Al-Eid, S., Almahboob, I., et al. (2006). *Accounting for English article interpretation by L2 speakers*. EUROSLA yearbook, 6, 7–25.

Heim, I. (1991). Artikel and Definitheit [Articles and definiteness]. In A.V. Stechow & D. Wunderlich (Eds.), *Semantics: An international handbook of contemporary research* (pp. 487–535). Berlin, Germany: De Gruyter.

Heller, K. A., & Perleth, C. (2000). KFT 4–12+R: Kognitiver Fähigkeits–Test für 4 bis 12. Klassen. Revision. Göttingen, Germany: Beltz.

Herron, C., & Tomasello, M. (1992). Acquiring grammatical structures by guided induction. *French Review*, 65, 708-718.

Horwitz, E. K. (1985). Using student beliefs about language learning and teaching in the foreign language methods course. *Foreign Language Annals*, 18(4), 333–340.

Horwitz, E. K. (1987). Surveying student beliefs about language learning. In A. Wenden & J. Rubin (Eds.), *Learner strategies in language learning* (pp. 119–129). Englewood Cliffs, NY: Prentice Hall.

Horwitz, E. K. (1988). The beliefs about language learning of beginning university foreign language students. *Modern Language Journal*, 72(3), 283–294.

Hosseini. S. B., & Pourmandnia, D. (2013). Language learners' attitudes and beliefs: Brief review of the related literatures and frameworks. *International Journal on New Trends in Education and Their Implications*, 4, 63-74.

Housen, A., Pierrard, M., & Van Daele, S. (2005). Structure complexity and the efficacy of explicit grammar instruction. *The Modern Language Journal*, 91(3), 235-269.

Housen, A., & Simeons, H. (2016). Introduction to special issue. *Studies in Second Language Acquisition*, 38(2), 163-175.

Hu, G. (2002). Psychological constraints on the utility of metalinguistic knowledge in second language production. *Studies in Second Language Acquisition*, 24, 347–386.

Hu, G. (2011). Metalinguistic knowledge, metalanguage, and their relationship in L2 learners. *System*, 39, 63–77.

Hulstijn, J. H. (2002). Towards a unified account of the representation, processing and acquisition of second language knowledge. *Second Language Research*, 18(3), 193-223.

Hulstjin, J., H. (2015). Explaining phenomena of first and second language acquisition with the constructs of explicit and implicit learning: The virtues and pitfalls of a two system-view. In P. Rebuschat (Ed.), *Implicit and explicit learning of languages* (pp.117–139). Amsterdam: John Benjamins.

Hummel, K. M. (2009). Aptitude, phonological memory, and second language proficiency in nonnovice adult learners. *Applied Psycholinguistics*, 30, 225-249.

Hwu, F. & Sun, S. (2012). The aptitude-treatment interaction effects on the learning of grammar rules. *System*, 40, 505-521.

Ionin, T. & Montrul, S. (2010). The role of L1-transfer in the interpretation of articles with definite plurals in L2-English. *Language Learning*, 60 (4), 877-925.

Ionin, T., Ko, H., & Wexler, K. (2004). Article semantics in L2 acquisition: The role of specificity. *Language Acquisition*, 12, 3–69.

Ionin, T., Zubizarreta, M. L., & Bautista Maldonado, S. (2008). Sources of linguistic knowledge in the second language acquisition of English articles. *Lingua*, 118, 554–576.

Jaekel, N., Schurig, M., Florian, M. & Ritter, M. (2017). From Early Starters to Late Finishers? A Longitudinal Study of Early Foreign Language Learning at School. *Language Learning*, 68(1), 631-664.

Johnson, J.S. & Newport, E.L. (1989). Critical period effects in second language learning: the influence of maturational state on the acquisition of English as a second language. *Cognitive Psychology*, 21, 60–99

Juffs, A., & Harrington, M. (2011). Aspects of working memory in L2 learning. *Language Teaching*, 44(2), 137-166.

Kempe, V., & Brooks, P. J. (2011). Individual differences in adult second language learning: A cognitive perspective. *Scottish Languages Review, 23*, 15-22.

Kiss, C. and M. Nikolov. (2005) Developing, piloting and validating an instrument to measure young learners' aptitude. *Language Learning* 55, 99–150.

Kormos, J., & Sáfár, A. (2008). Phonological short-term memory, working memory and foreign language performance in intensive language learning. *Bilingualism: Language and Cognition*, 11(2), 261-271

Krashen, S. D. (1981). *Second language acquisition and second language learning*. Oxford: Pergamon.

Krashen, S. D. (1982). *Principles and practice in second language acquisition*. Englewood Cliffs, NJ: Prentice Hall.

Krashen, S. D. (1985). *The input hypothesis: Issues and implications*. London: Longman.

Krashen, S. D. (1992). Under what circumstances, if any, should formal grammar instruction take place? *TESOL Quaterly*, 26, 409-411.

Larson-Hall, J. (2008). Weighing the benefits of studying a foreign language at a younger starting age in a minimal input situation. *Second Language Research*, 24 (1), 35-63.

Lasagabaster, D. & Doiz, A. (2003). Maturational constraints on foreign language written production. In Garcia Mayo, M. and Garcia Lecumberri, M., (Eds), *Age and the acquisition of English as a foreign language*. Clevedon: Multilingual Matters, 136–160.

Leech, G. & Svartvik, J. (1994). *A Communicative Grammar of English*. London / New York: Longman. (2d.ed.).

Leow, R. P. (1997). Attention, awareness, and foreign language behavior. *Language Learning,* 47, 467-505.

Leow, R. P. (2000). A study of the role of awareness in foreign language behavior: Aware versus unaware learners. *Studies in Second Language Acquisition, 22*(4), 557-584.

Li, S. (2015). The associations between language aptitude and second language grammar acquisition: A meta-analytic review of five decades of research. *Applied Linguistics*, 36(3), 385-408.

Li, S. (2016). The construct validity of language aptitude: A meta-analysis. *Studies in Second Language Acquisition*, 38(4), 801-842.

Lichtman, K. (2013). Developmental comparisons of implicit and explicit language learning. *Language Acquisition*, 20(2), 93-108.

Lichtman, K. (2016). Age and learning environment: Are children implicit second language learners. *Journal of Child Language*, 43(3), 707-730.

Linck, J. A., M. M. Hughes, S. G. Campbell, N. H. Silbert, M. Tare, S. R. Jackson & C. J. Doughty (2013). Hi-LAB: A new measure of aptitude for high-level language proficiency. *Language Learning*, 63 (3), 530–566.

Linck, J., Osthus, P., Koeth, J., & Bunting, M. (2014). Working memory and second language comprehension and production: A meta-analysis. *Psychonomic Bulletin & Review*, 21, 861-883.

Linck, J. A., & Weiss, D. J. (2011). Working memory predicts the acquisition of explicit L2 knowledge. In C. Sanz, & R. P. Leow (Eds.), *Implicit and explicit language learning: Conditions, processes, and knowledge in SLA and bilingualism* (pp. 101-113). Washington, DC: Georgetown University Press.

Liskin-Gasparro, J. E. (1998). Linguistic development in an immersion context: How advanced learners of Spanish perceive SLA. *Modern Language Journal*, 82, 159–175.

Loewen, S., Li, S., Fei, F., Thomson, A., Nakatsukasa, K., Ahn, S. & Chen, X. (2009). Second Language Learners` beliefs about grammatical instruction and error correction. *Modern Language Journal*, 93 (1), 91-104.

Long, M. H. (1991) Focus on fom: A design feature in language teaching methodology. In K. DeBot, R. Ginsberg, &c. Kramsch (Eds.), *Foreign language research in Crosscultural Perspective* (pp. 39-52). Amsterdam: John Benjamins.

Lopez, E. (2017). Teaching the English article system: Definiteness and specificity in linguistically-informed instruction. *Language Teaching Research*, 1-18.

Lyons, C. (1999). *Definiteness*. Cambridge: Cambridge University Press.

Master, P. (2002). Information structure and English article pedagogy. *System*, 30, 331–348.

Master, P. (2003). Acquisition of the Zero and Null Articles in English. *Issues in Applied Linguistics*, 14(1), 3-20.

Meara, P. (2005). *LLAMA language aptitude tests*. Swansea, UK: Lognostics.

Mills, N., Pajares, F., & Herron, C. (2006). A reevaluation of the role of anxiety: Self-efficacy, anxiety, and their relation to reading and listening proficiency. *Foreign Language Annals*, 39, 276–295.

Mills, N., Pajares, F., & Herron, C. (2007). Self-efficacy of college intermediate French students: Relation to achievement and motivation. *Language Learning*, 57, 417–442.

Milton, J., & Alexiou, T. (2006). Language aptitude development in young learners. In C. Abello-Contesse, R. Chacón-Beltrán, M. D. López-Chiménez & M. M. Torreblanca López (Eds.), *Age in L2 acquisition and teaching* (pp. 177-192). Oxford: Peter Lang.

Miyake, A., & Friedman, N. P. (1998). Individual differences in second language proficiency: Working memory as language aptitude. In A. F. Healy and L. E. Bourne (Eds.), *Foreign language learning: Psycholinguistic studies on retention and training* (pp. 339-364). Mahwah, NJ: Lawrence Erlbaum.

Muñoz, C. (2006). The effects of age on foreign language learning: The BAF Project. In C. Muñoz (Ed.). *Age and the rate of foreign language learning*. Clevedon: Multilingual Matters, 1–40.

Muñoz, C. (2008). *Symmetries and asymmetries of age effects in naturalistic and instructed L2 learning.* Applied Linguistics, 29, 578–596.

Muñoz, C. (2011). Input in foreign language learning: more significant than starting age. *IRAL,* 49(2), 113–133.

Muñoz, C., & Singleton, D. (2011). A critical review of age-related research on L2 ultimate attainment. *Language Teaching*, 44(1), 1–35.

Muranoi, H. (2000). Focus on form through interaction enhancement: Integrating formal instruction into a communicative task in EFL classrooms. *Language learning*, 50, 617-673.

Murphy, R. (2007). *Essential Grammar in Use with Answers: A Self-Study Reference and Practice Book for Elementary Students of English*. Cambridge University Press.

Norris, J. M., & Ortega, L. (2001). Does type of instruction make a difference? Substantive findings from a meta-analytic review. *Language Learning*, 51(1), 157–213.

O'Brien, I., N. Segalowitz, J. Collentine & B. Freed (2006). Phonological memory and flexible narrative, and grammatical skills in second language oral production by adult learners. *Applied Psycholinguistics* 27, 377-402.

Paradis, M. (1994). Neurolinguistic aspects of explicit and implicit memory: Implications of bialingualism and SLA. In N. Ellis (Ed.), *Implicit and explicit learning of languages* (pp. 393-419). San Diego, CA: Academic Press.

Paradis, M. (2009). *Neurolinguistic aspects of bialingualism*. Amsterdam, the Netherlands: Benjamins.

Petersen, C. R., & Al-Haik, A. (1976). The development of the Defense Language Aptitude Battery (DLAB). *Educational and Psychological Measurement*, 36, 369-380.

Piaget, J. (1929). *The Child`s Conception of the World*. London: Routledge.

Pimsleur, P. (1966). Testing foreign language learning. In Albert Valdman (Ed.), *Trends in language teaching*. New York: McGraw-Hill Company.

Quirk, R., S. Greenbaum, G. Leech & Svartvik, J. (1985*). A comprehensive Grammar of the English Language*. London: Longman.

Ranta, L. (2008). Aptitude and good language learners. In C. Griffiths (Ed.) *Lessons from good language learners*. Cambridge: Cambridge University Press.

Rebuschat, P. (2013). Measuring implicit and explicit knowledge in second language research. *Language Learning*, 63, 595 – 626.

Rebuschat, P. & Williams, J.N. (2009). Implicit learning of word order. In N.A. Taatgen & H. van Rijn (Eds.), *Proceedings of the 31th annual conference of the Cognitive Science Society* (pp. 425-30). Austin, TX: Cognitive Science Society.

Rebuschat, P. & Williams, J.N. (2012). Explicit and implicit knowledge in second language acquisition. *Applied Psycholinguistics*, 33, 829-856.

Richards, J. & Platt, J. (1992). *Longman Dictionary of Language Teaching and Applied Linguistics*. Essex: Longman.

Robinson, P. (1997). Individual differences and the fundamental similarity of implicit and explicit adult second language learning. *Language Learning*, 47(1), 45–99.

Robinson, P. (2002). *Individual differences and instructed language learning*. Amsterdam: John Benjamins.

Robinson, P. (2005). Aptitude and second language acquisition. *Annual Review of Applied Linguistics* 25, 46–73.

Robinson, P. (2007). Aptitudes, abilities, contexts, and practice. In R. M. DeKeyser (ed.), *Practice in second language*. Cambridge: Cambridge University Press, 256–286.

Rodríguez Silva, L. H., & Roehr-Brackin, K. (2016). Perceived learning difficulty and actual performance: Explicit and implicit knowledge of L2 English grammar points among instructed adult learners. *Studies in Second Language Acquisition*, 38(2), 317-340.

Rodríguez Silva, L. H. (2017). *The role of cognitive individual differences and learning difficulty in instructed adult`s explicit and implicit knowledge of selected L2 grammar points: A study with Mexican learners of English*. (Unpublished doctoral thesis). University of Essex.

Roehr, K. (2006). Metalinguistic knowledge in L2 task performance: a verbal protocol analysis. Language awareness, 15(3), 180-198.

Roehr, K. (2008). Metalinguistic knowledge and language ability in university-level L2 learners. *Applied Linguistics*, 29(2), 173-199.

Roehr, K. (2010). Explicit knowledge and learning in SLA: A cognitive linguistics perspective. *AILA Review*, 23, 7–29.

Roehr, K., & Gánem-Gutiérrez, G. A. (2009). Metalinguistic knowledge: A stepping stone towards L2 proficiency. In A. Benati (Ed.), *Issues in Second Language Proficiency* (pp. 79-94). London: Continuum.

Roehr-Brackin, K. (2014). Explicit knowledge and processes from a usage-based perspective: The developmental trajectory of an instructed L2 learner. *Language Learning*, *64* (4), 771–808.

Roehr-Brackin, K. (2015). Explicit knowledge about language in L2 learning. A usage-based perspective. In P. Rebuschat (Ed.), *Implicit and explicit learning of languages* (pp. 117–138). Amsterdam: John Benjamins.

Roehr-Brackin, K. (2018). *Metalinguistic awareness and second language acquisition*. New York: Routledge.

Rogers, V., Meara, P., Aspinall, R., Fallon, L., Goss, T., Keey, E. & Thomas, R. (2016). Testing aptitude: Investigating Meara's (2005) LLAMA tests. *EuroSLA Yearbook 16*, 179–210.

Rogers, V., Meara, P., Barnett-Legh, T., Curry, C. & Davie. E. (2017). Examining the LLAMA aptitude tests. *Journal of the European Second Language Association*, 1(1), 49-60.

Rosa, E. & O'Neil, M. D. (1999). Explicitness, Intake, and the Issue of Awareness, *SSLA*, 21, 511-556.

Rosa, D. and C. Muñoz. (2013). Do attitudes and aptitude go together? A study with 5th grade primary students. *Proceedings of the 30th Aesla Conference. Universitat de Lleida*.

Saito, K., Suzukida, Y., & Sun, H. (2018). Aptitude, experience, and second language pronunciation proficiency development in classroom setting: a longitudinal study. *Studies in Second Language Acquisition,* 1-25. doi:10.1017/S0272263117000432

Sawyer, M., & Ranta, L. (2001). Aptitude, individual differences, and instructional design. In P. Robinson (Ed.), *Cognition and Second Language Instruction* (pp.319-353). Cambridge: Cambridge University Press.

Scheffler, P. (2009). Rule difficulty and the usefulness of instruction. *ELT Journal*, (1), 5-12.

Scheffler, P. (2011). Rule difficulty: Teachers' intuitions and learners' performance. *Language Awareness*, 20(3), 221-237.

Schmidt, R. (1990). The Role of Consciousness in Second Language Learning. *Applied Linguistics*, 11, 129–158.

Schmidt, R. (1993a). Awareness and second language acquisition. *Annual Review of Applied Linguistics*, 13, 206–226.

Schmidt, R. (1993b). Consciousness, learning, and interlanguage pragmatics. In Kasper, G. and Blum-Kulka, S. (Eds.), *Interlanguage pragmatics*. New York: Oxford University Press.

Schraw, G. & K.J. Crippen, K. Hartley (2006). Promoting Self-Regulation in Science Education: Meatacognition as Part of a Broader Perspective on Learning. *Research in Science Education*, 36 (1–2), pp. 111-139

Serafini, E. J. & C. Sanz (2016). Evidence for the decreasing impact of cognitive ability on second language development as proficiency increases. *Studies in Second Language Acquisition*, 38(4), 607-646.

Sharwood-Smith, M. (1981). Consciouness-raising and the second language learner. *Applied Linguistics*, 2, 159-169.

Skehan, P. (1998). *A cognitive approach to language learning*. Oxford: Oxford University Press.

Skehan, P. (1989). *Individual differences in second language learning*. London: Edward Arnold.

Skehan, P. (2002). Theorising and updating aptitude. In P. Robinson (Ed.), *Individual differences and instructed language learning* (pp. 69-93). Amsterdam: John Benjamins.

Skehan, P. (2012). Language aptitude. In S. Gass, & A. Mackey (Eds.). *The Routledge handbook of second language acquisition*. New York, NY: Routledge Handbooks.

Skehan, P. (2015). Foreign language aptitude and its relationship with grammar: A critical overview. *Applied Linguistics,* 36 (3), 367–384.

Snape, N., & Yusa, N. (2013). Explicit article instruction in definiteness, specificity, genericity and perception. In M. Whong, K. Gil, & H. Marsden (Eds.), *Universal Grammar and the second language classroom* (pp. 161–183). Dordrecht: Springer.

Snow, C., E., & M. Hoefnagel-Höhle (1978). The critical period for language acquisition: Evidence from second language learning. *Child Development* 49 (4), 114-128.

Spada, N., & Tomita, Y. (2010). Interactions between type of instruction and type of language feature: A meta-analysis. *Language Learning*, 60, 263–308.

Spada, N., Shiu, L. J., & Tomita, Y. (2015). Validating an elicited imitation task as a measure of implicit knowledge: Comparisons with other validation studies. *Language Learning*, 65(3), 723–751.

Sparks, R. L. & L. Ganschow (1991). Foreign language learning difficulties: Affective or native language aptitude differences? *The Modern Language Journal*, 7, 3–16.

Sparks, R. L. & L. Ganschow (2001). Aptitude for learning a foreign language. *Annual Review of Applied Linguistics*, 21, 90–111.

Sparks, R. L., Patton, J., Ganschow, L., & Humbach, N. (2009). Long-term relationships among early first language skills, second language aptitude, second language affect, and later second language proficiency. *Applied Psycholinguistics*, 30, 725 – 755.

Spoelman, M. & Verspoor, M. (2010). Dynamic Patterns in Development of Accuracy and Complexity: A Longitudinal Case Study in the Acquisition of Finnish. *Applied Linguistics*,31 (4), 532–553.

Sternberg, R. J. (1997). *Successful intelligence*. New York, NY: Plume

Sternberg, R. J. (2002). The theory of Successful Intelligence and its implications for language aptitude testing. In P. Robinson (Ed.), 13-43.

Suárez, M. d. M., & Muñoz, C. (2011). Aptitude, age and cognitive development: The MLAT-E in Spanish and Catalan. In L. Roberts, G. Pallotti & C. Bettoni (Eds.), *EuroSLA Yearbook* (Vol. 11, pp. 5-29). Amsterdam: John Benjamins.

Sun, G. (2016). The Acquisition of English Articles by Second Language Learners: The Sequence, Differences, and Difficulties. *Sage Open*, 1-8.

Suzuki, Y. & DeKeyser, R. (2015). Comparing elicited imitation and word monitoring as measures of implicit knowledge. *Language Learning*, 65, 860–895.

Suzuki, Y. & DeKeyser, R. (2017). The interface of explicit and implicit knowledge in a second language: Insights from individual differences in cognitive aptitudes. *Language Learning*, 67(4), 747-790.

Tagarelli., M., K., Ruiz, S., Moreno, J.L. & Rebuschat, P. (2016). Variability in Second Language Learning: The Role of Individual Differences, Learning Conditions, and Linguistic Complexity. *Studies in Second Language Acquisition*, 38, 293-316.

Tellier, A., & Roehr-Brackin, K. (2013). The development of language learning aptitude and metalinguistic awareness in primary-school children: A classroom study. *Essex Research Reports in Linguistics*, 62(1), 1-28.

Tellier, A., & Roehr-Brackin, K. (2013). Language-learning aptitude in primary-level L2 learners. *EuroSLA*, 2016.

Thepseenu, B. & Roehr, K. (2013). University-level Learners` beliefs about Metalinguistic Knowledge. In K. Roehr & G. Gánem-Gutiérrez (Eds.), *The Metalinguistic Dimension in Instructed Second Language Learning* (pp.95-118). Bloomsbury Academic.

Tomasello, M. (2000). Do young children have adult syntactic competence? *Cognition*, 74, 209 – 253.

Tomasello, M. (2005). Beyond formalities: The case of language acquisition. *The Linguistic Review*, 22, 183–197.

Trebits, A., & Kormos, J. (2008). Working memory capacity and narrative task performance. *Proceedings from the 33rd International LAUD Symposium*, Landau/Pfalz, Germany.

Turner, M. L., & Engle, R. W. (1989). Is working memory capacity task dependent? *Journal of Memory and Language*, 28(2), 127-145.

UCLES. (2004). *Oxford Quick placement test: Paper and Pen pack*. Oxford, U.K: Oxford University Press.

Ushioda, E., & Dörnyei, Z. (2009). Motivation, language identities and the L2 self: A theoretical overview. In Z. Dörnyei & E. Ushioda (Eds.), *Motivation, language identity and the L2 self* (pp. 1-8). Bristol: Multilingual Matters

Vafaee, P., Suzuki, Y. & Kachisnke, I. (2017). Validating grammaticality judgement tests. *Studies in second language acquisition*, 39, 59-95.

VanPatten, B., & Smith, M. (2015). Aptitude as grammatical sensitivity and the initial stages of learning Japanese as a L2: Parametric variation and case marking— corrigendum. *Studies in Second Language Acquisition*, 37, 175–176.

Wen, Z., & Skehan, P. (2011). A new perspective on foreign language aptitude research: building and supporting a case for “working memory as language aptitude”. *Llha do Desterro A Journal of English Language, Literatures in English and Cultural Studies*, 60, 15–44.

Wen, Z. (2012). Working memory and second language learning. *International Journal of Applied Linguistics*, 22(1), 1-22.

Wen, Z., Biedron, A. & Skehan. P. (2017). Foreign language aptitude theory: Yesterday, today and tomorrow. *Language teaching*, 50 (1), 1-31.

Wen, Z., Mota, M. B., & McNeil, A. (2015). *Working memory in second language acquisition and processing*. Bristol: Multilingual Matters.

Wenden, A. L. (1998). Metacognitive knowledge and language learning. *Applied Linguistics*, 19, (4), 515-537

Wenden, A. L. (1999). An introduction to metacognitive knowledge and beliefs in language learning: Beyond the basics. *System*, 27 (4), 435-441.

Wesche, M. B. (1981). Language aptitude measures in streaming, matching students with methods, and diagnosis of learning problems. In K. Diller (Ed.), *Individual differences and universals in language aptitude*. Rowley, MA: Newbury House.

Wesely, P. M. (2012). Learner attitudes, perceptions and beliefs in language learning. *Foreign Language Annals*, 45 (1), 98-117.

Williams, J., & Evans, J. (1998). What kind of focus and on which form? In C. Doughty & J. Williams (Eds.), *Focus on form in classroom second language acquisition* (pp. 139-155). Cambridge: Cambridge University Press.

Williams, M., & Burden, R. L. (1999). Students developing conceptions of themselves as language learners. *Modern Language Journal*, 83, 193–201.

Williams, J. N. (2009). Implicit learning in second language acquisition. In W.C. Ritchie & T.K. Bhatia (Eds.), *The new handbook of second language acquisition* (pp. 319-353). Bingley, UK: Emerald Press.

Woltz, D. J. (2003) Implicit Cognitive Processes as Aptitudes for Learning. *Educational Psychologist*, 38 (2), 95-104

Yalçın, Ş. & Spada, N. (2016). Language aptitude and grammatical difficulty: An EFL classroom-based study. *Studies in Second Language Acquisition*, 38, 239-263.

Yilmaz, Y. (2012). Relative effects of explicit and implicit feedback: The role of working memory capacity and language analytic ability. *Applied Linguistics*, 34, 344 – 368.

Yilmaz, Y., & Granena, G. (2016). The role of cognitive aptitudes for explicit language learning in the relative effects of explicit and implicit feedback. *Bilingualism: Language and Cognition 19*(1), 147-161.

Yoo, I.W. (2009). The English definite article: What ESL/EFL grammars say and what corpus findings show. *Journal of English for Academic Purposes*, 8(4), 267-278.

Yoshida, R. (2008). Learners' perceptions of corrective feedback in pair work. *Foreign Language Annals*, 41, 525-41.

Zdorenko, T. & Paradis. J. (2008). The acquisition of articles in child second language English: fluctuation, transfer or both? *Second Language Research*, 24(2), pp. 227-250.

Zhang, R. (2015). Measuring university-level L2 learners` implicit and explicit linguistic knowledge. *Studies in second language acquisition*, 37, 457-486.

Ziętek, A. A., & Roehr, K. (2011). Metalinguistic knowledge and cognitive style in Polish classroom learners of English. *System*, *39*(4), 417–426.

APPENDICES

Appendix A. Background information questionnaire

Name:

Gender: Male Female

How old are you?

Are you bilingual?

If yes, what native languages do you speak?

When did you start studying English?

How many years have you been studying English?

Where do you study English (school, English courses, private tutor)?

Have you learned any other foreign language(s)?

If yes, what foreign language(s) have you learned?

Have you ever spent a long period in an English-speaking country (holiday, language courses etc.)?

If yes, how long?

Where?

APPENDIX B. Elicited imitation test

This is a beliefs questionnaire. I am going to ask you your opinion about a range of topics.

You will hear a question. Decide whether you agree/disagree with it or whether you don't know the answer by saying "yes", "no" or "don`t know". Then repeat the question in correct English.

Training session

You will hear ♪: Do you agree that Russian winters are very cold?

[PAUSE]

Yes No Don't know

[PAUSE]

What you should have said is: Do you agree that Russian winters are very cold?

You will hear ♪: Is it correct that Africa is a continent?

[PAUSE]

Yes No Don't know

Now repeat the question

[PAUSE]

What you should have said is: Is it correct that Africa is a continent?

The training is now finished.

Beliefs questionnaire

1) ♪ Do you agree that ***disabled** should take part in sports competitions?

[PAUSE]

Yes No Don't know

Now repeat the question

2) ♪ Do you agree that many students have ***the sandwich** for lunch?

[PAUSE]

Yes No Don't know

Now repeat the question

3) ♪ Do you believe that ***old** are afraid to use **mobile phones**?

[PAUSE]

Yes No Don't know

Now repeat the question

4) ♪ Is it correct that **the penguin** is **a bird** not **a mammal**?

[PAUSE]

Yes No Don't know

Now repeat the question

5) ♪ Is it correct that San-Marino is **an** independent **country**?

[PAUSE]

Yes No Don't know

Now repeat the question

6) ♪ Is it true that ***a Red Sea** has many coral reefs?

[PAUSE]

Yes No Don't know

Now repeat the question

7) ♪ Do you think that people always talk a lot about **the fit** and **the healthy**?

[PAUSE]

Yes No Don't know

Now repeat the question

8) ♪ Do you think that people are destroying ***a world** around them?

[PAUSE]

Yes No Don't know

Now repeat the question

9) ♪ Do you believe that **a watermelon** is ***the berry** not ***the fruit**?

[PAUSE]

Yes No Don't know

Now repeat the question

10) ♪ Do you agree that **the Russian president** has become very powerful?

[PAUSE]

Yes No Don’t know

Now repeat the question

11) ♪ Is it correct that **the Volga flows** into *__Caspian Sea__?

[PAUSE]

Yes No Don’t know

Now repeat the question

12) ♪ Can young people play ***guitar** or another musical instrument?

[PAUSE]

Yes No Don’t know

Now repeat the question

13) ♪ Is it true that in Russia ***the lawyers** are not as well paid as in Europe?

[PAUSE]

Yes No Don’t know

Now repeat the question

14) ♪ Do you believe that many people like **the United Arab Emirates**?

[PAUSE]

Yes No Don’t know

Now repeat the question

15) ♪ Do you agree that many couples go to ***Maldives** for their honeymoon?

[PAUSE]

Yes No Don’t know

Now repeat the question

16) ♪ Do you believe that everybody wants **an iphone**?

[PAUSE]

Yes No Don’t know

Now repeat the question

17) ♪ Do you agree that ***the oranges** are healthy because they are full of vitamins?

[PAUSE]

Yes No Don’t know

Now repeat the question

18) ♪ Do you believe that many people like **opera** and **ballet**?

[PAUSE]

Yes No Don't know

Now repeat the question

19) ♪ Is it true that **the ostrich** can run very long distances?

[PAUSE]

Yes No Don't know

Now repeat the question

20) ♪ Do you think that magazines have made **the Kardashians** famous?

[PAUSE]

Yes No Don't know

Now repeat the question

21) ♪ Do you think that we can always trust ***a media** nowadays?

[PAUSE]

Yes No Don't know

Now repeat the question

22) ♪ Is it true that **the giraffe** is **the tallest animal** in Africa?

[PAUSE]

Yes No Don't know

Now repeat the question

23) ♪ Is it correct that **the Indian Ocean** has a lot of coral reefs?

[PAUSE]

Yes No Don't know

Now repeat the question

24) ♪ Do many people all over the world respect ***British queen**?

[PAUSE]

Yes No Don't know

Now repeat the question

25) ♪ Is it true that Americans can get ***driving licence** at 15?

[PAUSE]

Yes No Don’t know

Now repeat the question

26) ♪ Do you agree that **a mobile phone** is necessary?

[PAUSE]

Yes No Don’t know

Now repeat the question

27) ♪ Is it true we are destroying **the ozone layer**?

[PAUSE]

Yes No Don’t know

Now repeat the question

28) ♪ Is it true that **the Canary Islands** have amazing national parks?

[PAUSE]

Yes No Don’t know

Now repeat the question

29) ♪ Do you believe that ***piano** is **the most popular** musical instrument?

[PAUSE]

Yes No Don’t know

Now repeat the question

30) ♪ Do you agree that **the rich** should pay higher taxes than **the poor**?

[PAUSE]

Yes No Don’t know

Now repeat the question

31) ♪ Do you believe that Brazil is ***the** very fast developing **country**?

[PAUSE]

Yes No Don’t know

Now repeat the question

32) ♪ Do you agree that **the** marine **flora** and **the fauna** are in danger?

[PAUSE]

Yes No Don’t know

Now repeat the question

33) ♪ Do many English people have **a garden** where they grow **fruits** and **vegetables?**

[PAUSE]

Yes No Don't know

Now repeat the question

34) ♪ Do you think that most women forget to turn off ***a light**?

[PAUSE]

Yes No Don't know

Now repeat the question

APPENDIX C. Oral production test

The Cambridge Egg

The Whites are **a** very pleasant **family**. Ask their **neighbors**, **colleagues** or **friends** and everybody will tell you they are **the nicest people** in Cambridge. Mrs. White is **a professor** at Cambridge University; Mr. White is **a journalist** who works for **the BBC**. Their three children John, James and Sue are always sweet and polite. **The Whites** live in **a** little **house** and have **a garden** where Mrs. White grows **flowers** and **strawberries**. On Sunday, she bakes **cakes** and gives them to **the old** and **the homeless**. She likes helping **the weak**. Mr. White plays **the piano**, Sue **the violin** and **the boys** love **the drums**. They have always lived **a happy life** but one day everything changed.

One sunny Sunday John, James and Sue decided to go play in **the fields** near **the river Cam.** They always played hide and seek there. They imagined that they were playing near **the Nile** or **the Amazon**. Suddenly Sue and John who had found **a** perfect hiding **place** heard James shouting out their names:

-John, Sue, come here quick, look what I have found!

The children ran as fast as they could. James was standing under **a big tree** by **the river Cam** and was holding a huge white stone.

-James, what is it? – asked Sue.

-It`s **an egg**! **A** huge **egg**. It`s as hard as rock!

-That must be **a dinosaur`s egg**, it`s so big! – said John.

-**Dinosaurs** died ages ago, it can`t be their egg! – replied Sue. She has always been very sceptical.

-**The dinosaur** was **the biggest animal** on earth and its eggs were huge! This egg weighs 5 or 6 kilos! I once saw **a programme** about Russian **archaeologists** who found **dinosaurs' eggs** in **the Urals**; their eggs looked the same as this one. – cried out James.

-We should show **the egg** to mum and dad, - said Sue.

What do you think happened next?

The children carried **the egg** back home. When they arrived, it was very late and both Mr. and Mrs. White were very angry! John showed **the egg** to Mr. White who was so surprised to see such **a huge egg** that he couldn`t say **a word**. Mrs. White switched **on the light** in **the** living **room** and they all studied the egg. Mr. White was sure it was **a dinosaur`s egg** and decided to write **an article** about it. He took some pictures of **the egg** and took it to work next morning. Everybody was amazed. Mr. White`s colleagues called the **BBC main office** in London and told them about Mr White`s egg.

Soon hundreds of journalists from all over **the world** came to Mr and Mrs White to see **the egg**. Even **the Queen** and **the Prime Minister** were invited. **The Prime Minister** decided to take **the egg** and put it into **the British Museum**. However, James did not want to give it away. He had found **the egg**, they couldn`t just take it from him!

So, while everybody was interviewing **the Prime Minister** and **the Queen** about **the biggest dinosaur's egg** ever found, James took **the egg** and hid it in **the woods**. He was so angry with **the government** that he never ever told them where he hid **the egg**. Many people were looking for **the egg** in **the woods** near **the river Cam**, but nobody has found it yet. So, **the eggs** Russian **archaeologists** found are still **the biggest eggs** ever found and **the Cambridge egg** will remain **a mystery** for as long as James keeps his silence.

APPENDIX D. Gap-fill test

Fill in the gaps with a definite article (the), an indefinite article (a(n)), or no article (-) and answer two questions following each item.

Guess – you are guessing the answer/означает, что вы просто угадываете

Intuition – you think the answer is right, but you don't know why/ вам кажется, что должно быть так

Memory – you have a memory of having heard or encountered something similar/ вы когда-то слышали что-то подобное и вспомнили

Rule – you know the rule and use it to make the answer/ вы точно помните правило и используете его при выборе ответа

Examples: I think **<u>the</u>** man over there is very unfriendly.

How sure are you about your answer? 100% <u>80%</u> 60% 40% 20% 0%

What was the basis of your answer? Guess <u>Intuition</u> Memory Rule

1. Where is __ dress I bought for you in Italy?
   It is in the bathroom I think.
   How sure are you about your answer? 100% 80% 60% 40% 20% 0%
   What was the basis of your answer? Guess Intuition Memory Rule

2. When was__ telephone invented?
   Great question but I have no idea.
   How sure are you about your answer? 100% 80% 60% 40% 20% 0%
   What was the basis of your answer? Guess Intuition Memory Rule

3. Mary loves music!
   I know she plays __violin amazingly!
   How sure are you about your answer? 100% 80% 60% 40% 20% 0%
   What was the basis of your answer? Guess Intuition Memory Rule

4. In Saint-Petersburg there are many special facilities for __ disabled.
   How sure are you about your answer? 100% 80% 60% 40% 20% 0%
   What was the basis of your answer? Guess Intuition Memory Rule

5. She received __ strange parcel from Mexico.
   How sure are you about your answer? 100% 80% 60% 40% 20% 0%
   What was the basis of your answer? Guess Intuition Memory Rule

6. I think __Indian Ocean is very mysterious! We know very little about it.
   How sure are you about your answer? 100% 80% 60% 40% 20% 0%
   What was the basis of your answer? Guess Intuition Memory Rule

7. My mum always feels depressed when __ moon is full!
   How sure are you about your answer? 100% 80% 60% 40% 20% 0%
   What was the basis of your answer? Guess Intuition Memory Rule

8. The Marriott is _ very nice hotel!
   I don`t think so! It is too expensive!
   How sure are you about your answer? 100% 80% 60% 40% 20% 0%
   What was the basis of your answer? Guess Intuition Memory Rule

9. My granny always drinks her tea from __ blue porcelain cup we brought her from Turkey.
   How sure are you about your answer? 100% 80% 60% 40% 20% 0%
   What was the basis of your answer? Guess Intuition Memory Rule

10. I hate it when __ fit and healthy are always trying to make you go to the gym and eat broccoli!
    How sure are you about your answer? 100% 80% 60% 40% 20% 0%
    What was the basis of your answer? Guess Intuition Memory Rule

11. Please, bring me __red book from the shelf! I forgot about it!
    How sure are you about your answer? 100% 80% 60% 40% 20% 0%
    What was the basis of your answer? Guess Intuition Memory Rule

12. The official currency of Kazakhstan is __ tenge.

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

13. Do you like __ Chinese food?

No, it`s too spicy for me.

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

14. My sister is not afraid of __mice!

Really? Both my mum and sister are afraid of them!

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

15. What did you have for lunch today?

I had __ cheese and bacon sandwich! It was amazing!

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

16. Jim studies in __ Netherlands. He likes it there a lot!

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

17. __ bicycle is a very popular means of transport.

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

18. My father says __lawyers make a lot of money!

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

19. Have you met our new maths teacher?

She is __very kind person!

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

20. Do you think our government should help __ homeless?

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

21. __ crime is a problem in most big cities.

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

22. What should I give your sister for her birthday?

Ha-ha! Her tastes are very expensive! She wants _ new Audi.

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

23. Have you finished your report about __ozone layer?

Not yet! It`s so boring!

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

24. __woman I didn`t greet yesterday was our new headmistress!

Ha-ha! She will definitely remember that!

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

25. What do you think about the generation gap?

Oh, it`s when teenagers can never understand __old? It`s crazy!

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

26. Many holidaymakers like __ Mediterranean Sea.

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

27. The sun is _ star.

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

28. The BBC is __famous broadcasting company.

    How sure are you about your answer? 100% 80% 60% 40% 20% 0%

    What was the basis of your answer? Guess Intuition Memory Rule

29. Jim`s parents gave him __brand new bike for his birthday!

    How sure are you about your answer? 100% 80% 60% 40% 20% 0%

    What was the basis of your answer? Guess Intuition Memory Rule

30. Where is Jane? Why is she absent again?

    She is on __Canary Islands with her parents!

    How sure are you about your answer? 100% 80% 60% 40% 20% 0%

    What was the basis of your answer? Guess Intuition Memory Rule

31. What is the longest river in the world?

    It`s __Nile, isn't it?

    How sure are you about your answer? 100% 80% 60% 40% 20% 0%

    What was the basis of your answer? Guess Intuition Memory Rule

32. I have always wanted to go to __ Maldives!

    How sure are you about your answer? 100% 80% 60% 40% 20% 0%

    What was the basis of your answer? Guess Intuition Memory Rule

33. Where do you go diving?

    We always dive in __ Red Sea in Ras Muhammad National Park.

    How sure are you about your answer? 100% 80% 60% 40% 20% 0%

    What was the basis of your answer? Guess Intuition Memory Rule

34. My parents are going to Venice at __ end of August.

    How sure are you about your answer? 100% 80% 60% 40% 20% 0%

    What was the basis of your answer? Guess Intuition Memory Rule

35. Have you ever crossed __ equator?

    No, but it`s my dream!

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

36. Do you know _ Smiths?

I do. They are a very nice couple.

How sure are you about your answer? 100% 80% 60% 40% 20% 0%

What was the basis of your answer? Guess Intuition Memory Rule

APPENDIX E. Metalinguistic knowledge test

Sentence correction and explanation task

The following sentences are incorrect; the location of the error is highlighted. Correct the sentence and explain (in Russian or in English) why they are incorrect, give as much detail as possible.

Example:

Nile is in Egypt.

Correction: The Nile is in Egypt.

Explanation: We use a definite article with the names of rivers

1. Your suitcases are in **a bedroom**.

   Correction: ______________________________

   Explanation: ____

2. **Moon** is full tonight.

   Correction: ______________________________

   Explanation: ____

3. I can`t play **piano**.

   Correction: ______________________________

   Explanation: ____

4. Many rivers flow into **Caspian Sea**.

   Correction: ______________________________

   Explanation: ____

5. I hate him! He is **the very selfish person**!

   Correction: ______________________________

   Explanation: ____

6. Her parents bought **the new flat** in Spain.

   Correction: ______________________________

   Explanation: ____

7. Miriam has **very fast car**.

   Correction: ______________________________

   Explanation: ____

8. My friends love surfing in **Pacific Ocean**.

   Correction: ______________________________

   Explanation: ____

9. In Saint Petersburg **a sky** is always grey.

   Correction: ______________________________

   Explanation: ____

10. **Giraffe** is the tallest of all animals.

    Correction: ______________________________

    Explanation: ____

11. **Blind** use special books.

    Correction: ______________________________

    Explanation: ____

12. I couldn`t live without **the music**.
    Correction: ______________________________
    Explanation: ____

13. I ordered **the amazing dress** for your birthday party!

    Correction: ______________________________

    Explanation: ____

14. **Chinese** invented printing.

    Correction: ______________________________

Explanation: ____

15. Magazines are reporting a lot about **rich and famous**.

Correction: ___________________________

Explanation: ____

16. **English** drink tea with milk.

Correction: ___________________________

Explanation: ____

17. Look at **apples** on that tree! They`re very big!

Correction: ___________________________

Explanation: ____

18. Do you remember **a boy** we saw in our gym yesterday?

Correction: ___________________________

Explanation: ____

19. Who is **a woman** in this photograph?

Correction: ___________________________

Explanation: ____

20. **The life** has changed a lot in the last 30 years.

Correction: ___________________________

Explanation: ____

21. **Red Sea** is famous for its coral reefs.

Correction: ___________________________

Explanation: ____

22. My maths tutor is **the very demanding person**.

Correction: ___________________________

Explanation: ____

23. Many Europeans work and live in **Emirates**.

Correction: ___________________________

Explanation: ____

24. **Taylors** are very nice!

Correction: ___________________________

Explanation: ____

25. She is **a best student** in our class.

Correction: ___________________________

Explanation: ____

26. Bell invented **a telephone**.

Correction: ___________________________

Explanation: ____

27. There are many islands in **Indian Ocean**.

Correction: ___________________________

Explanation: ____

28. **Vegetarian** is somebody who doesn`t eat meat.

Correction: ___________________________

Explanation: ____

29. My brother wants **iPad** for his birthday.

Correction: ___________________________

Explanation: ____

30. Do you collect **the stamps**?

Correction: ___________________________

Explanation: ____

31. **Pacifist** is somebody who is against war.

Correction: ____________________

Explanation: ____

32. **The apples** are good for you.

Correction: ____________________

Explanation: ____

33. My parents always go to **Canaries** in June.

Correction: ____________________

Explanation: ____

34. Life is not easy for **unemployed**.

Correction: ____________________

Explanation: ____

35. My father plays a guitar.

Correction: ____________________

Explanation: ____

36. Don`t look at **sun** without sunglasses! It`s bad for your eyes.

Correction: ____________________

Explanation: ____

Rule illustration task

For each of the following rules, write an English sentence that illustrates the rule

Rule: We use a definite article when we are talking about mountain chains.

Example illustrating the rule: The Alps are very beautiful.

1. We use a definite article + adjective to talk about groups of people.

   Example____

2. We use a definite article to talk about a type of animal, machine etc.

   Example____

3. We use a zero article when we are talking about things or people in general.

   Example____

4. We use a definite article when it is clear from the context which specific thing(s) or person/people we mean.

5. We use a definite article when there is one of something.

   Example____

6. We use an indefinite article to say what kind of thing/ person something/somebody is.

   Example____

7. We use an indefinite article when we are talking about something for the first time.

   Example____

8. We use a definite article when we talk about rivers, oceans, seas etc.

   Example____

9. We use a definite article with plural names of islands, people, and countries.

   Example____

APPENDIX F. Backward digit span test

		Trial 1	Trial 2
3	5 - 8 – 2		
	6 - 9 – 4		
	1 - 4 – 8		
	2 - 7 – 6		
4	6 - 4 - 3 – 9		
	7 - 2 - 8 – 6		
	9 - 6 - 2 – 5		
	7 - 4 - 9 – 1		
5	4 - 2 - 7 - 3 – 1		
	7 - 5 - 8 - 3 – 6		
	6 - 4 - 7 - 8 – 1		
	9 - 6 - 2 - 7 – 4		
6	6 - 1 - 9 - 4 - 7 – 3		
	3 - 9 - 2 - 4 - 8 – 7		
	7 - 1 - 8 - 4 - 9 – 5		
	1 - 5 - 7 - 4 - 2 – 9		
7	5 - 9 - 1 - 7 - 4 - 2 – 8		
	4 - 1 - 7 - 9 - 3 - 8 – 6		
	6 - 5 - 1 - 7 - 4 - 9 – 2		
	1 - 4 - 7 - 5 - 3 - 8 – 6		
8	5 - 8 - 1 - 9 - 2 - 6 - 4 – 7		
	3 - 7 - 2 - 9 - 5 - 1 - 8 – 4		
	5 - 9 - 1 - 6 - 8 - 3 - 4 - 2		
	3 - 2 - 5 - 7 - 4 - 9 - 1 – 8		
9	2 - 7 - 5 - 8 - 6 - 2 - 9 - 1 - 4		
	7 - 1 - 3 - 9 - 4 - 2 - 5 - 6 - 8		
	8 - 1 - 3 - 9 - 6 - 2 - 5 - 7 - 4		
	2 - 9 - 5 - 1 - 7 - 3 - 4 - 6 – 8		

APPENDIX G. Instruction satisfaction questionnaire

Please answer the following questions about the course you have taken part in by ticking one of the options after each statement.

	Strongly agree	Agree	Agree somewhat	Disagree somewhat	Disagree	Strongly disagree
1.I enjoyed the classes						
2.I liked the way the material was presented						
3.I liked the way we worked with the new material						
4.The material we covered was useful for learning how English articles are used						
5.The material we covered was easy to understand						
6.I was happy with the amount of work we were asked to do in the class						
7. I was happy with the amount of extra activities (homework) we were asked to do the teacher gave us						
8. I felt free to ask questions						

Please answer the following questions by expressing your own thoughts and ideas

9.List up to 3 things you liked about the course:

10.List up to 3 things you didn`t like about the course:

APPENDIX H. Teaching Materials

Teaching session 1: A(an) + first mention

Healthy Henry and Susanne Stressed

Henry

Henry is a health freak, well you know the one who is totally obsessed with his health. Every day he wakes up at 6 am and goes for a run in the park. He runs even when it is rainy, but he never forgets an umbrella or a rain coat. The umbrella he carries is hand-made, hand made by Henry and the coat…well the coat was made by his mum, but Henry helped her. He doesn`t want to catch a cold. Bless him! At 7 am he comes back home and has a long shower or even a bath to kill all nasty bacteria. Henry hates bacteria! At 7.25 he has a cup of coffee…oh sorry no (my bad)…he has a cup of green tea without any caffeine, caffeine is bad for you and a slice of granary toast with a spoon of organic sugar free jam, he also has a green apple and a big clove of garlic. He loves garlic because it kills bacteria. After breakfast Henry puts on a special bacteria proof suit: the suit is black and covers all his body, he wears a pair of gloves and a mask with slits for eyes. So many people cough and sneeze nowadays he can`t risk his health, you know. Henry never uses a bus or a train, no no no …carbon emissions can kill him, he rides a bicycle to work, bicycles are healthy. Henry works in a small office, the office is special because Henry has many green plants there, plants are healthy they produce oxygen and emit positive energy that is beneficial for your nerves. Henry has bad nerves as nobody has any compassion for his healthy lifestyle. At 12 in the afternoon Henry has his second clove of garlic, a cup of green tea, a bottle of water, 2 boiled eggs and a bowl of mixed leaf salad from his garden. Henry loves salad, he is a vegetarian, but he still eats eggs, he loves eggs. The eggs he eats come from a small farm his best friend owns. Healthy Henry finishes work at 5 and rides his bicycle home. He never goes to a café to have a cup of coffee with sweets, sweets are bad for your teeth and metabolism, he never catches up with friends, friends can always have the flu or a cold he can`t risk his health. At home he does some yoga and meditation. He loves meditation it helps him sleep. In the evening he has his third clove of garlic, a bowl of steamed broccoli with some fat free cheese and a glass of water with lemon juice. He then listens to music or reads a book about health. The book he is reading now is about fasting, Henry wants to fast but he needs to do it in a healthy way. At 9.30 Henry goes to bed. You need to sleep 8 or 9 hours to recover from the stress of the day and Henry is always stressed because bacteria never sleep.

Susanne

Susanne is not happy at all. How can you be happy when you cannot fit in any clothes and your doctor says you need to lose weight? Susanne is unhappy because she loves doughnuts with custard cream, chocolate fudge and triple chocolate cookies but she needs to lose weight and eat only spinach and broccoli! Boring! Susanne wakes up at 8.30 am has a cigarette (yes a cigarette) with a cup of black coffee and a lovely bar of chocolate. The bar of chocolate she loves has salted caramel bits, they are so crunchy! For sure you can have a chocolate before 12, this is what she thinks, and she is always right. Bless her! She never goes for a run, it is bad for your knees and back. At 9.15 she takes a bus to work (the 62 bus stops right in front of her house) even though her work is just 15 minutes' walk from her home, she has to go down the stairs (she lives on the second floor), she doesn`t use a house lift she tries to exercise a bit. Moreover, the house lift is very old and makes funny noises, Susanne is scared of it. At work she has a cup of coffee, a juicy gossip with her colleague about Henry and his garlic cloves and a croissant, she burns calories going down the stairs, so she can have one. The croissant she has for lunch has chocolate filling! At 12 Susanne has a burger with a diet coke and a cigarette. She always drinks diet coke and she is very happy about it. After work she goes to the gym and does 10 minutes on a treadmill. She always uses the same treadmill. It is very hard to run but she manages 10 minutes. After the gym she goes home, switches on her favourite programme and orders fish and chips with mayonnaise and barbecue sauce. She then has a cup of green tea with sugar. She doesn`t eat after midnight because it is bad for you, but she always brings a triple chocolate cookie in bed it helps her to fall asleep. The cookie she absolutely loves has Macadamia nuts in it! Susanne is very stressed she has nearly given up smoking, for sure 4 cigarettes don`t count, and sugar no clotted cream or fudge just a bar of chocolate but it doesn`t count. She goes to the gym, oh that is stressful and no more pizzas after 11 but there is always a cookie waiting for her after midnight…yummy!

Instructional Sequence

Steps	Deductive	Guided Inductive	Incidental
Step 1	Presentation Presentation and explanation of the grammatical rule (a/an + first mention) + exercise on the use of articles	Rule search Reading and Listening to 2 texts: Healthy Henry and Susanne Stressed (articles are highlighted) Students are instructed to look for the grammar patterns.	Work with a text Reading and Listening to 2 texts: Healthy Henry and Susanne Stressed.
Step 2	Practice Reading and Listening of 2 texts: Healthy Henry and Susanne Stressed Exercise based on the texts: 1. Gap fill (a/an or the) + true or false judgement 2. Language Game: “Simon says”	Rule search + Practice Exercise based on the texts: 1. Gap fill (a/an or the) + true or false judgement. Rule elicitation 2. Language Game: “Simon says”	Practice Exercise based on the texts: 1.True or false judgement + sentence correction 2. Speaking task: Individual work + discussion in pairs: five more things Henry and Susanne do every day
Step 3	Production Individual work + pair work: Are you Healthy Henry or Susanne Stressed?	Production Individual work + pair work: Are you Healthy Henry or Susanne Stressed?	Production Individual work + pair work: Are you Healthy Henry or Susanne Stressed?

Teaching session 2: The + specific people/ things in a given context

Where do odd socks go?

Do you believe in fortune tellers? I believe that there are people with supernatural powers, however, I have never met one myself. I am not sure whether I would like to know my future in detail but certain things like whether I will become a millionaire, write a bestseller, buy a villa in Madagascar or at least get to know where my socks disappear to could make my life easier.

One evening as I was reading a newspaper somebody knocked on the door. I switched on the light in the hall, looked through the spyhole and saw my best friend. I opened the door and let him in.

He was very excited. He took off his shoes and went straight into the sitting room, not saying a word.

- Antony, are you all right?

Antony sat on the chair closest to the fire place, gave me a bewildered look and said:

- Jeoff, can I have a coffee please?

- Sure! White no sugar in the white cup with roses that you like so much, or do you prefer a mug?

- The white cup will be all right, thank you!

I went back to the kitchen made him a coffee and brought it into the sitting room. Antony was staring at his feet and holding a piece of paper.

- Antony, what's wrong? What is that piece of paper you are holding?

-It's not just any piece of paper, it's the piece of paper with the prediction! Jeoff, I went to see the man who lives in Sandy Balls! The one who can tell you about your past and future!

-Antony, you are crazy!

- No Antony, listen, he told me everything about my past, details only I know. Do you remember my neighbour, Miss Pratchet?

-The girl who lived next door?

-Yes, Jeoff. Well I didn't tell you that, but I loved her secretly, wasn't brave enough to ask her out. The guy told me about her. Jeoff, he told me about the poppy field where I found my father dead after a heart attack, he told me about the wall in my nana's house where she hung stupid plates with dogs and kittens. He told me so many things and, well, I believe him. I believe he is right and can see the future.

I didn't know what to say. I knew Antony well and knew about the poppy field story and the lady he loved and the wall with the plates, it was all true. I didn't know what to make of the things he said, it was a bit too much for my practical mind. I decided to get more things out of him.

-Antony, I believe you. I do. Now tell me, what did he predict?

-Well, Jeoff, remember the lady who works in the coffee shop opposite where I live? He said we will get married and, Jeoff, I do like her! I have always been scared to ask her out, but now I will do that. Moreover, he said I will move to Argentina because I will get a job offer. Guess what the boss mentioned in the morning?

- That you do business with Argentina...

- Exactly, Jeoff! Exactly that.

- Antony, but you love England. What are you talking about! I was shocked. Antony was saying things that he never usually said.

- Jeoff, he said you would not believe the story I would tell you. So as a proof he told me to instruct you to go upstairs, open the loft room, in the right corner you will see a box, open the box and below a pile of cards you will find something very precious to you, something you lost ages ago.

I was staring at him in amazement but managed to get up, go upstairs and get into the loft room. I opened the box and below the pile of letters from my ex-wife I found a photo, the only photo of my mum that survived in the fire that destroyed our family house. I had been looking for it everywhere but could not find it. The photo was precious to me. Hope ran through me and I rushed downstairs. I wanted to meet the fortune teller, I knew it now. Antony was standing by the fireplace.

-Antony, please I need an address?

-What address?

-The address, that man's address!

-But you don't believe in fortune tellers!

-Please, Antony, give me the address and the name.

-What will you ask him, Jeoff? Aren't you a stubborn bachelor unwilling to marry again.

-I will ask him where my socks go! I don't want to go bankrupt buying pair after pair!

Instructional Sequence

Steps	Deductive	Guided Inductive	Incidental
Step 1	Presentation Presentation and explanation of the grammatical rule (the + specific people/things in a given context)	Rule search Reading and Listening to a text: Where do odd socks go? Students are instructed to look for the grammar patterns.	Work with a text Reading and Listening to a text: Where do odd socks go?
Step 2	Practice Reading and Listening to a text: Where do odd socks go? Exercise based on the texts: 1.Answer the questions using information from the text 2. Gap-fill (a/an or the) 3. Written exercise: write sentences with the words provided	Rule search + Practice Exercise based on the texts: 1.Answer the questions using information from the text 2.Gap-fill (a/an or the) 3.Written exercise: write sentences with the words provided Rule elicitation	Practice Exercise based on the texts: 1.Answer the questions using information from the text 2.Gap-fill (a/an or the) 3.Written exercise: write sentences with the words provided
Step 3	Production Pair work: Interview with a fortune teller from Sandy Balls.	Production Pair work: Interview with a fortune teller from Sandy Balls.	Production Pair work: Story retelling Pair work: Interview with a fortune teller from Sandy Balls.

Teaching session 3: A/an or zero article + general context

Modern values vs Victorian values: why you should not moan!

We have all been in a situation when having said something silly without thinking we were greeted by “shoosh” from our parents. At home you had to face the music and your parents gave you a song and dance on “You are from a decent family, please do not embarrass us with your lack of education and culture”. You rolled eyes at them only to get back something like: “Don`t you dare roll your yes, young lady/gentleman!”

Well, what`s wrong with chewing and blowing a bubble gum, saying “I hate classical literature and music”, wearing bright lipstick to school and expressing your views on how PlayStation is more fun than opera and ballet? There is such a thing as ethics, values and morals.

Just to show you how lucky you actually are living in the 21st century we will give you a couple of examples from the distant past. So stop moaning, blow your nose and pay attention to what we have to say.

Setting: British Empire, 19th century, Queen Victoria is on the throne:

Queen Victoria had a very strict morality for society that prescribed to all families how to behave. We know laziness is fun and being a couch potato is your favourite occupation, but if you were thrown into Victorian times your couch potato lifestyle would have to come to an end. Work and discipline (that included doing homework and reading good literature for young boys and girls) was very important. Next time you fight with mum about doing home-work, just remember Queen Victoria!

You love laughing out loud, gossiping, swapping Dostoevsky for magazines, going to discos, and many other things. Well, you are lucky you can get away with it. Queen Victoria would not have let you do that as seriousness of character for both boys and girls was a virtue. Being silly, or unfocused was bad and there was a strict character code for men and women. You could either be an angel worshipping literature, music, religion or a demon doing everything else. So next time you moan about reading Russian classical literature for your class instead of comics or magazines think about the poor boys and girls of Victorian England.

You are not allowed to wear jeans to school, no miniskirts or bright make-up for girls, that`s very sad indeed. We are sorry for you, but we are even more sorry for Victorian ladies. Just think, respectable women wore their hair pinned up, they had to keep their arms, legs, shoulders and feet covered at all times, it was a scandal to be seen barefoot or to see a woman's leg. So what were you saying about tight dresses, miniskirts and crop tops?

We hope that now when you have something to compare your situation with, you will praise home-work, watch less TV, love theatre, classical literature and music as much as adults do, eat your porridge for breakfast and love your school uniform!

Instructional Sequence

Steps	Deductive	Guided Inductive	Incidental
Step 1	Presentation Presentation and explanation of the grammatical rule a/a(n) or zero article + general context	Rule search Reading and Listening of the text: Modern values vs Victorian values: why you should not moan!	Work with a text Reading and Listening to the text: Modern values vs Victorian values: why you should not moan!
Step 2	Practice Reading and Listening to the text: Modern values vs Victorian values: why you should not moan! Exercise based on the texts: 1. Sentence correction 2. Gap fill 3. Memory game	Rule search + Practice Exercise based on the texts: 1. Sentence correction Guiding questioning. 2.Work with minimal contrasts Guiding questioning 3.Rule gap fill + examples illustrating it. Students now have the rule	Practice Exercise based on the texts: 1.True or false judgements 2. Test your partner! 3. Memory game

Step 3	Production Individual work + pair work: President Putin`s character code	Production Individual work + pair work: President Putin`s character code	Production Individual work + pair work: Interview with Queen Victoria President Putin`s character code

Teaching session 4: A/an + what kind of thing/person something/somebody is

Guide to fantastic beasts and monsters: all you need to know to stay alive

Every time the clock shows midnight children and not very brave adults jump into their beds and cover themselves with huge duvets – a weapon against monsters haunting "the under the bed kingdom". We are not sorry for slippers, they can be eaten by hungry creatures as long as our feet are fully covered. Some of our experts who have made research into the monsters have written a guide of fantastic beasts and monsters to ensure your children will survive till the age of 18. Let us begin by identifying who is who in the monsters` club.

A toe eater is a small fluffy creature that looks a bit like a hedgehog. They have long legs and sharp claws. A toe eater is a very nasty thing that is very hard to get rid of. Toe eaters hunt in packs of 4 or 6, they are extremely dangerous. Once they see exposed feet they first take a bite to make sure they are not allergic to victim`s blood. The best way to protect yourself from toe eaters is to sleep in extremely smelly socks.

A hair poxy is a very cute looking but in reality, a very evil creature. Female poxies are pink with long blond hair, male poxies are blue and don`t normally have any hair. Female poxies grow scissors instead of arms which they use to cut naughty boys` and girls` hair. Poxies are afraid of light, the best way to protect yourself from them is to be good. Alternatively leave a bedside lamp on all night long. For an immediate working solution please contact our experts.

A tickler is a long creature that pesters only those children who eat cookies in bed leaving crumbs on pillows and blankets. A tickler is a beast, not a demon. Ticklers feed on the crumbs and then to amuse themselves after a good meal they start tickling poor children, not letting them fall asleep. The best way to protect yourself from ticklers for now is to listen to your mum and never eat in bed. For best working solutions please contact our experts.

A booka is a horrible demon that terrorizes not only babies and kids but also adults. A booka is a shadow creature that can take a human shape and form. Bookas always hunt on their own, they sneak into bedrooms, blend with the interior and once a child or an adult is left alone they approach cribs or beds and hover over their victims paralyzing them with their demonic eyes. Bookas feed on fear and negativity. The best way to protect yourself from them is to contact our experts as fast as possible.

For further information on fantastic beasts and creatures please call 07894567. Our qualified experts will answer all your questions and help you to get rid of all the unwanted creatures residing in your home.

Instructional Sequence

Steps	Deductive	Guided Inductive	Incidental
Step 1	Presentation Presentation and explanation of the grammatical rule (a/an + what kind of thing/person something/somebody is	Rule search Reading and Listening to the text: Guide to fantastic beasts and monsters: all you need to know to stay alive Students are instructed to look for the grammar patterns.	Work with a text Reading and Listening to the text: Guide to fantastic beasts and monsters: all you need to know to stay alive
Step 2	Practice Reading and Listening to the text: Guide to fantastic beasts and monsters: all you need to know to stay alive Exercise based on the texts: 1. Gap-fill 2.Pair work: providing definitions for monsters 3.Snowball game: My	Rule search + Practice Exercise based on the texts: 1.Work out the pattern Guiding questioning. 2. Gap-fill 3. Pair work: providing definitions for monsters Guiding questioning 4. Rule gap fill + examples illustrating it.	Practice Exercise based on the texts: 1. Gap-fill 2.Pair work: providing definitions for monsters 3.Additional written exercise: definition of your monsters 4.Snowball game: My

	monster club	Students now have the rule	monster club
Step 3	Production Individual work + pair work: Guess who? Describing monsters	Production Individual work + pair work: Guess who? Describing monsters	Production Individual work + pair work: Guess who? Describing monsters

Teaching session 5: The + one of something

Ancient religions: the sun, the moon and the sky

People have always been interested in the world around them. In ancient times they worshipped the sun, the moon, the sky and other forces of nature. They often depicted them as gods in human shape. If we analyse Egyptian, Greek and Roman mythology we can see a lot of parallels in the way people from different continents and cultures explained the world.

In Ancient Egypt the sun god Ra was the most important god. Egyptians believed that every night Ra was swallowed by the sky goddess Nut. He had to travel through the underworld at night to be reborn in the morning. Similarly, to Egyptian mythology, in Greek and Roman tradition the sun god Apollo was one of the most complex deities. He was worshipped as the god of light, truth and healing.

The cult of the moon was not as important as that of the sun and was often mixed with the cults of night, travelling and magic. In Egypt the moon god was Khonsu, which is translated as “traveller” and could be related to the nightly travel of the moon across the sky. In Greek and Roman tradition, the moon was depicted as the female goddess Selene. She is also a traveller driving her moon chariot across the sky.

Egyptians believed that the sky was formed by the stunningly beautiful goddess Nut. She was seen either as a star-covered woman arching over the earth or a star-covered cow. In Greek tradition the god ruling the sky was Uranus who was the son and husband of Gaea, Mother Earth.

He and Gaea are seen as two of the most influential gods, and they are the ancestors of most Greek gods.

Gaea was the primal mother goddess in Greek tradition. She represented the Earth and was worshipped as the universal mother of everything and everybody. In Egyptian mythology the Earth was represented by the male god Geb. He was the husband and brother of the sky goddess Nut.

In ancient times people worshipped the world around them and tried to live in peace with the gods. The world was sacred to them. The advent of knowledge has completely transformed the way people see forces of nature: they left the gods in favour of modern science.

Instructional Sequence

Steps	Deductive	Guided Inductive	Incidental
Step 1	Presentation Presentation and explanation of the grammatical rule (the + one of something)	Rule search Reading and Listening to the text: The sun, the moon and the sky. Students are instructed to look for the grammar patterns.	Work with a text Reading and Listening to the text: The sun, the moon and the sky.
Step 2	Practice Reading and Listening to the text: The sun, the moon and the sky. Exercise based on the text: 1.Gap-fill 2.True or false judgement 3.Pair work: Making sentenc es from the words provided. 4.Snowball game: Gods I	Rule search + Practice Exercise based on the texts: 1.Gap-fill 2.True or false judgement 3.Rule gap fill + examples illustrating it. Students now have the rule	Practice Exercise based on the texts: 1.Gap-fill 2.True or false judgement 3.Additional speaking exercise: Test your partner! 4.Pair work: Making sentenc es from the words provided. 5.Snowball game: Gods I

	know	4.Snowball game: Gods I know	know
Step 3	Production Individual work: Writing short paragraphs about 3 gods	Production Individual work: Writing short paragraphs about 3 gods	Production Individual work: Writing short paragraphs about 3 gods

Teaching session 6: The + type of animal/machine

Endangered birds

Many species keep us alive: they purify water, recycle waste, protect our crops and keep a perfect balance in the world we live in. However, people tend to take this for granted. Many species have become either endangered or completely extinct which means the balance has become fragile. Scientists from the Zoological Society of London and Yale University have assessed the world's 9,993 bird species according to their evolutionary distinctiveness and global extinction risk to produce a list of the worlds' 100 most unusual and endangered birds. Here are some of them.

Number one is the giant ibis – the world's largest ibis. It weighs around 4.2kg and reaches more than one metre in height. It has been estimated that only 230 pairs remain in the wild, thus it is on the verge of extinction. The population has been so dramatically reduced due to habitat loss, human disturbance and hunting.

The New Caledonian owlet-nightjar – a mysterious species, found only on the island of New Caledonia, has not been seen since 1998. The bird has been classified as critically endangered as its population is unlikely to number more than 50 individuals.

The kakapo - a nocturnal parrot that is a flightless bird found in New Zealand. The numbers of the kakapo have declined catastrophically due to hunting, forest clearance and habitat degradation. It is now extinct throughout its natural range and survives only on three small islands after a series of successful translocations. The population has increased to 125 individuals thanks to intense conservation efforts.

The kagu, a beautiful ash-white bird, is also on the verge of extinction. It can now be found only in the dense, humid forests of New Caledonia. Local people call the kagu 'ghost of the forest'.

The Philippine eagle is one of the world's largest, most powerful birds of prey. It`s natural habitat is the Philippines. For the past 40 years the eagle`s population has declined and is close to extinction. The Philippine eagle has recently acquired the status of the national bird of the Philippines, which has helped to conserve its population.

The Sumatran ground cuckoo is a forest-dwelling bird found on the Indonesian island of Sumatra. It is estimated that there are 70-400 individuals in the wild. The main reason for the decline of the population is the grotesque deforestation of Sumatra.

The Forest owlet is a strikingly beautiful owl. The population has become endangered due to loss of habitat through deforestation. An extremely small and fragmented population can now be found in central India only.

Instructional Sequence

Steps	Deductive	Guided Inductive	Incidental
Step 1	Presentation Presentation and explanation of the grammatical rule (the + type of animal/machine)	Rule search Reading and Listening to the text: Endangered Birds (articles are highlighted) Students are instructed to look for the grammar patterns.	Work with a text Reading and Listening to the text: Endangered Birds
Step 2	Practice Reading and Listening to the text: Endangered Birds Exercise based on the texts: 1.Target items elicitation task 2. Gap fill 3. Make sentences from the words provided	Rule search + Practice Exercise based on the texts: 1.Target items elicitation task Guiding questioning 2. Gap fill Guiding questioning 3. Make sentences from the words provided	Practice Exercise based on the texts: 1.Target items elicitation task 2.Additional speaking activity: Test your partner! 3. Snowball game

Step 3	Production Pair work + class work Interview with the WWF specialist	Production Pair work + class work Interview with the WWF specialist	Production Pair work + class work Interview with the WWF specialist

Teaching session 7: The + Adjective denoting a group of people

Fat taxes: Government against obesity

Fast food is a type of food that is prepared and served very quickly. It was first popularised in the United States and started spreading very fast. Now you can find fast food restaurants all over the globe. Fast food is loved by both the young and the old, however, according to the latest statistics the young are the main fast food consumers.

Moreover, people go for fast food no matter what their social status or nationality is. In big cities like New York or London in MacDonald's you can meet the rich and the poor sitting side by side eating juicy burgers and sipping on a coke. The Spanish enjoy fast food as much as Norwegians, Americans or the British. However fast food is not just about uniting people in their love for convenient French fries, burgers or sweetened fizzy drinks. It actually it poses substantial health risks to its consumers. The fit and healthy including dieticians, athletes and nutritionists believe it is one of the main reasons behind obesity and diet-related diseases all over the world.

Governments have decided to fight fast food consumption on official levels by introducing "fat taxes". They want to increase the price of unhealthy food and drinks – the bad as experts call them - by as much as 20%. According to research published in the British Medical Journal such measures should be accompanied by subsidies on healthy foods – the good such as fruit, vegetables, fish and lean meat - to encourage a change in dietary habits.

Two academics from "Oxford University" Dr Oliver Mytton and Dr Mike Rayner examined food taxes in countries across the globe. According to them the Dutch have brought in a "fat tax", Hungarians a "junk food tax" and the French a tax on all sweetened drinks. The Irish are discussing fat taxes on governmental levels, the same debates are going on in Peru. The English are also considering to follow the trend.

It is still unclear how "fat taxes" could be brought in and enforced, but they could help ensure that poor diet plays less of a role in the future in a range of illnesses such as obesity, heart disease, type two diabetes and tooth decay. Although the less well-off are affected more by these taxes in comparison to the wealthy they may also benefit in the long run. As the poor consume less healthy food they have a higher rate of most diet-related diseases. The research has also indicated that the unhealthy are the main consumers of fast food and the only thing that can stop them from buying fast food is a substantial increase in prices. The perfect example illustrating this is the USA where the seriously obese buy twice as much fast food in comparison to people not suffering from obesity. Health and nutrition experts believe that "fat taxes" could be the most effective means of fighting obesity and promoting healthy and balanced lifestyle. What do you think, would you pay 20% more to enjoy your favorite fizzy drink or would you opt for water?

Instructional Sequence

Steps	Deductive	Guided Inductive	Incidental
Step 1	Presentation Presentation and explanation of the grammatical rule (the + adj. denoting a group of people)	Rule search Reading and Listening to the text: Fat taxes: Government against obesity (articles are highlighted) Students are instructed to look for the grammar patterns.	Work with a text Reading and Listening to the text: Fat taxes: Government against obesity
Step 2	Practice Reading and Listening to the text: Fax taxes: Government against obesity Exercise based on the texts: 1. Gap fill 2. True or false judgement 3.Snowball Game	Rule search + Practice Exercise based on the texts: 1. Gap fill Guiding Questioning 2.True or false judgement Guiding Questioning	Practice Exercise based on the texts: 1.Pair work. True or false judgements. 2.Extra writing and speaking exercise: 8 facts about food consumers in Russia

		3.Snowball Game	3.Snowball game
Step 3	Production Individual work + pair work: Interview with a nutritionist	Production Individual work + pair work: Interview with a nutritionist	Production Individual work + pair work: Interview with a nutritionist

Teaching session 8: The + oceans/seas/rivers

Mysterious water: are you brave enough to take a dip?

What are you afraid of? Mice, insects, heights, maths, exams or maybe water? You may laugh, who is afraid of water? Think of Sochi and the Black Sea, Europe and the Mediterranean Sea, the Maldives and the Indian Ocean, the permanently frozen Arctic Ocean, the Atlantic Ocean, numerous seas and rivers. There is nothing wrong with water after all. Indeed, but what about the strange creatures the mighty water has given birth to? As humans are not native to the oceans this makes us easy pray for many of these creatures, although thankfully we are largely off the menu. We are ready to take you on a small journey across our planet`s oceans, seas and rivers. We hope that afterwards you will be more jovial about equations than about warm summer waters.

The Mariana Trench is the deepest part of the world`s oceans. It is located in the Pacific Ocean, to the east of the Mariana Islands. It reaches a maximum-known depth of 10,994 m, although some measurements place the deepest part at 11,030 metres. Just imagine 11, 030 metres! No light, complete darkness and only some demon-like creatures lurking there: google viperfish whose teeth are so long they can't even fit in its mouth, or the goblin shark with a huge horn protruding from its head. Brrrr!

Well, the Mariana Trench has at least some life, even if it scares the wits out of you. There is a place on earth where life is not possible and it`s called the Dead Sea or the Sea of Death. The water in the Dead Sea is so salty that no creatures can survive there with the exception of some bacteria. The Jordan River is the only major water source flowing into the Dead Sea, there are no outlet streams. Since 1930 the Dead Sea has started shrinking, dramatically affecting the region. In May 2009 at the World Economic Forum, Jordan announced its plans to construct the "Jordan National Red Sea Development Project" (JRSP). This is a plan to convey seawater from the Red Sea to the Dead Sea to save this dead miracle.

We have all seen scary films where shoals of Piranhas basically eat people alive stripping flesh from their bones. The piranha is a freshwater fish with deadly teeth and powerful jaws inhabiting South American rivers. Piranhas are indigenous to the Amazon and the São Francisco River systems. Piranhas can be extremely aggressive and vicious! Attacks resulting in deaths have occurred in the Amazon basin many times. 190 piranha attacks were reported there in the first half of 2007. In 2011, a series of attacks in the Brazilian state of Piauí resulted in 100 people being injured. Thus, some Brazilian rivers have warning signs about lethal piranhas. Some people have spotted piranhas in the Mississippi and some silly ones claim they were bitten by them in the Nile. No reports have come from Russia yet, so you can still swim in the Volga or the Neva River without fear of ending up without a toe or a finger!

We won`t talk much about polar bears and 4 m tall leopard seals as you might not want to have a holiday by the Arctic Ocean. Let`s roam the Earth`s warmest lovely tropical waters of the Pacific and Indian Oceans. These oceans are a home to many naughty creatures. One of them is a small sea snake that lives in coastal waters (think beaches) we all love so much. Sea snakes are highly venomous. You might think that sea snakes are harmless as they only have tiny mouths. This is a complete myth! It is true that sea snakes don’t have huge mouths, however they are capable of swallowing fish whole and can easily sting and harm a human.

Now it`s time to return to maths equations you have not finished or vocabulary for that annoying English test as hopefully you might not want to daydream about lovely water much after what we shared. Good luck!

Instructional Sequence

Steps	Deductive	Guided Inductive	Incidental
Step 1	Presentation Presentation and explanation of the grammatical rule (the + oceans/seas/rivers)	Rule search Reading and Listening to the text: Mysterious water (articles are highlighted) Students are instructed to look for the grammar patterns.	Work with a text Reading and Listening to the text: Mysterious water
Step 2	Practice Reading and Listening to the text: Mysterious water Exercise based on the texts: 1.Target items elicitation task 2. Gap-fill 3.Snowball game: Facts about water	Rule search + Practice Exercise based on the texts: 1.Target items elicitation task Guiding questioning. 3.Rule gap fill +examples illustrating it Guiding questioning 3.Gap-fill 4. Snow ball game: Facts about water	Practice Exercise based on the texts: 1.Target items elicitation task 2.Test your partner! 3.Snowball game: Facts about water
Step 3	Production Individual work + pair Interview with the man who has been in the Mariana Trench	Production Individual work + pair work: Interview with the man who has been in the Mariana Trench	Production Individual work + pair work: Interview with the man who has been in the Mariana Trench

Teaching session 9: **The + plural names of people/places**

Mind the totem poles

The Grants are a very prosperous and respectable family. They believe in education, hard work, property and money in the bank, not stashed somewhere under the bed. They religiously pray to the gods of prosperity and well-being by paying regular visits to bankers, going to dinners with investors and entrepreneurs and playing bridge with the Lloyds.

The Grants have two children: Elsie Grant and Luke Grant. Young Miss Grant studies business. She loves flying to the Emirates for her winter break, the USA for Easter and Italy or Spain in the summer. Luke studies accounting and plays American football. Mr Grant is always busy with his timber or oil and gas business, pumping as much money into them as possible. In the evening he usually has whisky and a Cuban cigar with Mr Lloyd, they discuss politics, economy and interest rates. Mrs Grant doesn`t work; she is busy embroidering handkerchiefs in the Ladies Embroidering Society. She doesn`t like Mrs Lloyd much but meets her every morning in the Sketch tea room where they discuss cushions, new clothing collections and holiday destinations. Misses Grant wants to go the Canaries in September, however Mrs Lloyd finds the idea gross, her choice are the Maldives.

A month ago the Grants bought a beautiful property in Dedham, Gainsborough's birth place. They were very proud of the purchase and invited the Lloyds to show off their acquisition. In the evening the men went to the study to smoke cigars and talk politics and the ladies went to the garden to have their tea. Mrs Lloyd was very cross that the Grants had outdone them and was looking for something negative to comment on. Her gaze fell on some strange totem poles standing in the middle of the garden. She turned to Mrs Grant and said:

-Dear Rebecca, why are you keeping these strange poles? They are gross and spoil all the view!

-My dear Mollie, I don`t dare touch them. I have a bit of a prejudice regarding the totem poles, they should stay where they are!

-Dear Rebecca, it`s nonsense. We live in the 21st century, not medieval times, get rid of them. I doubt that the Ashtons will come to visit you if they get to know you have these outrageous poles in your grounds. They are in the Netherlands at the moment but returning soon.

Mollie Lloyd gave Rebecca a triumphant smile, turned and walked back to the house. Rebecca looked at the poles again. She could not allow Mollie Lloyd tell everyone they have poles in their grounds.

The next morning she instructed her workers to remove the poles and put them in the shed. The poles were removed and Mrs Grant decided to call Mollie Lloyd and share the news. However the phones were not working and there was no mobile reception either. Rebecca was very angry, the workers must have done something to the cables! She went to her room, tried to switch on the light but there was no electricity. She came to the window to open the curtains but suddenly felt her feet were not touching the ground, she was floating in the air. Mrs Grant was terrified, she wanted to scream but couldn't, she had lost her voice, moreover she couldn't move, she was just floating helplessly in the air. She could hear some sort of hissing and then suddenly a hoarse but powerful voice talked to her in her head:

-Get us back, get us back!

-I can`t, - she thought to herself, - what will the Lloyds and the Ashtons say? The second she thought it, some unfathomable force pushed her body forward. She went flying through the room and crashed into the wall. In what felt like an hour the door opened and Mr Grant entered the room.

-Dear! – he said.

-OMG! Dear, are you all right! You are pale! What`s wrong, Rebecca! Rebecca, talk to me!

Mr Grant was shaking Misses Grant, calling her name over and over. She looked at him, fear in her eyes and whispered:

-Get the totem poles back! Get them back in their places now, they are in the shed!

She looked at Mr Grant one more time and fainted.

Neither the Lloyds nor the Ashtons have come to visit the Grants since then. Fair enough, no respectable family will want to have five o`clock tea on the patio overlooking some strange black totem poles.

Instructional sequence

Steps	Deductive	Guided Inductive	Incidental
Step 1	Presentation Presentation and explanation of the grammatical rule (the + plural names of people/ places)	Rule search Reading and Listening to the text: Mind the totem poles (articles are highlighted) Students are instructed to look for the grammar patterns.	Work with a text Reading and Listening to the text: Mind the totem poles
Step 2	Practice Reading and Listening to the text: Mind the totem poles Exercise based on the texts: 1.Target items elicitation task 2. Sentence writing task 3.Gap fill	Rule search + Practice Exercise based on the texts: 1.Target items elicitation task Guiding questioning. 2.Sentence writing task Guiding questioning 3.Gap filling task Guiding questioning 4. Fill in the gaps in the rule + examples to illustrate it	Practice Exercise based on the texts: 1.Target items elicitation task 2. Sentence writing task 3.Gap fill 4.Additional speaking exercise: Interview with Mrs. Grant
Step 3	Production Individual work + pair work: Story retelling	Production Individual work + pair work: Story Retelling	Production Individual work + pair work: Story retelling

APPENDIX I. Targeted article uses

Targeted article uses	Examples
1. The + adjective denoting a group of people	The rich can never understand the poor.
2. The + type of animal/machine	My father can play the guitar.
3. A/an or zero article + general context	She loves music.
4. The + specific people/things in a given context	The book I'm reading at the moment is a bestseller.
5. The + one of something	The moon was bright last night.
6. A/an + what kind of thing somebody/something is	The BBC is a famous broadcasting company.
7.A/an + first mention	My neighbor bought a new car last week.
8. The + oceans/seas/rivers	The Red Sea has many coral reefs.
9. The + plural names of people/places	The Smiths have invited us for dinner.

APPENDIX J. Correlations between LLAMA subtests

	LLAMA F	LLAMA B	LLAMA D
LLAMA B	.32**		
	p <.001		
LLAMA D	.27**	.19*	
	p = 004	p =.037	
LLAMA E	.42**	.24**	.22*
	p <.001	p =.009	p = .018

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

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