

**Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

**Bansho Mathematics strategy as a means for enhancing writing skills  
in second graders**

**Martin Alfonso Arias Rivera**

Universidad Pedagógica Nacional

**Master's Program in the Teaching of Foreign Languages**

Bogotá, D.C.

**Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

**Bansho Mathematics strategy as a means for enhancing writing skills  
in second graders**

**By**

**Martin Alfonso Arias Rivera**

**A thesis presented to the Faculty of Humanities, Department of  
Languages at the Universidad Pedagógica Nacional as a requirement  
to obtain the degree of Master in the Teaching of Foreign Languages**

**Under the supervision of thesis director Ángela Camargo Uribe. Ph. D**

**Bogotá D.C.**

**NOTE OF ACCEPTANCE**

**Thesis Director:**

\_\_\_\_\_

**Ángela Camargo Uribe. Ph. D**

**Juror:**

\_\_\_\_\_

**Juror:**

\_\_\_\_\_

**Acuerdo 031 del 04 de diciembre de 2007 del Consejo Superior de la  
Universidad Pedagógica Nacional**

**Artículo 42, Parágrafo 2:**

«Para todos los efectos, declaro que el presente trabajo es original y de mi total autoría;  
en aquellos casos en los cuales he requerido del trabajo de otros autores o investigadores,  
he dado los respectivos créditos.»

### **Acknowledgements**

First of all, I would like to express my gratitude to Professor Ángela Camargo for her effort and support. Despite the very tight time frame, I was fortunate to have had a reliable, motivating supervisor who guided me through the elaboration process.

I would also like to thank my family for carrying me through this phase by simply being there whenever I needed them.

Finally, I would like to thank my favorite person for helping me in every possible way and for her endless patience.

**Abstract**

This action research project, conducted with second-grade students at a private institution in Bogotá, Colombia, investigated how Bansho mathematics teaching strategy influences second graders' EFL writing skills under the CLIL framework. It revealed that this area of literacy could be boosted and worked by considering a depth exploration of the possible benefits of the engaging approach derived from the integration of Mathematics methodologies and EFL learning.

Therefore, six hermeneutic cycles were carried out after needs analysis to favor a specific learning environment and explore and analyze the mathematical strategy scopes. During the cycles, data were gathered through field notes, artifacts, rubrics, and focus groups. The adapted Bansho strategy was used as a metacognitive tool to encourage and enhance students to solve numeracy problems and write the procedure descriptions.

The findings provide information about the importance of increasing the meaningful view of writing skills and cooperative learning at this decisive education stage. Likewise, considering content areas methods to support high EFL competence levels, including insights into more effective ways to help learners within a CLIL environment at the primary school level.

***Key words:*** *CLIL, Mathematics, Bansho, EFL writing, cooperative learning.*

### **Resumen**


Este proyecto de investigación-acción, realizado con estudiantes de segundo grado en una institución privada en Bogotá, Colombia, investigó cómo la estrategia de enseñanza de matemáticas de Bansho influye en las habilidades de escritura de EFL de los estudiantes de segundo grado bajo el marco del enfoque AICLE. Este estudio reveló que esta área de alfabetización podría impulsarse y trabajarse al considerar una exploración profunda de los posibles beneficios del enfoque derivado de la integración de metodologías de Matemáticas y el aprendizaje del Inglés como lengua extranjera.

Después del análisis de la problemática y establecimiento de los objetivos, se realizaron seis ciclos hermenéuticos para favorecer un ambiente de aprendizaje específico y explorar y analizar los alcances de la estrategia matemática. Durante los ciclos, los datos se recolectaron a través de notas de campo, artefactos, rúbricas y grupos focales. La estrategia Bansho adaptada se utilizó como una herramienta metacognitiva para motivar a los estudiantes y propiciar escenarios de resolución de problemas de aritmética y posteriormente escribir las descripciones de los procedimientos.

Los hallazgos aportan información sobre la importancia de incrementar la visión significativa de la escritura y el aprendizaje cooperativo en esta decisiva etapa educativa. Del mismo modo, considerar métodos de áreas de contenido para respaldar altos niveles de competencia en Inglés como lengua extranjera, incluidas propuestas sobre formas más efectivas de ayudar a los estudiantes dentro de un entorno AICLE en el nivel de la escuela primaria.

***Palabras clave:*** AICLE, Matemáticas, Bansho, escritura en Inglés, aprendizaje cooperativo.

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

 UNIVERSIDAD PEDAGÓGICA NACIONAL <small>CONOCIMIENTO AL SERVICIO</small>	<b>FORMATO</b>	
	<b>RESUMEN ANALÍTICO EN EDUCACIÓN - RAE</b>	
Código: FOR020GIB	Versión: 01	
Fecha de Aprobación: 10-10-2012	Página 3 de <u>202</u>	

<b>1. Información General</b>	
<b>Tipo de documento</b>	Tesis de grado
<b>Acceso al documento</b>	Universidad Pedagógica Nacional. Biblioteca Central
<b>Título del documento</b>	Bansho Mathematics strategy as a means for enhancing EFL writing skills in second graders. (Estrategia matemática Bansho como medio para fomentar las habilidades de escritura en inglés como lengua extranjera)
<b>Autor(es)</b>	Arias Rivera, Martin Alfonso
<b>Director</b>	Camargo Uribe, Ángela
<b>Publicación</b>	Bogotá Universidad Pedagógica Nacional, 2022. 191 páginas
<b>Unidad Patrocinante</b>	UNIVERSIDAD PEDAGÓGICA NACIONAL
<b>Palabras Claves</b>	CLIL, Mathematics, Bansho, EFL writing.

<b>2. Descripción</b>
<p>Master's degree thesis situated in a qualitative action research study where the author's primary purpose was to examine how the Bansho mathematics teaching strategy influences the EFL writing skills of second-grade students in CLIL classes. Forty-two students took part in the study for over six months at a private school in Bogota, Colombia. Bansho artifacts, field notes, and focus groups interviews were the main instruments for data collection. Findings showed that evident cognitive processes in the problem-solving requirements assisted students in developing the content and foreign language activities proposed for each intervention through the worked strategy. Likewise, students strengthened Cooperative Learning principles such as positive interdependence and individual and group accountability. The teacher-researcher also concluded that the Bansho strategy improved the students' writing skills, particularly text coherence and cohesion. It can be related to students' familiarity with the steps to solve word problems and how they used them as a reference structure to the written productions. Finally, the author suggests further research using the Bansho strategy to examine its influence on speaking skills or research pointing to the formal view regarding grammar and syntax in written productions.</p>



### 3. Fuentes

- Bandura. (1997). *Self-efficacy: The exercise of control*. New York: W H Freeman/Times Books/ Henry Holt & Co.
- Bandura, A. (2001). Social Cognitive Theory: An Agentic Perspective . *Annual Review of Psychology* , 52(1), 1-26. <https://doi.org/10.1146/annurev.psych.52.1.1>
- Barwell , R., Kubota, Z., & Culotta, D. (2018). Teaching and Learning Secondary School Mathematics. In A. Kajander, J. Holm, & E. Chernoff, *Learning Mathematics When Students Are New to Schooling and New to English. En Kajander, A., Holm, J., & Chernoff, E.J., Teaching and Learning Secondary School Mathematics: Canadian Perspectives in an International Context* (pp. 101-116). Springer International Publishing.
- Cenoz, J. (2015). Content-based instruction and content and language integrated learning: the same or different? . *Language, Culture and Curriculum*, 28(1), 8-24. <https://doi.org/https://doi.org/10.1080/07908318.2014.1000922>
- Cohen, L., Manion, L., & Morrison, K. (2007). *Research Methods in Education (6th ed.)*. Routledge Falmer.
- Coyle. (2006). Content and language integrated learning: Motivating learners and teachers. *Scottish Languages Review*, 13, 1-18.
- Coyle. (2007). Content and Language Integrated Learning: Towards a Connected Research Agenda for CLIL Pedagogies. *International Journal of Bilingual Education and Bilingualism*, 10(5), 543-562. <https://doi.org/10.2167/beb459.0>
- Coyle, D., Hood , P., & Marsh, D. (2010). *Content and Language Integrated Learning*. Cambridge University Press.
- Creswell. (2009). *Research Design: Qualitative, Quantitative and Mixed Methods*. Los Angeles: SAGE publications, Inc.
- Cumming, A. (2001). Learning to Write in a Second Language: Two Decades of Research . *Infernational Journal of English Studies*, 1(2), 1-23.
- Fernández. (2009). Spanish CLIL: Research and official actions. In A. Fernández-Fontecha, *Content and language integrated learning: Evidence from research in Europe* (p. 3.21). Multilingual Matters.
- Fernandez, , C., & Yoshida, M. (2004). *Lesson Study A Japanese Approach To Improving Mathematics Teaching and Learning*. Routledge.
- Johnson, D., Johnson, R., & Holubec, E. (2015). *Advanced Cooperative Learning*. Interaction Book Company

- Kubota, Z. (2011). Translating Japanese teaching and learning practices for North American mathematics educational contexts. It's not simple nor complicated. Toronto, Ontario: Unpublished doctoral dissertation in progress.
- Marsh. (2002). *Content and Language Integrated Learning*. Edita: Servicio de Publicaciones de la Universidad de Córdoba.
- Marsh. (2008). Language awareness and CLIL. *Encyclopedia of language and education*, 6(238), 233-246.  
[https://doi.org/https://doi.org/10.1007/978-0-387-30424-3\\_152](https://doi.org/https://doi.org/10.1007/978-0-387-30424-3_152)
- Marsh, D., & Lange, G. (2000). Using languages to learn and learning to use languages. Eds. D. Marsh - G. Langé. Finland: University of Jyväskylä.”.
- Merriam. (2009). *Qualitative Research: A Guide to Design and Implementation*.
- Jossey- Bass. Merriam, S., & Tisdell, E. (2016). *Qualitative Research: A Guide to Design and Implementation J*.  
ossey-Bass.
- Ministry of Education. (2005). *THE ONTARIO CURRICULUM, GRADES 1–8: MATHEMATICS*.  
<http://www.edu.gov.on.ca/eng/document/curricul/elementary/math1-8e.pdf>
- Montague, M. (2002). *Mathematical problem solving instruction: Components, procedures, and materials*. In M. Montague, & C. Warger (Eds.), *Afterschool extensions: Including students with disabilities in afterschool programs*. Reston, Va.: Exceptional Innovations.
- Patton, M. (2002). *Qualitative Research and Evaluation Methods*. London: SAGE Publications, Inc.
- Pugalee, D. (2001). Writing, Mathematics, and Metacognition: Looking for Connections Through Students' Work in Mathematical Problem Solving. *School Science and Mathematics* , 101(5), 236-245.  
<https://doi.org/https://doi.org/10.1111/j.1949-8594.2001.tb18026.x>
- Van de Craen, Piet, Mondt, Allain, & Gao. (2007). Why and how CLIL works. An outline for a CLIL theory. *Vienna English Working Papers*, 16, 70-78.
- Yoshida, M. (2002). Developing effective use of the blackboard study. *RBS Lesson Study Conference*.  
[https://doi.org/www.rbs.org/lesson\\_conference/2002/papers/yoshida\\_blackboard.shtml](https://doi.org/www.rbs.org/lesson_conference/2002/papers/yoshida_blackboard.shtml)

#### **4. Contenidos**

The following research project is divided into six chapters:

In the first chapter, the diagnostic stage pointed out the path to state the problem. It was supported by a series of evidence and features that displayed the need to improve EFL writing skills. Then, the research question, general objective, and subsidiary objectives were established.

Chapter Two presents a literature review with the primary constructs that supported the study, situating the study according to CLIL advantages as a methodology to fulfill language and cognitive needs. Also, the teacher-researcher considered EFL writing skills development and mathematics subject approach to such skills in school students.

Chapter Three presents the research design outlined and describes the methodological route that supports the study. It traced the research approach, the setting and participants in which the research took place, the data collection instruments used, the researcher's role, and the definition of the hermeneutic cycles in the CLIL classroom.

Chapter Four describes the pedagogical intervention carried out in the context. In addition, it contains the vision of language, learning, and the classroom that the researcher has. This chapter also explains step by step each of the action research stages carried out throughout the six hermeneutic cycles.

Chapter Five contains the data analysis process from the theoretical conceptualization. It shows how each of the steps to analyze the information was executed and how its interpretation was made. This chapter also contains the categories and subcategories with their corresponding findings compared and contrasted with the theoretical constructs from the researcher's voice.

Finally, chapter six set out the conclusions regarding the categories' findings. Also, the study mentions the implications it brings for the field of ELT, the school, and the teacher-researcher as a professional and novice researcher. Finally, it considered both the limitations encountered when conducting the study and the possible further research to carry out.

#### **1. Metodología**

The action research was carried out from the following stages:

1. Approach the population and its context to identify the present problem.
2. Application of a diagnostic test to ratify the problem situation and thus plan and execute the pedagogical intervention.
3. Articulation of the theory. Search for information and bibliographic resources to construct the theoretical framework of the study.
4. Execution of the six hermeneutic cycles. Each pedagogical intervention was conducted considering the curricular demands of the institution and the objectives of the research. During and after the development of each proposed task, there was a constant process of

observation, reflection, and analysis.

5. Analysis of the gathered data and the resulting categories of such a process. The teacher-researcher supported this work in the chosen data analysis approach and the categorization steps.

## **2. Conclusions**

The purpose of this study was to examine how the Bansho mathematics teaching strategy influences the EFL writing skills of second-grade students at a Private School. In support of this objective, six hermeneutic cycles were conducted, and three (3) subsidiary objectives led the way forward to answer the research question.

Findings show that participants foster their cognitive skills in every intervention by developing problem-solving strategies already internalized up to the level of speaking and writing about them. The teacher-researcher concluded that students showed evident cognitive process in the problem-solving requirements, which assisted them in developing the content and foreign language activities proposed for each intervention.

Due to the Bansho dynamics, the teacher-researcher amount of help the students requested lowered progressively. The intention some participants had on including the Teacher in their discussions led to the conclusion that he was part, as well, of the positive interdependence claimed by the Cooperative Learning theory and the student-centered classroom promoted from the CLIL and the school policies. So, the interaction had co-constructing connotations under the premise and principles of action research.

As support for the Bansho elements that intervened, it is necessary to consider participants' perceptions regarding how attractive or valuable the Bansho strategy was for solving problems and developing writing skills in the foreign language. The teacher-researcher increasingly recognized that the high-level engagement occurred when bringing something unknown, groundbreaking, or infrequent to the classroom.

This study has also shown the learners' negotiation during activities development interaction and the employment of various strategies, such as explaining or consensus, which help them in the task completion process. The teacher-researcher highlighted how students overcame intelligibility during the application process and were able to find the main messages in the written productions of their classmates. Even though some students made mistakes when writing in the Bansho booklet, their peers managed to omit them and create natural communicative spaces.

The teacher-researcher confirmed the endorsement character of CLIL in boosting the cooperative nature of learning in the classroom and the conceptual tools that this approach offers. The primacy of language not only supports both content and language learning but provides a fundamental basis for the negotiated relationship between these dual goals. CL culture is mainly observable in the student's role, moving from passive to an active agent when constantly participating in knowledge

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

co-construction. Likewise, that scenario allowed changing the prominent figure the Teacher had and gave students confidence and leading roles in dynamics of feedback and argumentation in search for accurate answers.

The findings, furthermore, revealed that the Bansho strategy improved the students' writing skills, particularly text cohesion. Thus, it clearly remarks that the Bansho may promote possibilities to guided text structures. The process also gave the participants the confidence to write freely, avoiding giving too much attention to spelling and grammar mistakes. Another relevant aspect to remark is the gradually increasing number of words participants reach in the last part of the intervention process. This result might be crucial in this study because standardized test weaknesses in the diagnosis phase pointed to the generally limited extension of the texts produced. This study has also made it clear that the Bansho activity fosters students' intelligibility by leading them to think in their expected readers. The instruction dynamics to accomplish the proposed tasks positively affect learners' autonomy, urging commitment and a team sense of responsibility.

Finally, vocabulary knowledge, which was also a theme with the highest number of entrances in the field notes, is, according to the teacher-researcher, the most determining aspect to succeed in the writings task completion. As a consequence of the attention given to this aspect and the adaptations made to the Bansho, the students began to detail, refine, and polish their written productions, achieving outstanding levels of quality evident in the hermeneutic cycles five (5) and six (6).

<b>Elaborado por:</b>	Arias Rivera, Martin Alfonso
<b>Revisado por:</b>	Camargo Uribe, Ángela

<b>Fecha de elaboración del Resumen:</b>	13	02	2022
--	----	----	------

## Table of Contents

<b>CHAPTER 1 .....</b>	<b>21</b>
<i>Introduction.....</i>	<i>21</i>
<i>Needs Analysis.....</i>	<i>26</i>
<i>Significance and Purpose of the Study.....</i>	<i>33</i>
<i>Research Question.....</i>	<i>34</i>
<i>Research Objective:.....</i>	<i>34</i>
<i>Subsidiary objectives: .....</i>	<i>34</i>
<b>CHAPTER 2 .....</b>	<b>35</b>
<b>CONCEPTUAL FRAMEWORK .....</b>	<b>35</b>
<i>Introduction.....</i>	<i>35</i>
<i>The CLIL Approach .....</i>	<i>36</i>
<i>Writing while learning Mathematics .....</i>	<i>40</i>
<i>Mathematics: Bansho strategy.....</i>	<i>43</i>
<i>EFL Writing Skills .....</i>	<i>45</i>
<i>Teaching EFL Writing .....</i>	<i>48</i>
<i>Previous Research.....</i>	<i>49</i>
EFL writing approaches.....	50
EFL writing and CLIL approach .....	53
Mathematics and CLIL.....	55
<b>CHAPTER 3 .....</b>	<b>59</b>
<i>Research Design.....</i>	<i>59</i>
Research Paradigm .....	59
Type of study .....	61
Description of the context.....	63
Participants and Sampling .....	65
Ethical Issue.....	66
Data gathering instruments.....	66
Field Notes.....	67
Students' artifacts.....	70
Focus Group .....	71
Role of the Researcher.....	75

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

Hermeneutic Cycles.....	76
Validity and Reliability .....	84
<b>CHAPTER 4 .....</b>	<b>86</b>
<i>Instructional Design</i> .....	<b>86</b>
Vision of curriculum.....	86
Vision of language.....	88
Vision of learning .....	89
Vision of classroom.....	90
<b>CHAPTER 5 .....</b>	<b>94</b>
<i>Data Analysis and Findings</i> .....	<b>94</b>
Data Analysis approach.....	94
Procedures of data analysis.....	95
Findings .....	101
Category 1: Prominent Bansho elements that intervened in the mathematics CLIL classes .....	101
Category 2: Cooperative learning fashions fostered through the Bansho activities...119	
Category 3. Students' EFL writing performance according to the tasks demanded in the framework of Bansho activities .....	130
Discussion.....	137
Category 1: Prominent Bansho elements that intervened in the mathematics CLIL classes .....	137
Category 2: Cooperative learning fashions fostered through the Bansho activities...144	
Category 3. Students' EFL writing performance according to the tasks demanded in the framework of Bansho activities .....	148
<b>CHAPTER 6 .....</b>	<b>153</b>
<i>Conclusions and Implications</i> .....	<b>153</b>
<i>Conclusions</i> .....	<b>153</b>
Implications .....	159
Limitations.....	160
Further research .....	161
<b>References .....</b>	<b>163</b>

**LIST OF APPENDICES**

**Appendix A:** Standardized open-ended interview

**Appendix B.** Answers from the Interview

**Appendix C.** Teachers' answers from the questionnaire

**Appendix D.** English Area Plan Document

**Appendix E.** Mathematics Class Goals

**Appendix F.** Artifacts (21 notebooks) and Board Transcription

**Appendix G.** Grammar Sequence and Grammar Approach

**Appendix H.** Repetition Exercise

**Appendix I.** Lack of Free Writing

**Appendix J.** Modelled exercises

**Appendix K.** Tests about Knowledge of Grammar Elements

**Appendix L.** Cambridge Standardized Tests for Young Learners (movers)

**Appendix M.** Informed Consent



**LIST OF FIGURES**

- Figure 1:** *Results of one student in Cambridge standardized exams (Movers).*
- Figure 2:** *Problem Solving Prompt*
- Figure 3:** *Co evaluation rubric*
- Figure 4:** *Answer's structure*
- Figure 5:** *Peer Results*
- Figure 6:** *Kemmis and Mc Taggart's Action Research Spiral, 1988*
- Figure 7:** *Field notes format*
- Figure 8:** *Hermeneutic cycle 1*
- Figure 9:** *Hermeneutic cycle 2*
- Figure 10:** *Hermeneutic cycle 3*
- Figure 11:** *Hermeneutic cycle 4*
- Figure 12:** *Hermeneutic cycle 5*
- Figure 13:** *Hermeneutic cycle 6*
- Figure 14:** *Key Elements- Intervention 2*
- Figure 15:** *Key Elements- Intervention 5*
- Figure 16:** *Sequence- Intervention 2*
- Figure 17:** *Sequence- Intervention 2*
- Figure 18:** *Students' artifact (Bansho) No. 18*
- Figure 19:** *Diagram of the cognitive-metacognitive model of mathematical problem solving*
- Figure 20:** *Students' artifact (Bansho) No. 14*

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

**Figure 21:** *Students' artifact (Bansho) No. 2*

**Figure 22:** *Students' artifact (Bansho) No. 19*

**Figure 23:** *Students' artifact (Bansho) No. 5*

**Figure 24:** *Lee and Mark Elements of metacognition, 2018*

**Figure 25:** *Students' artifact (Bansho) No. 21*

**Figure 26:** *Students' artifact (Bansho) No. 10*

**Figure 27** *Co- evaluation Readability Rubric*

**Figure 28:** *Readability*

**Figure 29:** *Co- evaluation Explanation Rubric*

**Figure 30:** *Explanation*

**Figure 31:** *Logical Organization of Ideas*

**Figure 32:** *General Vocabulary*

**Figure 33:** *Students' artifact (Bansho) No. 10*

**Figure 34:** *Students' artifact (Bansho) No. 10*

**Figure 35:** *Diagram of the cognitive-metacognitive model of mathematical problem solving (Montague,2003)*

**Figure 36:** *Lee and Mark Elements of metacognition. 2018*

**Figure 37:** *Logical Organization of Ideas Cycle 3*

**Figure 38:** *Logical Organization of Ideas Cycle 6*

**Figure 39:** *General Vocabulary Cycle 4*

**Figure 40** *General Vocabulary Cycle 6*

**LIST OF TABLES**

**Table 1:** *Focus Group Structure*

**Table 2:** *Hermeneutic Cycles Plan*

**Table 3:** *Pedagogical Intervention*

**Table 4:** *Instruments' Coding Sample*

**Table 5:** *Color Coding Label's Example*

**Table 6:** *Objectives and questions*

**Table 7:** *Preliminary List of Categories*

**Table 8:** *Final List of Categories and Subcategories*

**Table 9:** *Key Elements Classification Rubric*

**Table 10:** *Sequence Rubric*

**Table 11:** *Logical Organization of Ideas Rubric*

**Table 12:** *General Vocabulary Rubric*

## **CHAPTER 1**

### **Introduction**

This research study intends to explore the effects of the Mathematics problem-solving strategy (Bansho) in second graders' English as a Foreign Language (EFL) writing skills performance in CLIL classes.

In recent years, both EFL teaching and learning processes have been gaining relevance in our country, in part, thanks to the interest of World Bank policies. Wells (2008) and Roux (2013) recapitulated and analyzed the recommendations done by this institution to strengthen economic competitiveness in two essential skills: digital literacy and English as an international language.

This phenomenon could be seen in the increasing academic hours assigned to EFL in the regular school timetables and the different instructional innovations programs adopted by some institutions. Likewise, Cárdenas (2018) reflects on the trends of bilingualism in Colombia by providing a historical overview of how the teaching of foreign languages was introduced to the country. Bilingual or intensive English programs eventually aim to obtain better results and foster students in all possible language skills. Thus, the opportunity to adopt approaches that integrate language learning and subject areas learning has emerged.

Integrating both language and subject areas learning has been, in recent years, a topic of interest for EFL teachers in Colombia. Mcdougald (2009), Rodriguez (2012), Torres (2013), Mariño(2014), among others, assess and report the advances in such an area in schools and universities considering principles and contexts. Besides, they pointed out the need to continue researching this integration to benefit the related teaching

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

practices.

Evidence to support this integration of foreign language learning and content subjects can be found in the number of approaches that share the idea that language is best developed when it is used in useful ways, convey meaning, and have a communicative purpose. To name a few: "bilingual content teaching," "bilingual subject teaching," or "content-based language teaching."

Nevertheless, the term CLIL "Content and language integrated learning" supports the institution's bilingual program where this study takes place and, therefore, is a cornerstone of this research.

Marsh & Langé (2000) state that:

Content and language integrated learning (CLIL) is a generic term and refers to any educational situation in which an additional language and therefore not the most widely used language of the environment is used for the teaching and learning of subjects other than the language itself (p. iii).

The approach is based on the well-known assumption that foreign languages are best learnt by focusing mostly on the content through which language is transmitted in the class instead of focusing the didactics on form and structure. Hence, the preceding aspects imply that it is necessary to make the most of CLIL to tackle some language skills improvement opportunities while further consolidating subject areas learning. To establish and analyze the connection between content subjects' tasks and writing skill results convenient for this study in meaningful learning environments.

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

According to Lasagabaster (2009), CLIL befits different learning styles and provides higher communicative situations and “can do” opportunities that engage students and foster the development of linguistic awareness. Accordingly, “This is difficult to achieve in a language lesson where the main focus is on ‘doing things with words’ and not ‘using words to achieve things.’” (Marsh, 2008, pág. 238).

Although many school subjects may contribute to increasing the number of communicative scenarios and "can do" activities, it is appealing the role of mathematics classrooms in foreign languages. It goes wider than the development of mathematical cognition itself and considers how language shapes and is shaped by the entire experience. Craig, Morgan, Schütte, and Wagner (2014) point out that students' mathematics skills may be closely related to their development of linguistic competencies. This relationship is a consequence of the semiotic nature of mathematics experience.

For the present research, Mathematics takes on importance in the light of the experience of the teacher-researcher. At this point, it is essential to clarify that the specific vocational training of the teacher-researcher is B.A in foreign languages, even though current educational tendencies allow him to be a Mathematics teacher in primary school. Thus, specific methodologies worked on the teaching/learning process regarding this area of knowledge, in the framework of a bilingual school where the research is conducted, would be one relevant aspect to consider.

There has been a general trend in Mathematics education to focus on more than just the traditional algorithms to help ensure that students understand the "hows" and

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

"whys" of solving a range of mathematical problems. One of the emerging alternatives is the "Singapore mathematics teaching method" which gathers concepts and methodologies from different perspectives, among those, the promotion of Mathematical communication as an essential process for learning mathematics, because through communication, students reflect upon, clarify, and expand their ideas and understanding of Mathematical relationships and arguments. In this respect, writing represents a suitable activity that promotes engagement with Mathematical problems and could be a paramount component in implementing a balanced and effective Mathematics program.

Written Communication enables students to think about and articulate what they know. Mathematical writing also provides evidence of students' Mathematical understanding. Before beginning any writing task, students need experiences in expressing their ideas orally, as well as listening to the ideas of others. The quality of a written product is significantly improved by the opportunity to participate in a class dialogue before writing (Ontario Ministry of Education, 2006). The specific approach to Mathematics' teaching that is going to be considered here is known by the name of Bansho. Bansho, in Japanese, literally means "board writing."

Bansho, according to Kubota (2011), is a Mathematics instructional strategy that makes explicit students' mathematical thinking. It provokes students' collective knowledge production through strategically coordinated discussion, organization, and mathematical annotation of students' solutions to a lesson problem. Because the Bansho is a written record, it helps to find an efficient organization to foster students' notetaking (Yoshida, 2002). Because this written record enables simultaneous comparison of multiple-solution methods, there is an opportunity for students to construct new

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

mathematical ideas and deepen their Mathematical understanding.

During solving problem activities, it becomes important for teachers and students to bear in mind that Mathematical communication is more than answering the question using isolated words, numbers, pictures, and symbols. Instead, they realize that these forms of communication are selected and applied to create precise Mathematical arguments. Likewise, by modeling effective organization, Bansho fosters student note-taking skills once they start depicting the processes conducted.

The study conducted at a private school in Mathematics CLIL class, with 42 second- grade students whose ages range between 8 and 9 years, intends to show that the integration of language and subject areas methodologies as Bansho could influence in certain way the EFL writing skill. Indeed, the proposal gap explores this integration by examining the influence of the content area methodologies on EFL writing skills performance instead of studying the impact of EFL methodologies in content areas. Also, another gap could refer to the fact that it is not an EFL method implementation nor an approach in an EFL teaching context. Many studies have focused their attention on the integration of language arts in areas never thought of as language-based subjects, for instance, Mathematics, by assessing the support that language skills provide to succeed in their goals (Chan, 2015; Corzo & Heidy, 2011; Mercer, Dawes, Staarman,, 2009; Sams & Mercer, 2006; Schleppegrell, 2007).

Other studies make explicit the help of specific skills such as writing when supporting mathematical reasoning and problem solving, highlighting how it helps students internalize practical communication features. When teachers read students' writing, they look for evidence of logical conclusions, justification of answers and



## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

processes, and the use of facts to explain their thinking (Pugalee, 2005).

### **Needs Analysis**

The path taken in this study is supported by a series of experiences that displayed the need for developing the students' EFL writing skills. Therefore, as a beginning point, it was considered the standardized test; their results reflected improvement opportunities regarding this skill. As a second source, the interviews conducted with the EFL teachers that oriented the formal teaching process provided insights regarding the necessity to work on this issue.

Likewise, the notebooks and textbooks' writing analyses gave some insights to consolidate the view in which the skill is treated. Finally, a diagnosis activity was carried out to confirm the difficulties with the writing skill. That diagnosis in the action research framework is the first intentional intervention to establish the plan to follow.

Below are listed and depicted the experiences aforementioned:

It is important to note that Cambridge Standardized Tests for young learners (Movers), part of the curriculum tests they have to face in first grade, reflects improvement opportunities regarding reading and writing skills in second graders (**Appendix L**). These results may be due to a strong emphasis on mastering language skills such as listening and speaking. This lack of emphasis on reading and writing in EFL interferes with developing integral aspects of language learning due to the necessity to boost the four language skills.

Figure 1 shows the results obtained by a student. It illustrates that the highest score given for reading and writing skills (28,1%) is low compared to the other skills.

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

The figure also shows a need to approach abilities to interpret, argue and propose accurate answers according to the requested tasks.

**Figure 1**

*Results of one student in Cambridge standardized exams (Movers).*

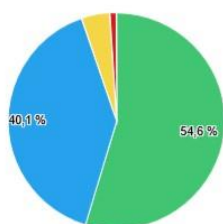
### Cambridge 1-4

#### Cambridge

Estos son los resultados de el estudiante en el grado indicado para la prueba de cambridge. La distribución de resultados generales se puede ver abajo de esto, con fines de comparación.

Grade	Listening	Reading and Writing	Speaking	Total
1	GOOD	LOW	EXCELLENT	FAIR

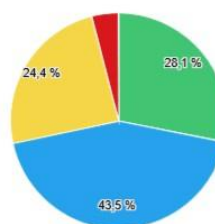
Listening: Cambridge en primero y cuarto



Color by Listening

- EXCELLENT
- GOOD
- FAIR
- LOW

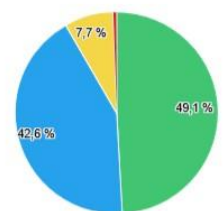
Reading and Writing: Cambridge en primero y cuarto



Color by Reading and Writing

- EXCELLENT
- GOOD
- FAIR
- LOW

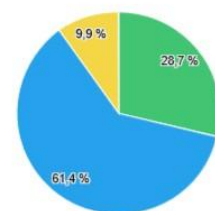
Speaking: Cambridge en primero y cuarto



Color by Speaking

- EXCELLENT
- GOOD
- FAIR
- LOW

Total: Cambridge en primero y cuarto



Color by Final Result

- EXCELLENT
- GOOD
- FAIR

Another evidence to consider was informal conversations with the three EFL primary teachers from the school where the study took place. Teachers agreed on the importance of finding and incorporating alternative tools and activities to foster writing in the students. They explicitly mentioned the need to work on syntactic constructions because, although they emphasized sentence completeness (subject - verb - complement) and capitalization, students constantly omit elements or misuse them.

Consequently, an interview was applied (**Appendix A**) to validate EFL primary

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

teachers' perceptions (One of the three teachers refused to fill out the data collection instrument). Over- schematic and grammar-based activities were evident, considering some answers from the questionnaire (**Appendix B and C**). The data displayed by the questionnaires revealed a contrast between the type of activities implemented by the EFL teachers and the activities that should be implemented following the area plan document, which is supported in the meaningful learning and communicative approach method as described in subparagraphs 2.2 and 6.2.2. among others (**Appendix D**).

By the same token, after surveying the EFL books used in the section, its grammar-based approach was noticeable, and the text-based class development teachers have to promote -to demonstrate learners' progress- according to the program.

**(Appendix E).**

Additionally, after examining the written productions in 21 EFL notebooks, the teacher- researcher found that mostly written production was board transcription (**Appendix F**). Great attention to grammar sequence and grammar approach (**Appendix G**). Repetition exercise (lines) to correct spelling mistakes (**Appendix H**). There was no evidence of freewriting (**Appendix I**). Modeled exercises (**Appendix J**). Lack of communicative approach characteristics and tests that account for memorization of grammatical elements (i.e., Parts of the speech) (**Appendix K**). Simplified productions, according to the kind of texts demanded (descriptions, informal messages, and short stories.)

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

In sum, rigorous teaching schemes and repetitive book exercises, and decontextualized material negatively affect accurate and authentic writing skills. In that respect, The Thinking- Approach Project (2004), supported by the British Council, criticizes the traditional approaches (i.e., grammar-based syllabus, functional-notional syllabus) to language education. It notes the critical contradiction in which some teachers fall when they spend most of their time teaching language competence but do not prepare students for using it in real-life, meaningful situations.

The teacher-researcher proposed a writing exercise in Mathematics to confirm the set plan. This prompt was designed (See Figure 2) to assess the writing skill approach. Students faced a word problem scenario as second-grade Mathematics syllabus required and aligned with the textbook exercises. In this exercise, a hypothetical student, “Tommy,” solved a word problem in two steps. Step A involved adding three-digit numbers, and step B required subtracting the result from that addition to the original number. After that process, Tommy arrived at an incorrect answer. The teacher-researcher read the prompt aloud while the students looked over Tommy’s work. Then, students wrote about Tommy’s mistakes and how to solve the problem correctly.

According to the research purposes, the evaluation of this exercise was carried out by peers of 2C group, using a rubric that assessed four (4) criteria according to the level of **message clarity**. (See figure 3)

**Figure 2**

*Problem Solving Prompt*

**LET'S REFLECT**

*Hello, 2B family.*  
*I asked Tommy to solve the following problem:*

An artist collected 3915 cardboard Rolls for an art exhibition. He used 1268 cardboard rolls for his first exhibit and 1380 cardboard rolls for his second exhibit. How many cardboard rolls did he have left?

*Here's how Tommy solved the problem*

Total Cardboard rolls	Exhibit 1	Exhibit 2
3915	1268	1380

$$\begin{array}{r} 3915 \\ - 1268 \\ \hline 2657 \end{array}$$

$$\begin{array}{r} 2657 \\ + 1380 \\ \hline 4037 \end{array}$$

*The artist has left 4037*





*Tommy made several mistakes in different steps of the problem. Please, write in your notebook about the mistakes Tommy made and write about how you would solve it correctly.*

**Figure 3**

*Co-evaluation rubric*

*How clear was the explanation given by your partner regarding the errors made by Tommy and the accurate problem solution?*

✓ *Mark one option*

VERY CLEAR	CLEAR	A BIT UNCLEAR	HARD TO UNDERSTAND
			

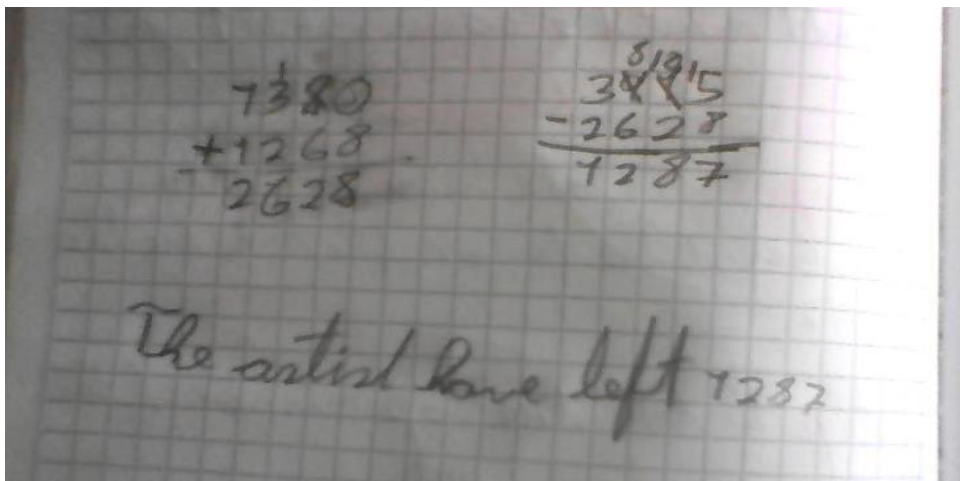
## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

When reviewing the results, it was observed that the students wrote short texts, the student who wrote the most did not exceed 36 words. Besides:  
Two (2) students did not solve the exercise nor did write anything. Three (3) students solved the problem and did not write anything. One (1) student made drawings to explain their process.  
Two (2) students attempted to make a list listing the errors.

Four (4) students answered only the problem question using the type of answers they had internalized with the modeling they know from the UPAC<sup>1</sup> problem-solving strategy, thus avoiding writing about the main task (describing the errors and explaining how the appropriate process would be). In the strategy, students recognize that the final part of the question is the answer's structure (see figure 4).

### Figure 4

*Answer's structure*



---

<sup>1</sup> This method is a specific variant of the mathematics problem-solving strategy shown in Polya's 4-step Problem Solving Process (Polya 1945). It consists of four steps 1) Understand the problem, 2) Plan what to do, 3) work out the **Answer** and, 4) Check.

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

According to peers' evaluation:

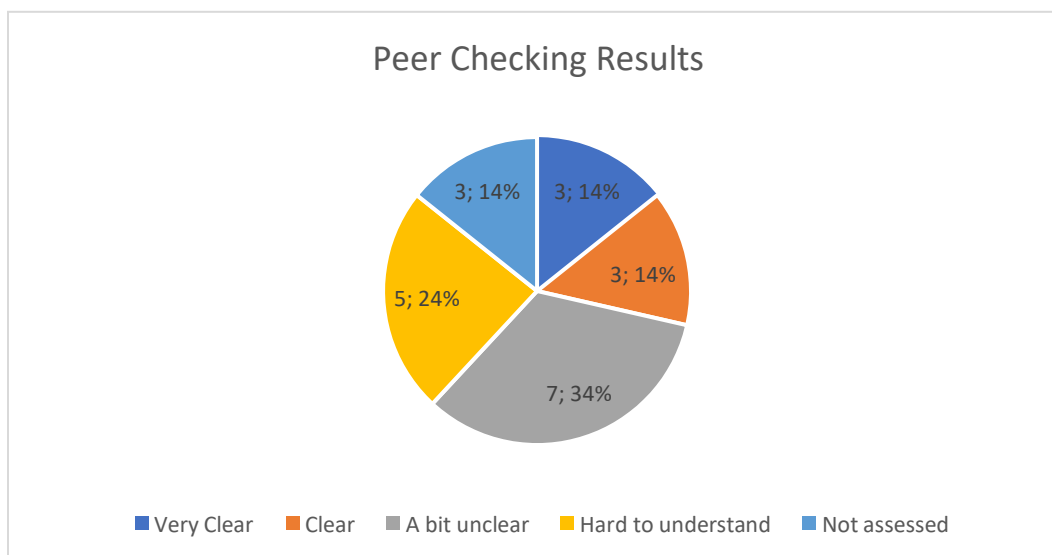
Three (3) students' productions were assessed with: Very clear. Three (3) students' productions were assessed with: Clear.

Seven (7) students' productions were assessed with: A bit unclear. Five (5) students' productions were assessed with: Hard to understand.

Likewise, peers did not evaluate three (3) productions since pupils did not carry out the exercise.

### Figure 5

#### *Peer Results*



Hence, in view of these low results the objective was to go deeper in the analysis and establish a plan to collect more information.

It would be interesting to explore in depth the possible benefits of the engaging approach derived from the integration of Mathematics methodologies and EFL writing skill, since – among others- widening the range of opportunities would allow the classroom to convert the untraditional practices into the foundations for a renewed

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

meaningful classroom.

To examine how students could foster their writing skills in EFL through a Mathematics teaching method, word-problem solving process, and answer-hypothesis writing will specifically be the focus. Thus, six intervention cycles using “Bansho” in classes will be implemented in a second-grade classroom.

To this effect, the needs analysis revealed that: The School EFL second graders need to develop higher writing skills. Likewise, the diagnostic stage's information evidenced the usefulness of incorporating activities in CLIL lessons to help second-grade students enhance their EFL writing skills. Therefore, the school opportunity to strengthen the CLIL approach to explore its multiple alternatives to develop both content and language areas.

### **Significance and Purpose of the Study**

The needs analysis revealed that it is necessary to incorporate teaching methods in a CLIL classroom to support and enrich EFL writing skills in the students, learn effective use of syntactic rules, and promote the production of authentic texts.

At the same time, it could be noted the importance of increasing the meaningful use of writing skills at this decisive stage of the learning (children between the ages of 8 and 9 years). To promote both the motivation and the experience of connecting writing skills with the other domains of knowledge such as Mathematics may provide opportunities to explore new meaningful activities to develop the skill under consideration.

For this study, the role of the Bansho Mathematics teaching method is important because it essentially requires meaningful writing in solving a Mathematics problem. The



## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

idea of writing a hypothesis to answer a real-life problem strengthens analysis, coherence, and negotiation habits which have been the aim of several teaching language approaches.

“Reflection and communication are intertwined processes in mathematics learning.

Writing in mathematics can also help students to consolidate their thinking because it requires them to reflect on their work and clarify their thoughts about the ideas” (Joyner & Reys, 2000, pág. 61). Accordingly, this proposal's contention aims to introduce innovative practices in CLIL classes to support content areas and EFL objectives.

The teacher-researcher intended that the implementation of the study would provide further information about the possibility of considering content areas methods to support high EFL competence levels, including insights into more effective ways to help learners within a CLIL environment at the primary school level.

### **Research Question**

How does the Bansho Mathematics teaching strategy influence second graders' EFL writing skills in a CLIL class at a private school?

### **Research Objective:**

To examine how the Bansho mathematics teaching strategy influences the EFL writing skills of second-grade students at a Private School.

### **Subsidiary objectives:**

- To identify the Bansho elements that intervene when integrating the mathematics problem-solving process and the EFL writing skills development in a CLIL class.
- To characterize the Cooperative Learning practices within the framework of Bansho activities.
- To document and describe second graders' EFL writing performance when being involved in Bansho activities.

## **CHAPTER 2**

### **CONCEPTUAL FRAMEWORK**

#### **Introduction**

In agreement with the objectives of this study, this chapter depicts the main supporting theories behind the research question. It aims to situate the study according to CLIL advantages to fulfill language and cognitive needs. In the same way, it remarks that teaching and learning subjects other than English in/through the Foreign Language (FL) may enable the opportunities to explore new alternative sources. The present review focuses on EFL writing skill development and Mathematics subject contributions to enhance this skill in primary school students (second graders).

Given the intense need to expose English Language Learners (ELL) students to as much language as possible, many studies have focused their attention on the integration of Language arts in areas hardly thought of as language-based subjects, such as Mathematics and Science.

Since many schools with ELL populations utilize ESL strategies such as immersion, ESL classrooms, and bilingual education; Language Arts has naturally been integrated into many different areas of education supported with several foundations and approaches.

Additionally, some research shows that integrating target language writing into different subject areas has positive effects in many different respects (Brandenburg, 2002; Wallace; Pearman; Hail., 2007; Carter, 2009). These strategies are helpful for ELLs, young learners, and students with special needs. Teachers benefit from writing focus and integration as they provide new insights into how students learn and synthesize

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

information (Powell, 1997). In this regard, the chapter's first part begins with a thorough definition of CLIL, and it details the significant characteristics of the approach. Then, it points some CLIL frameworks to approaching content subject activities towards enriching Foreign Language Learning (FLL), remarking how essential teaching Mathematics in English is and how CLIL supports this teaching. The second part of the chapter focuses on writing in Mathematics, emphasizing a specific activity (The Bansho). Consequently, this definition is followed by a general view of EFL writing skills and some theories of this skill teaching. Finally, the Teacher-researcher presents similar studies and approaches' effects and academic achievements in specific populations. All the theories and literature on the topic found in this chapter help understand the concepts underpinning this study.

### **The CLIL Approach**

Marsh (2009) states:

In 1994, after a long period of analysis and negotiation, a group of experts working under the remit of European Commission funding, agreed on launching the term Content and Language Integrated Learning (CLIL). This term was adopted to articulate a shared understanding of the commonalities of methodological practice found in diverse global 'bilingual' educational experiences. CLIL was defined as a dual-focused educational approach in which an additional language is used for the learning and teaching of both content and language (p.7).

According to Coyle, Hood, Marsh (2010), CLIL is not a new form of language education, nor is it a new form of subject education; it is a pioneering fusion of both. On that basis, essentially, its main feature is to be an integrated approach, where both

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

language and content are developed continuously without giving a particular prevalence to anyone.

It is a dual-focused methodological approach that embraces both language and non-language content, focusing mainly on 'meaning.' It differs from other approaches that predominantly focus on 'form.' Thus, there are as many types, as reasons, for delivery. These hinge on cultural, environmental, linguistic, non-language content, and learning objectives (Marsh, 2002, p. 65).

There are several pathways and programs of CLIL according to the contexts and objectives emerging from its implementation. For instance, total immersion in Canada and bilingual language teaching programs in North America, where some experts consider can be found some of the foundations of the Content-based approach instruction to L2 with good results reported (Ruiz, & Jimenez, 2009). In the case of Spain, a partial immersion, around 50% of the curriculum in certain places, as mentioned by Fernández (2009), or exposure to the target language in small regular lessons of 20 to 30 minutes "language showers"<sup>2</sup> in certain subjects as The Salzburg Model in Austria.

However, it is worthwhile to remember that over the last decades, CLIL has won in implementation and use in a variety of language learning contexts in Europe; indeed, one of the reasons was the necessity to foster language development in different language educational programs. Nevertheless, essential questions emerged regarding the CLIL's suitability to consolidate a coherent theoretical approach to language learning that can be applied in different educational conditions (Ruiz, & Jimenez, 2009).

Coyle (2007) remarks that CLIL has its roots in European contexts where sociolinguistic and political settings are diverse and very important. The author explains

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

the link between CLIL to any language, age, and stage, including beyond the mandatory education such as kindergarten, vocational and professional learning. To put it simply, CLIL may comprise constant learning. In this sense, the author states that contextual and situational variables determine the position of CLIL models in the progression. Some of those situational variables have to do with curriculum demands, students' families' profiles, and teachers' professional development in this research context.

The academic openness, the information access, and the worldwide trending help adopt and adapt models and approaches to benefit the different areas. As expected, the CLIL approach has also affected South American region policies regarding EFL. It has called the attention of educational policy, and it has rapidly increased its scope of implementation. Coyle et al. (2010) provide a picture of the growing interest in CLIL, which is, by one hand, understood by examining best practices in education according to the nowadays requirements.

On the other hand, it is crucial to recognize the main implications of globalization and how the economic and social junction forces may determine who and what language should be learned, besides how and at what stage in the learners' development. The stimulating factors for language teaching/learning vary from region to region, yet the goal of efficiently conforming to international standards continues to be the way forward.

---

<sup>2</sup> Language baths / Language showers are regular, short, continual exposure to a CLIL subject delivered in the target language for about 15 or 30 minutes several times a week. Language showers are more common in primary CLIL and usually involve one subject area such as Art or Mathematics.

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

In this regard, between CLIL and traditional language education, there are differences to remark. As previously highlighted, CLIL is dual-focused and aims to consider both content and language development. In this methodological approach, the target language is used as a vehicle for communication and is therefore not the ultimate purpose. Thus, this creates a meaningful learning environment in which pupils have an immediate need to use the target language. The goal is a two for one gain of both language and content (Coyle, 2006).

In contrast, there are various reasons why implicit (language) learning is not used often enough in traditional education. Sun, Mathews, Lane (2007) described it as follows: "Most educational settings focus on teaching conceptual (explicit) knowledge rather than setting up an opportunity for gaining substantial experiential (mostly implicit) knowledge" (p. 1). In traditional language education, the emphasis is very often on grammatical correctness. Due to time constraints, teachers cannot give their students enough time to use and practice using the target foreign language. Sometimes, the contexts provide no substantial opportunities for meaningful FL communicative experiences.

CLIL goes beyond a regular language lesson plan since it involves other aspects relevant for lifelong learning. CLIL integrates four components necessary for meaningful learning: "content (subject matter), communication (language learning and using), cognition (learning and thinking processes) and culture (developing intercultural understanding and global citizenship)" (Coyle et al., 2010, p. 54). To the effect of this study, the CLIL components matched with the main concepts developed in the research question, thus "content" links with Mathematics, EFL writing links with

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

"communication," the Bansho strategy links with "cognition," and the FLL itself links with "culture."

This combination, known as the 4Cs (content, communication, cognition, and culture), determines learning effectiveness. Students can develop crucial skills to clearly understand the topics and foster deeper engagement towards the target subjects.

Precisely, those standards urge on working in the language skills effectively; this research explores that possibility by focusing on EFL writing skills. Writing is an essential skill inside the educative and professional field for the human being because knowing how to produce meaningful and effective texts, people tackle others more formally, establishing a solid and cordial relationship (Gené-Gil, Garau, Salazar, 2015). Coyle et al. (2010) affirm that communicative goal is one of CLIL's underpinnings, with culture, cognition, and content becoming part of the 4Cs pyramid. Perhaps, the main objective of implementing CLIL methodology in the EFL classrooms is to develop the global target language communicative competencies simultaneously and the content without spending extra time separately (Gené-Gil et al., 2015).

Content, as mentioned, links in this case to Mathematics. This subject area presents opportunities to develop writing exercises in the framework of problem-solving situations. It allows projecting possibilities to enhance EFL writing concerning vocabulary and coherence. (Whittaker, Llinares, McCabe, 2011) developed a study that asserted that CLIL methodology greatly impacted academic registers (vocabulary), and students also tended to produce more cohesive and coherent texts.

### **Writing while learning Mathematics**

The framework of CLIL allows the intentional development of all language skills

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

in content schools subjects. This chapter section mentions relevant aspects of writing in the Mathematics classroom. Writing is an essential component of communication in the classroom, and research studies have highlighted the benefits of writing to learn Mathematics (Pugalee, 2001; Stonewater, 2002).

Communication in the Mathematics classroom has increasingly played a prominent role because it supports the students' reflection process and enables the expression of their conclusions and concepts building structure. Through listening, talking, and writing about Mathematics, students are prompted to organize, re-organize and consolidate their Mathematical thinking and understand, analyze, evaluate and build on the mathematical thinking and strategies from their classmates' inputs. In this context, an approach to describe communication involves the "transmission of thoughts mediated by language" that construct models of the student's thinking (Sierpiska, 1998).

Research has found that integrating writing in other subjects demonstrates students' ability to improve language acquisition skills. Likewise, such integration benefits learners whose teacher can track and help improve particular language and critical thinking challenges that individuals may exhibit (Armon & Morris, 2008; Honnert & Bozan, 2005;). Writing strategies and integrated Mathematical concepts benefit students and teachers when they struggle with Mathematics and teaching Mathematics concepts (Humphrey & Hourcade, 2010).

Reasons for including writing as an essential part of the mathematics lesson support the development of Mathematical knowledge crucial to effective problem-solving strategies. Writing within Mathematical problem-solving is crucial to encourage children to develop a meaningful understanding of Mathematical knowledge. Davison & Pearce



## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

(1998) explain that performing a writing task requires learners to reflect on, analyze, and synthesize the material being studied in a thoughtful and precise way.

The role of language in the development of mathematical understanding and in supporting problem-solving processes is evident in CLIL classes. Hence, writing demands a more conscious process in elaborating the messages. Writing helps learners clarify and define their thinking, examine their ideas, and reflect on what they have learned to deepen and extend their understanding (Burns, 1995). Writing in Mathematics is one of the means of representing and communicating understanding; it helps the learner make sense of mathematical ideas to construct knowledge. Writing is a tool for learning and communicating Mathematics (Kuzle, 2013).

Through writing activities, teachers help students have a permanent record of their thoughts to return to reflect on them. According to Columba (2012), conceptual understanding develops when learners represent their understanding using words, symbols, graphs, and discourse.

Integrated writing exercises have been worked in several studies. Some have targeted various writing strategies to demonstrate the effectiveness of integrating writing and language navigation skills to improve mathematics and reading and writing achievements. These studies include Mathematics journal exploration for high school students in ESL classrooms (Powell, 1997) and arguments that point out the recent changes in Mathematics instruction and how they may usefully serve as possible models for analogous changes in the field of English teaching (Bowe, 2009). The success in implementing two or more curricular areas (Mathematics thinking into writing exercises) has been related by an expert (teacher-researcher) in elementary education (Carter, 2009).

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

### **Mathematics: Bansho strategy**

A focalized program of collective knowledge production in Ontario Mathematics Classrooms led to the adaptation of the Japanese "Board writing" or Bansho. The Ontario curriculum emphasizes that students learn through problem-solving and that problem-solving lies at the core of an effective mathematics program, Ontario Ministry of Education, (2005).

Essentially, Bansho is a supporting classroom tool developed in Japan. Teachers use large blackboards in a well-planned manner that the students can easily understand and remember what has been discussed and take notes of it neatly for review. Students' solutions and strategies are recorded on a large-size chalkboard or dry-erase board using Mathematical expressions – numbers, letters and Mathematical symbols, figures, graphs, algorithms, and labeled diagrams (Shimizu, Isoda, Okubo, Baba, 2005; Stigler & Hiebert, 1999; Takahashi, 2006; Yoshida, 2002).

Some research has focused on using Bansho as a tool to analyze instructions in mathematics lessons, which could potentially visualize pupils' thinking processes in that experience (Shirley et al., 2018). Some other approaches depict situations such as teaching Mathematics to students who are new to schooling and new to English, for instance, refugee arrivals in Canada, experience which looks primarily challenging. Examples include activities designed to support both mathematics and language learning concerning multiplicative and proportional reasoning and money (Barwell, Kubota, Culotta, 2018).

Bansho follows a specific structure that enables teachers and students to see and discuss the different methods used to solve the problem proposed and compared to clarify and justify the merits and limitations of each method. According to Yoshida (2002),

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

Bansho has a range of purposes:

- Keeping a record of the Mathematical details from the lesson discussion.
- Prompting students to remember what they need to do and think about.
- Enabling students to see Mathematical connections between different parts of the lesson and the progression.
- Providing a visual aid for comparing, contrasting, and discussing the Mathematical ideas that are represented in students' solutions to the lesson problem.
- Organizing student thinking to discover new mathematical ideas and promote deeper mathematical understanding.
- Modelling effective organization to develop notetaking skills.

This instructional strategy has been interpreted and adapted within teaching and learning Mathematics in Ontario by Kathryn Kubota-Zarivnij. She outlines the specific aspects of (Ontario) Bansho in the context of the three-part problem-solving lesson (Before, During, and After). Bansho makes students' Mathematical thinking explicit and urges students' collective knowledge production through strategically coordinated discussion, organization, and writing of students' solutions to a lesson problem (Kubota, 2011). Consequently, the Bansho strategy brings crucial possibilities for cooperative Learning. Some adaptations regarding the needs of this study will be made in the Bansho strategy. Among these, the work by pairs and the design of booklets that become the Bansho template. However, those will not affect the essence and the proposed purpose of the tool. The changes and adaption will be explained and addressed in chapter four when explaining the pedagogical intervention.

### **Cooperative learning**

Cooperative learning (CL) will support an essential approach in the Bansho dynamics. It has emerged in recent times as a student-centered teaching method. Therefore, CL is a recognized educational practice "which affords students the opportunity to develop a range of cognitive, metacognitive and social as well as linguistic skills while interacting and negotiating in the classroom" (Crandall, 1999, pág. 227) .

According to McCafferty et al., (2006), while Vygotsky emphasized the role of more capable peers in the co-construction of the Zone of Proximal Development (ZPD), nowadays, attention has been focused on how students of the same level can help each other. Furthermore, they argue that the concept that peers can help and learn from each other is similar to student- centered educational perspectives and to what is called positive interdependence developed in deep by (Johnson & Johnson, 2002).

Consequently, CL is also a learning strategy that supports the CLIL approach. Successful CLIL classes have often included a significant amount of paired work, group work, and CL (Coyle et al., 2010). Furthermore, these learning environments increase trust between peers, making students less inhibited in establishing conversations in the foreign language even if they could make mistakes. As Novotná et al., (2001) state, teachers should encourage CL to positively influence the CLIL process and constitute means to overcome affective barriers.

### **EFL Writing Skills**

The writing skill view is one of the cornerstones of this research. To begin with this review, it is worth noting that writing is considered a language skill. The traditional concept of language skills usually contains four skills: speaking, writing, reading, and

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

listening. These have been grouped into active and passive skills; the first two were termed active, and the latter were passive. The division is also reflected in what is called productive and receptive skills and respectively denotes speaking and writing as productive and reading and listening as receptive skills (Savignon, 1991). A further criterion of defining and grouping the language skills is the aural/visual division making speaking and listening aural media while writing and reading are visual media (Widdowson, 1984). According to this classification, writing is an active, productive skill and simultaneously a visual medium.

Nevertheless, it is essential to state that this traditional concept of language skills is misleading as it separates the skills from each other. It is, however, not always possible to make a clear distinction between the individual language skills, since especially writing and reading are closely connected (Kress, 2010, p. 39). For instance, Grabe (2001) found that "L2 reading and L2 writing are connected in five aspects: —reading to learn, writing to learn, reading to improve writing, writing to improve reading, and reading and writing together for better learning" (p. 15).

Despite that finding, the teacher-researcher experience as an EFL instructor led him to conclude that writing demands higher cognitive processes than reading. According to Fageeh (2003), writing is a complex process that requires significant effort to learn and teach because it must be learned through conscious exposure. Learners must be instructed and practice writing, as writing skills cannot be acquired naturally (Emig, 1997; Raimes, 1983).

Likewise, EFL writing proves more challenging than EFL reading because it involves creating a new text rather than focusing on a pre-existing text (Ferris &

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

Hedgcock, 2001). Writing requires effort from those attempting to learn it. EFL teachers must include various activities in their teaching materials that enable learners to practice writing effectively (Abdel-Motaal, 2002). Thus, building processes to expose learners to such challenges progressively may provide tools to move through this challenging skill more confidently. This research is an attempt to that intent.

Numerous approaches, assumptions, and definitions have been proposed to specify "writing" as a concept in the literature. Customarily, writing is a form of communication that allows students to put their beliefs and ideas arranged systematically in a written representing form.

Coulmas (1991) defines writing as a set of visible or tactile signs used to represent units of language systematically to record messages that can be deciphered by anyone who knows such language, and the rules under these messages are encoded in the writing system. Cumming (2001) states that the word "writing" refers to text in the written script and also the acts of thinking, composing, and encoding language into such text; these acts also necessarily entail discourse interactions within a sociocultural context. Writing is text, is composing, and is a social construction. While these definitions provided an understanding of writing nature and its qualities, they also project implications for its instruction.

Communicative competence needs to be mentioned when elaborating further on the term writing. The skill of writing can be linked to this communicative competence since writing is viewed as an act of communicating (Connor & Mbaye, 2002). Following this connection, it is essential to clarify that the spirit of this study is consistent with this writing perspective. In such direction, according to Pincas (1982), it is necessary to

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

identify three aims in teaching English writing for communicative purposes:

- The scope of writing should be widened beyond the artificial, unrealistic school-type composition of traditional teaching to more authentic, practical, and relevant writing.
- Writing should be as communicative or functional as possible. It should fulfill communication purposes or functions in everyday situations.
- It should go beyond merely reinforcing grammar and vocabulary lessons and deal quite specifically with those skills required for effective writing. The teaching of writing should be recognized as a particular part of language teaching with its aims and techniques.

### **Teaching EFL Writing**

Considering this review on the nature of writing tasks and what factors might influence a second language learners' attainment of this skill, it can be inferred that teaching writing can be tackled by the teachers' perspectives from their practice in instructional settings. To further illustrate this point, it is necessary to mention two of the most common approaches to teaching writing in a second language. Nunan (1999) defined those two approaches for teaching writing as the product-oriented approach (POA) and the process approach (PA). Whereas the former focuses on "the final product, the coherent, error-free text," the latter concentrates on "the steps involved in drafting and redrafting a piece of work" (Nunan, 1999, pág. 272). The first approach aims at affording high-quality productions through a reflection, discussion, and successive rework of drafts on the text (Nunan, 1999). On its behalf, POA concentrates on models which the learner imitates, copies, and transforms. These models are provided by the teacher or the textbook (Nunan, 1999).

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

Sasaki & Hirose (1996) Model of L2 Composing Ability is considered as one of the attempts to build a comprehensive model of L2 writing instruction. It involves constructing and testing a process-product explanatory model of student achievement that seems to be unique to second-language writing (Cumming, 1989). This model explains the main factors influencing L2 writing ability: L2 proficiency, L1 writing ability, and L2 writing metaknowledge. Sasaki & Hirose (1996) found that the writing ability of their Japanese EFL writers interacted with their L2 proficiency. However, the significance of this model seems to be its indication that L2 writing ability and proficiency might be influenced by previous writing experience, including formal writing instruction (Cumming, 1989, p. 157).

The complexity of writing is generally acknowledged. Nevertheless, there is a need for a functional view of writing, and the present study is an attempt in this direction. Consequently, this study sees writing as a situated (context-dependent) composite skill involving communicative competencies and meaning negotiation abilities. Yasuda (2019) argues that writing should not be reduced to linguistic/syntactic features but should be interpreted as the journey toward meaningful content production and realizing communicative goals. Thus, exploring what L2 writers can do in terms of meaning-making should be the main focus. To that end, this study aims to explore L2 writers' communicative repertoires focusing on two aspects of writing: cohesive markers and collaborative resources. These areas are of paramount importance in written communication with the intended reader.

### **Previous Research**

This section presents a general scope of other studies on EFL writing approaches and CLIL in national and international settings. It is essential to understand them to



## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

identify similarities and differences concerning this study and determine their contributions to these fields. Hence, the teacher-researcher classified the research into three perspectives: 1) EFL writing pathways, 2) EFL writing and CLIL approach and 3) Mathematics and CLIL.

### ***EFL writing approaches***

In the last decade, there have been local and international research studies focusing on the development of writing skills. These researchers have focused on specific ways to address the process of writing and its teaching/learning rapport (Al-Zankawi 2018; Briesmaster and Etchegaray, 2017; Rosas, 2018; Pañi 2019).

Al-Zankawi (2018) researched EFL writing strategies and cohesion of Kuwaiti undergraduate students. The study was carried out with 128 Kuwaiti college students of English in the first and second year of study to explore the theoretical framework of the sociocognitive approach to EFL writing from students' perspectives and their use of cohesive devices.

According to Al-Zankawi (2018), EFL can promote bilingualism among Kuwaiti undergraduates and bring them fluency, leading to participating in an increasingly globalized world. The researcher focused on four main aspects to develop this research: 1) the strategies Kuwaiti college students utilize for writing 2) the impact of utilizing L1 when composing in English as a foreign language for Kuwaiti college students 3) the characteristics of the texts produced by Kuwaiti college students in terms of cohesion and quality 4) the relationship between strategy use and text characteristics in the writing of Kuwaiti college students.

This research summarized its findings in four main aspects: 1) the influence of L1 on L2 writing, cohesion, gender, and the relationship between strategy use and text

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

characteristics. 2) cohesion, the findings revealed a notable difference in the students' use of cohesive devices in terms of frequency. 3) the analysis revealed that the correlation coefficient between writing scores and reference cohesive devices is positive and statistically significant. However, the other cohesive devices did not have a relationship with the score. 4) the results suggest the participants need to be exposed to different writing skills and gender and effective writing strategies to improve their writing.

Regarding the impact of a metacognition-based intervention on the coherence and cohesion of EFL students' writing production, Briesmaster & Etchegaray (2017) developed a research project including 19 students from an 8th-grade Chilean public school. They took part in EFL classes focused on a metacognition-based writing intervention implemented by one of the researchers. A control group of 10 students who did not receive any particular intervention was also considered in the study.

The researcher's purpose was to identify the successfulness of the metacognition-based intervention on the experimental student group's performance. It was addressed by comparing both groups' progress in their pre-and post-writing production, specifically in the subskills of coherence and cohesion.

Briesmaster and Etchegaray (2017) stated that 1) the participants in this study improved the metacognitive processes when writing in English; however, the actions carried out during the process remained focused on the accuracy of lexical items. 2) students, under proper supervision, might eventually develop higher critical thinking skills and act as self-regulating learners. 3) The factors that might have influenced better results are the learners' L1 proficiency, personal issues that surface when producing, and self-efficacy beliefs about writing.

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

Hence, it is possible to say that this study sheds light on how metacognition-based activities can assist EFL students in becoming better writers when such interventions are carefully aligned with a realistic appreciation of their critical thinking abilities.

Meanwhile, Rosas (2018) carried out a research project to determine how teaching strategies, including music videos and a writing process in English, support the self-concept exploration and expression in A2 adolescent learners at a public school in Bogotá.

Therefore, the study aims to contribute to foreign language didactics by presenting an alternative way to foster writing skills in English by using music videos as authentic multimodal materials and implementing different teaching and learning strategies.

Among Rosas' (2018) conclusions can be highlighted: 1) music videos support the practical exploration of the learners' self-concept when adequately selected. 2) To effectively express the reflections resulting from the learner's exploration of their self-concept through writing, teachers must assume a supportive role by developing a writing process. 3) the practical expression of the self-concept in writing demanded the transformation of the teaching practices; the materials selection criteria, the topics, and tasks proposed, resulting in the encouragement of the learners' creativity and the development of collaborative work skills.

After considering and observing this first group of studies, the multiple alternatives studied to approach EFL writing are evident. However, it is necessary to conduct more research to explore different ways to enhance this skill. For this study's purposes, it is clear the invitation to see more possibilities and emphasize the recurrences

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

in the studies reviewed, such as the role of coherence and cohesion and the influence of L1 to set viable interventions and leave solid bases for further research.

### ***EFL writing and CLIL approach***

The interrelation between CLIL and EFL writing led the teacher-researcher to remark two studies that may give some prompts related to some favorable scenarios to strengthen EFL skills. Thus, this research evidence the influence of the CLIL on fostering the EFL writing performances (Lahuerta 2017; Pañi 2019).

Lahuerta (2017) presented a study that was carried out with four hundred secondary education students from several state schools in Asturias. To investigate and compare the written competence of a group of students enrolled in a CLIL program and another group enrolled in a non-CLIL program. The primary data came from a written composition activity administered to participants in one of their classes.

By observing, assessing, and notetaking, the results revealed significant differences between the CLIL and non-CLIL program groups. The CLIL program group significantly outperformed the non-CLIL program group in the general quality of the composition and three areas of writing (accuracy, fluency, and grammatical and lexical complexity) examined.

Thus, Lahuerta (2017) stated that bilingual programs as the CLIL positively influence all the language aspects measured. Because: 1) students in CLIL programs are more frequently exposed to the English language and 2) bilingual settings, which involve integrating both content and language goals, seem to provide proper contexts to develop written discourse. Finally, the author added that the development trend in written competence from first to fourth grade is observed in both groups, indicating that the measures of fluency, accuracy, grammatical, and lexical complexity progress at the same

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

rate and are significantly correlated.

Apart from comparing, Pañi (2019) carried out a study to analyze the influence of CLIL methodology in the students' writing skill development at third–secondary in an Ecuadorian School. The participants were 30 third secondary students who attended the regular classes at the school.

The researcher found out that the core problem treated in the research was the inadequate CLIL methodology in developing third secondary students' writing skills. Likewise, the scarce exposure of authentic materials and the exclusive use of textbooks in EFL classes elicit demotivation in students.

Therefore, support elements to guide the research were: 1) To diagnose the students' writing level through rubric-based writing following the Common European Framework (CEF) parameters. 2) To implement the CLIL methodology activities in the teaching practice and 3) evaluate the effects of CLIL methodology on the participants' writing skills development by applying written pre-test and post-test.

Pañi (2019) noticed that students' pre-test performance was lower than the required at CEF standards. Nevertheless, the improvement in the writing skill performance was demonstrated by the comparative study drawn from the statistical calculations of the individual assessment. Therefore, the author concluded that by using CLIL methodology in the classroom, students boosted their writing skills and self-awareness about cultural aspects, giving a plus in their written production. In addition, they realized how to support their learning using previous knowledge.

Pañi (2009) finally recommended creating the appropriate environment to develop the writing skill freely and autonomous. Every teacher should be familiarized with CLIL

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

to improve their practices at school.

The research mentioned above noted the supporting role CLIL had as a facilitator approach to foster improvements in EFL learners. The main contributions made by these two studies to the present research deal with the rigor required to learn and research CLIL. Thus, to feature good scenarios in the proposal's implementation and fulfill the expectations.

### ***Mathematics and CLIL***

Local and foreign researchers about the CLIL approach have explored its contributions to Mathematics dynamics, highlighting the potential to scaffold good learners' results in content and language. The studies read suggest focusing on the necessary teachers training and analyzing the cognitive processes demanded under this framework (Ouazizi, 2016; Peña, 2016; Surmont; Van Den Noort, Van De Craen, 2016).

Peña's (2016) research aimed to examine the CLIL approach as a bridge to connect English and Mathematics learning in first grade. Likewise, to know the impact of promoting CLIL activities with children in a Colombian school with an intensive English program. This study is limited to a group of first-grade students from 7 to 8 years old who are initiating the acquisition of a foreign language and developing their Mathematical thinking skills.

Through observation, field notes, students' artifacts, and questionnaires, this qualitative action research shows how first-grade students learn Mathematics when being taught in English following a CLIL approach. What Peña (2016) found out was that: 1) the learning of Mathematics in a foreign language was developed by the integration of the four components established in the CLIL approach: "*communication, cognition, content, and culture.*" 2) working on activities focusing on *learning specific language or*

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

*vocabulary* allowed students to understand commands and instructions essential to following directions in class and developing math tasks. 3) the use of language emerged when some students were interested in using new words or phrases to complete an exercise in class. 4) there were three main ways in which the study participants approached the learning of Mathematics in a foreign language: integrating English and math content, developing cognitive processes, and integrating culture into mathematics classes. 5) students' responses towards implementing CLIL activities to learn mathematics were positive as they felt happy and comfortable participating in class.

In regards to the Effects of CLIL Education on the Subject Matter (Mathematics) and the Target Language (English), an article by Ouazizi (2016) aims at providing an account of the investigation about the effects of learning a subject matter, mathematics particularly, through a foreign language, English specifically, on both subject matter competence and language proficiency. The research followed three main supporting backgrounds: 1) CLIL education, 2) the underlying learning mechanisms of CLIL education and, 3) the neurolinguistic aspects of Mathematics and language.

Ouazizi (2016), in this study, attempted to demonstrate that CLIL education, shaped by its integrative model of content and language, is innovative in that it fosters creative learning of the subject matter through enhancing "variable repetition." It also creates an ideal context of learning languages that echoes the environment of learning the mother tongue through enhancing the pragmatic aspect of acquiring a language in terms of language proficiency. The author concluded that:

1. Cognitively, subject matter learning and language learning reciprocally benefit from each other in the underlying brain mechanisms activated.

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

2. Psychologically, the language and content integration design of CLIL education create a highly motivational atmosphere for learning both languages and subject matter.
3. Structurally, the language and content integration allow the schools and classrooms to restructure and adopt new methods and policies of teaching and learning.
4. Socially, CLIL education fosters a plurilingual society.

Finally, in the last study reviewed, the effects of CLIL on mathematical content learning, Surmont et al., (2016) looked for demonstrated that CLIL goes beyond improving the linguistic domain but also Mathematics performance. So, their study purpose was to answer whether pupils who learn Mathematics in a CLIL environment outperform their traditionally schooled peers.

In total, 107 pupils entered the study. All participants were in the first year of secondary education at a school in Ostend, in Flanders, the Dutch-speaking part of Belgium. Thirty-five pupils followed CLIL education in a foreign language (French), and 72 followed traditional education given in the native language (Dutch). All participants were tested using a mathematical test at the beginning of the year, three months, and ten months. The first measurement of the mathematical scores showed that the two groups did not differ. Following their hypothesis, the CLIL group scored higher than the non-CLIL group after three months and after ten months. To conclude, CLIL appears to positively impact the mathematical performance of pupils even after a short time.

To conclude, it is clear that the three previous studies highlight the role of CLIL in facilitating the integration of language and Mathematics and its positive influence in scaffolding higher performances not only in linguistic skills but also in the content area. These visions located CLIL as the benefactor. In contrast, the present research gives the



## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

content area a central role as the provider of strategies to scaffold higher foreign-language performances, specifically writing skills. It allows exploring different ways to see the benefices of this integration.

## **CHAPTER 3**

### **Research Design**

This chapter outlines and describes the methodological route that supports the present study. It traces the research approach, the setting and participants in which the research takes place, the data collection instruments used, the researcher's role, and the outline of the hermeneutic cycles in the CLIL classroom.

### ***Research Paradigm***

This research study is situated in the qualitative research paradigm. This paradigm is consistent with the CLIL approach (Mathematics classes) and EFL writing skills development because qualitative research drives researchers around understanding how people interpret their experiences; how they build their worlds and assign meaning to their experiences (Merriam and Tisdell, 2016). Qualitative research, in this sense, is by nature, hermeneutic and interpretive. It focuses on processes, understanding, and meanings; the researcher is the main instrument of data collection and analysis; the process is inductive, and the product is abundantly descriptive (Merriam, 2009).

The project aims to understand the specific contexts and the interactions in certain groups of people in an educational institution. In the words of Merriam (2009) "people in professional fields such as education, law, counseling, health, and social work have often been interested in specific cases for understanding a phenomenon" (p.6). Hence, it is connected to the purpose of examining how a content teaching method may influence the EFL writing skills of second graders students at a Private School. To that effect, it is important to remark the population

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

(second graders) and the perspective of examining the influence of a specific method in specific skills (EFL writing skills). Mills & Airasian (2012) support the preceding when describing:

Qualitative researchers do not necessarily accept the view of a stable, coherent, uniform world. They argue that all meaning is situated in a particular perspective or context, and because different people and groups often have different perspectives and contexts, the world has many different meanings, none of which is necessarily more valid or true than another (p.7)

In the same line of thought, Merriam and Tisdell (2016) provide some strategies to understand qualitative research better. Qualitative research is more procedural than static; its studies change. Social life is seen as a series of events. It is crucial to emphasize the changes rather than build generalizations from the results; thus, in this situated study, the purpose sought to evidence changes in EFL writing skills more than establish definite conclusions.

It is necessary to consider further that qualitative research - more than deciding in advance what we are going to look for, and how it is going to be done-, tends to favor a strategy of relatively extensive research and not structured one. In this case, the participants (second graders) and their ages could lead the study to different appealing paths according to their motivation and performances. Similarly, Merriam & Tisdell (2016) suggest that in qualitative research, the researchers are witnesses and instruments because they participate in the life or experiences of others, obtaining data in the natural environment, facing reality and not in a laboratory or manipulated environment.

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

Since this research is centered on the development of EFL writing skills in CLIL classes, qualitative research is probably the best choice for this kind of study. Hence, working in a mathematical method and insights related to employing CLIL in the classrooms, participants' productions and perceptions could provide a detailed description of their writing experience in these activities.

Besides, a qualitative research method provided the fluidity and freedom needed for proper participation expression in this study. Given the perspective, qualitative research facilitates teaching practices sensitive to the realities of the people we work for, their cultural diversity, and the contexts in which their lives unfold.

### ***Type of study***

One of the approaches of qualitative research is action research. It is defined by Johnson & Christensen (2014), as a combination of research and action. It results in local knowledge, and it often allows changes in practices. Action research is used to sample new strategies and methods, and the researcher studiously evaluates and observes the findings, effects, and implications of these initiatives.

Classroom Action Research (CAR) emerged as a viable opportunity considering its appropriateness. Due to his immediate teaching context, the teacher-researcher identified a problem and approached it through hermeneutic cycles. The goal of CAR is to improve teaching practices in the classroom (or department or school), and there is no requirement that the CAR findings be generalized to other situations, as, in traditional research, the results of classroom action research can add to the knowledge base (Mettetal, 2001). Therefore, the selected instruments searched for advances in the pedagogical objectives outlined. It means, the characteristics of the goals address a

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

specific problem in a practiced-based setting (Herr & Anderson, 2014).

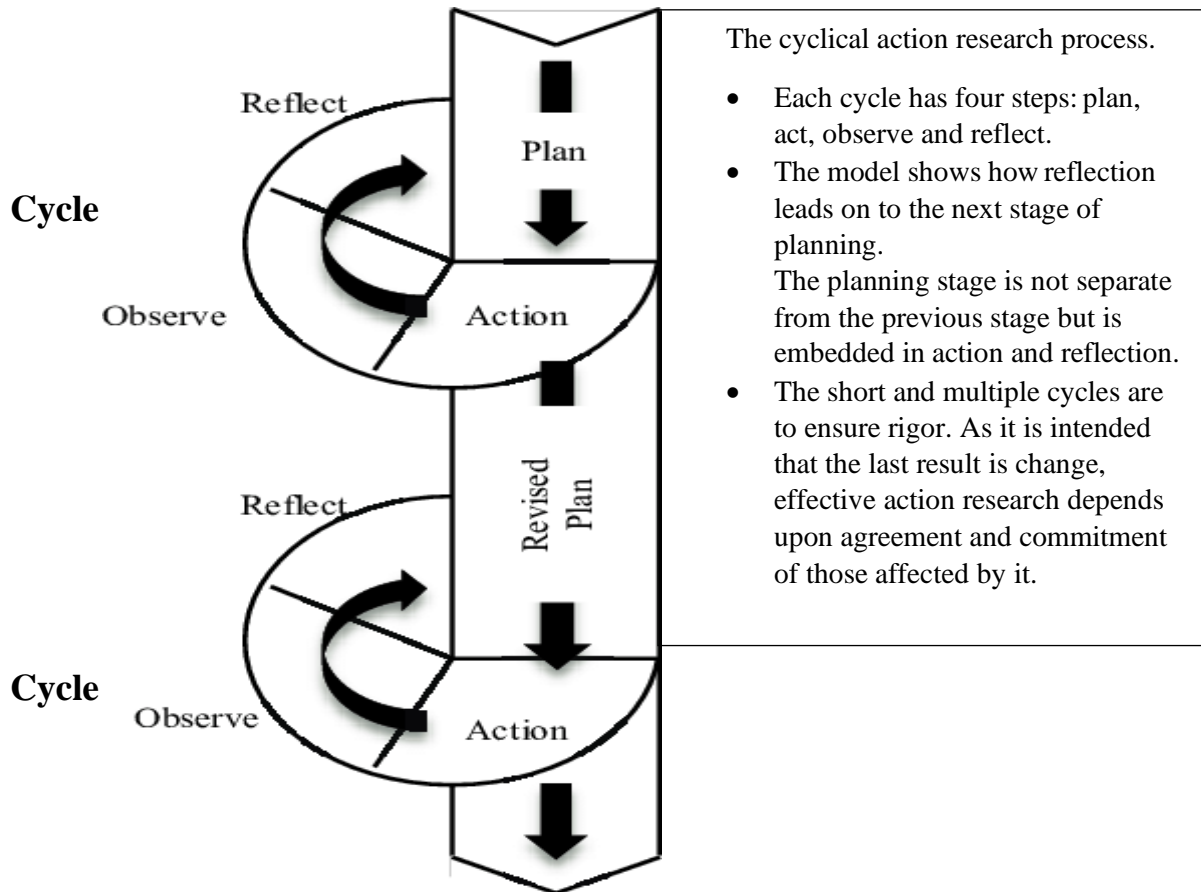
In this respect, Elliott (2015) highlights the need for teachers to recognize research as a process inherent to teaching that provides them with opportunities to transform their teaching practice. In this case, by conducting the study, the possibility of widening the picture can be grasped by how some content methods may influence students' EFL writing skills. This feature called the teacher-researcher attention inviting to find out an opportunity to attempt an approach.

Cohen et al., (2007) state that "action research is a powerful tool for change and improvement at the local level" (p.297). They also define it as an intervention in the real world and close observation of the results of that intervention. It means that "CAR aims to overcome problems in the teaching/learning process to improve educational practice" (Mills, 2003, cited in Fraenkel & Wallen, 2006, p. 590).

Hence, as mentioned earlier, this classroom action research's scope includes identifying the potential of the strategy Bansho, the opportunities that the CLIL Mathematics class may allow, and the description of the teaching strategies implemented to support their practical use. Furthermore, the analysis of their effect on the exploration and expression of second-grade learners' EFL writing skills. To do this, a cyclical process of planning, acting, observing, and reflecting will be carried out as set by (Kemmis & Mc Taggart, 1988). They described the cyclical nature of action research where each stage is linked to the previous one, and cycles are repeated until it results in changes. Those steps can be illustrated below. The diagram can be explained as follows:

**Figure 6**

*Kemmis and Mc Taggart's Action Research Spiral, 1988*



Therefore, the pedagogical intervention designed in this action research implied the planning and implementation of six cycles, each one preceded by careful observation and followed by the reflection on the results obtained so that necessary adjustments would be included. Further in the chapter, they are presented according to the action research spiral.

### ***Description of the context***

This research took place at private school Gimnasio la Montaña<sup>3</sup>, located in the northern part of Bogotá, specifically in its primary section during the first and part of the

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

second semester of the academic year 2019/2020.

The school's PEI emphasizes Christian values and commitment to society, the environment, and Colombia. According to its PEI, critical thinking is promoted, as well as a global approach to knowledge, aiming to develop competencies, skills, and attitudes appropriate for the 21st century (Montaña, 2019). The students and their families belong to social strata 4, 5, and 6. It offers grades from preschool to eleventh grade full time from 7:30 am to 3.30 pm. It has a large campus with green areas and a variety of rooms and halls in a modern physical campus, equipped with technological elements that allow the development of multiple activities. In this school, the groups are gender-mixed and vary between 20 and 22 students.

According to its profile, the school is a National Bilingual School. The secretary of Education of Bogota Secretaria de Educacion (2012) establishes the following characteristics to define the different types of bilingual schools (International Bilingual School, National Bilingual School and Intensification in a Foreign Language) National Bilingual Schools: There is a high amount of contact with the foreign language in the curriculum (over 50%), and two or more languages are used as teaching language for different curricular areas. Most of the teachers are Colombian bilinguals. They also require their graduates to pass language proficiency test, in addition to passing the Colombian curriculum requirements.

---

<sup>3</sup>Special gratitude to Gimnasio La Montaña board of directors for their openness and willingness regarding this information and permanent support in the research process

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

### ***Participants and Sampling***

Regarding the selection of participants, a non-probabilistic sampling was chosen to accomplish the current study; it derives from the researcher targeting groups, in the full knowledge that it does not represent the broader population; it merely represents itself (Cohen et al., 2007). One type of non - probability sample was considered in this study; that was the convenience sample. As stated by Cohen et al., (2007), a convenience sample involves choosing the nearest individuals to serve as respondents (those who happened to be available and accessible at the time). The authors also stated that in this type of sampling, the researcher chooses the sample from those to whom they have easy access. Additionally, Merriam (2009) asserts that this kind of sampling "is based on time, money, location, availability of sites or respondents" (p. 79). Furthermore, in the teacher-researcher context, the participants were also defined by the informed consent parents could provide, considering he is the homeroom teacher of one of the groups (2B).

Therefore, the research was conducted by considering two of the three second-grade groups (grades B and C) from the private school. The groups consist of 22 students, equally distributed between girls and boys; the participants shared similar characteristics in terms of age (mostly eight years old, except for three students who are nine years old).

The participants should have an expected English level of A2, according to The Common European Framework of Reference for Languages (CEFR). The interventions took place in Mathematics classes (classes conducted in English) due to the researcher's specific teaching role (Math teacher in second grade); however, they also have EFL classes as part of the curriculum.



## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

### ***Ethical Issue***

As to ethical considerations, certain essential aspects were considered. In this case, the needed permissions from the school, then a written letter was delivered to the principal of the school, giving her information about the duration and requirements of the project. As suggested by Creswell (2009), a consent form was delivered to parents in order to permit them to know the objectives of the research and permit their children to participate before they engage in the research (see **Appendix M**). Additionally, parents had the possibility of asking questions and requiring information for the project.

It was also considered central to inform the students clearly that they were participants in the study, allowing them to decide whether they wanted to participate, emphasizing that their cooperation was fundamental to carry out this research. Equally, to protect the students, all the information gathered through the study was confidential, as well as changing students' names to protect their identity.

Finally, the results were shared with the school and with the bilingual teachers at other school sections.

### ***Data gathering instruments***

For this study, different instruments were used to collect data. The primary stage was observation because it is the first contact in the classroom. There are several factors to define what to observe. For this research work, the class observation focused on: Pupils' interest and attitudes towards the activities proposed, group learning dynamics, as well as the procedures and the improvement opportunities in the completion of the tasks provided. Regularly, most of the observation was recorded in an audio recorder device to avoid missing relevant details, and because the role of the tutor made it challenging to sit down and register in the middle of the explanations or when giving instructions. As a

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

result of such information, a written account of the observation constitutes field notes. This instrument followed a specific format that allowed the Teacher-researcher to find essential information, as Merriam (2009) suggested.

In the collecting data process, however, observation provided the first approach. Students' artifacts (Bansho) and assessment artifacts (rubrics) comprised the basis of the proposed questions. The core of the Bansho method is reliable if used as an artifact in the pedagogical intervention. The rubrics and the categories derived from them traced the analysis pathways; to put it simply, the artifacts connoted both observation and analysis activities.

Participants' conclusions, ideas, comments, and opinions contributed to the study and provided valuable information. These elements were collected through the interventions, and focus-group interviews which were conducted after finishing the last intervention with samples of both groups (2B and 2C), in this data collection procedure as Patton (2002) explained: "The object is to get high-quality data in a social context where people can consider their own views in the context of the view of others" (p. 386).

As stated by Merriam (2009), the data collection techniques used were determined not only by the teacher-researcher but also for the theoretical approach of the study, the problem and the research question, the purpose of the study, and the sample selected.

### ***Field Notes***

The first technique selected to collect data was the observation. As mentioned, class observation is an efficient instrument to gather information to keep track of students' behavior, attitudes, and interaction between them and other aspects that evidence what is going on in a classroom. Consequently, its instrument, field notes, complement it since, as suggested by Merriam & Tisdell (2016): "observational data

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

represent a firsthand encounter with the phenomenon of interest rather than a secondhand account of the world obtained in an interview” (p. 137). Therefore, they become rich sources to confirm and broaden the information gathered and the understanding of the analyzed event.

To the study purposes, the format designed to register the information of each intervention presented in the head the teacher-researcher name, the school’s name, the grade, the date, the number of participants, the purpose of the session and the research question. Then, the document was divided into three columns to organize the paramount elements to register. In the first column, the aspects to focus the observation (interest and attitudes regarding the activities proposed, interaction and group learning dynamics, pupils' requirements, and performance during the activity). The second column provided the space to write what was observed according to each aspect. The third column - implemented after the first hermeneutic cycle- requested the possible connection of the entries with the research question (see figure 7).

In this process, the crucial issue is what to be observed. Categorized specific elements may guide the analysis in a short period. Thus, the teacher researcher must be selective and choose in an organized way to maintain the representativeness criterion. Fraenkel & Wallen (2003), propose two types of observations: Narrow focus and Broad focus observations. Narrow focus observation usually concentrates on a single element, and broad focus concentrates on an overall picture of what is happening in the classroom. In the case of this study, as evidenced in the format, it was chosen "Broad focus.” Thus, the purpose of this instrument was to observe and describe how students faced and developed the activities proposed for the interventions.

Bansho Mathematics strategy as a means for enhancing writing skills in second graders

**Figure 7**

*Field notes format*

FIELD NOTES: INTERVENTION 2	
<b>TEACHER-RESEARCHER:</b> Martin Arias	<b>SCHOOL:</b> Gimnasio La Montaña
<b>GRADE:</b> 2C	<b>DATE:</b> October 1 <sup>st</sup> , 2019, <b>TIME:</b> 10: 40 AM
<b>NUMBER OF PARTICIPANTS:</b> 20	<b>CLASS TOPIC:</b> One-step word problems involving addition and subtraction.
<b>PURPOSE OF THE LESSON:</b> To introduce the first adaptation of the strategy Bansho.	<b>RESEARCH QUESTION:</b> <i>How does the Bansho mathematics teaching strategy influence second graders EFL writing skills in a CLIL class at a private school?</i>

<b>OBSERVATION</b> <i>Focus</i>	<b>ANALYSIS</b> <i>What was observed?</i>	<b>RELATION WITH RESEACRH QUESTION</b> <i>What is its relationship with the RQ?</i>
<b>STUDENTS' INTEREST AND ATTITUDES</b>		
<b>INTERACTION</b>		
<b>GROUP LEARNING DYNAMICS</b>		
<b>STUDENTS' REQUIREMENTS AND PERFORMANCE</b>		

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

### ***Students' artifacts***

Merriam (2009) used the term documents regarding printed and other materials relevant to a study, including public records, personal documents, popular culture, visual documents, and physical artifacts. So, mining data from documents certainly provide detailed records that enable the researcher to derive insights different from those provided by observations and interviews.

In this research, it is necessary to indicate the distinction between the standard reference to documents as materials existing naturally in the study context in contrast to researcher-generated documents. "Researcher-generated documents are documents prepared by the researcher or for the researcher by participants after the study has begun" (Merriam, 2009, p.149). Hence, this distinction introduces the importance of the students' artifacts in this data-collection scenario since the content area activity applied becomes itself an artifact, as well as the paramount sample of the EFL written productions. In other words, the worksheets designed and implemented throughout the pedagogical intervention became the artifacts of this study. These portrayed the work done by students when facing the problem-solving strategy and EFL written production based on their Metacognition.

Accordingly, the teacher-researcher generated and modified an artifact related to the focus of the data required. Making emphasis on teaching and learning mathematics through problem-solving and supported in the current exploration of collaborative approaches from Ontario Classrooms adaptation, a specific Model of a Bansho arose.

These artifacts were worked by groups of two students and related to what students understood, answered, and considered necessary to communicate in their written

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

productions. Students had to face mathematical problems which intended to stimulate discussion among them. After, they used their prior knowledge to propose solutions to the problematic situations; Finally, agreed about what to write in the EFL and the best way to express the process that drove them to the conclusion.

Thus, students participated in problem-solving activities that promoted, among other skills, reflection, and EFL written productions. In each hermeneutic cycle, the artifacts adjustments range from including Mathematics thinking activation, to prompting technical vocabulary related to mathematics topic worked, and furnish useful expressions needed to develop the tasks asked. The appliance and detailed description of these artifacts will be mentioned later in this chapter.

### ***Focus Group***

A focus group or focus group interview is a qualitative technique for data collection; it is implemented with a small group of people on a specific topic (Patton, 2002). A focus group according to Denscombe (2007) "consists of a small group of people, usually between six and nine in number, who are brought together by a trained moderator (the researcher) to explore attitudes and perceptions, feelings and ideas about a topic" (p.115). It means that a focus group interview provides a relatively homogeneous group setting to reflect on the interviewer's questions.

On the other hand, qualitative researchers usually collect data in the form of words, (Johnson & Christensen, 2014). In this connection, focus groups are useful interviews to explore the depth and nuances of participants' opinions regarding the process they have been through and to capture the interpretations of the advantages and disadvantages of the activity to solve mathematical problems, as well as their view of the written process developed.

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

The focus group method was chosen for this study because it allowed access to socially constructed expressed views, opinions, and attitudes of the participants who helped the researcher understand how they interpret their experience. Merriam (2009) asserts, "since the data obtained from a focus group is social-constructed within the interaction of the group, a constructivist perspective underlies this data collection procedure" (p. 94). The focus group correlation allowed participants to draw from others or brainstorm together collectively. This may lead to many ideas, opinions, issues, and topics being discussed. In a focus group, participants can listen to each other's responses and make additional remarks beyond their initial responses as they listen to what other people have to say (Patton, 2002).

Despite the homogeneity because of the nature determined by the purpose of the study. The researcher attempted to organize each focus group based on the heterogeneity in the results. Heterogeneity, or different performances in the hermeneutic cycles, since one of the goals in a focus group is encouraging participation and discussion. Interactions between participants improve the quality of the data. Participants tend to provide checks and balances on each other, eliminating false or extreme opinions (Krueger & Casey, 2014).

At the start of each focus group, the teacher-researcher explained the technique's purposes and his role as a moderator, also the use of the audio recorders and how their responses will be confidential through the use of pseudonyms. Two focus group sessions were conducted at the end of the last pedagogical intervention, each session with six students per grade, they took between twenty (20) and twenty-three (23) minutes. According to Krueger & Casey (2014), there are five categories of questions with

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

distinctive functions in the flow of a focus group interview. They call these categories of opening, introduction, transition, key, and ending questions. So, bearing in mind the above categories, the research objective, and the instrument's aim, the following semi-structured question guide was proposed to help guide the discussion and keep it on the topic:



**Table 1**

Focus Group Structure

---

<b>FOCUS GROUP STRUCTURE</b>	
<b>Grades: 2B and 2C</b>	
<b>Headlines</b>	<b>Interview Questions</b>
Image and use of the Bansho strategy in general.	<i>-If I say Bansho, what is the first thing that comes to your mind? -What does the idea of Bansho refer to? Why? Something to add. -In class, do you think this strategy contributes to something? Why? What benefits? -Does Bansho present any obstacles? Which? Why? -Bansho has two parts, what are those? Which you prefer? Why? -Was it easy or difficult to carry out the Bansho? Would you like to work this strategy more frequently? If not, why?</i>
Group learning	<i>-How were the dynamics when doing the Bansho strategy in pairs? -What were your roles specifically? -How do you feel about solving a problem with a classmate? -How do you feel about the writing process with a classmate?</i>
Writing part of Bansho	<i>-Now thinking in the explanation part: are there any benefits doing that part? Was it difficult or easy to do? Why? -Did you notice the changes in the second part of Bansho through the classes? What do you think of each version? -When you see and compare your different explanations, what could you say? -What do you think the teacher uses the Bansho strategy for?</i>
Closing	<i>-Now to finish, would you like that the coming second-grade students do the Bansho strategy? -Would you recommend the school to do the Bansho strategy in all the levels? -What would you change add or remove from the Bansho strategy? -Any other comment?</i>

---

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

Data collection included the audio recordings, observation of nonverbal communication cues, and note-taking. These instruments were fundamental not only to collect the necessary information but also to support the findings of this study.

### ***Role of the Researcher***

The researcher is the primary instrument used to collect and analyze data in this type of research; he or she relies on skills and intuition to find and interpret the information (Merriam, 2009). Being part of the classroom as a mathematics teacher brings the opportunity to participate actively in this study. Accordingly, the teacher-researcher role was as a participant-observer; he planned a set of activities that involved the teaching and learning of mathematics in a foreign language, trying to impact students writing skills and then reflecting upon this implementation. According to Burns (2001), this role involves: "entering the research context and observing oneself and others in that context" (p. 82).

In that way, it was possible to notice some students' perceptions, behaviors, and attitudes regarding the activities proposed, mathematical skills, and foreign language learning process. Furthermore, being an active participant and observer facilitated the reflection and shaping of the teaching practices and how they transform to assist students' needs according to the emerging contexts.

On the other hand, the observations done considered an emic perspective. It means as Patton (2002) explained, being part of a "setting or program" (p.268). An emic aspect referred to how a situation or phenomenon is seen from an internal point of view (Freeman, 1998). In this particular case, the primary purpose was attempting to observe, describe, and analyze what children experienced throughout the implementation of this

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

study. Creswell (2014) also defined some characteristics to describe the researcher's role when doing action research: the familiarity and knowledge of the participants, the clearness with the participants and people involved in the project such as parents and school coordinators, and to obtain the appropriate permissions to carry out the study.

Notwithstanding the above, biases presented by the researcher must be considered, accounted for, and monitored to determine their impact on data collection and analysis. For Merriam (2009), given the researcher's position in this kind of study, he/ she could filter data through his or her theoretical affinities and biases. So, deciding what should or should not be attended to when collecting and analyzing data is frequently up to the investigator. Likewise, the researcher participates in the activities as he observes the context where the students are learning. Hence, it is essential to consider that this double role of teacher/researcher permits first, in several moments considering the expectations brought to the study when reflecting on and analyzing the teaching and learning processes. Secondly, as researchers rather than trying to eliminate these biases or "subjectivities," it is crucial to identify them and monitor them as to how they may be shaping the collection and interpretation of data to control their influence (Merriam, 2009).

### ***Hermeneutic Cycles***

In this continuous reflexive process, the teacher-researcher attempted to establish how, in a specific context of CLIL classes (Mathematics), contingent upon content activities, could be enhanced EFL teaching, especially writing skills.

Consequently, this action research comprised six (6) hermeneutic cycles. The first one in the diagnosis stage (Chapter 1) allowed the teacher-researcher to find improvement opportunities regarding the structure and provided a possible route to

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

follow. Each research cycle included four procedures: plan, act, observe, and reflect following the action research method of (Kemmis & Mc Taggart, 1988).

Every pedagogical intervention took two classes in each group (second grade B and second grade C). Each class corresponding to a schedule lasted 45 minutes, so per intervention, the teacher-researcher used 90 minutes with every group.

Having as reference the alternatives and possible influence of the specific Mathematics method (Bansho) to solve problems, each of the cycles focused on different aspects regarding the work and development of the EFL writing skills. Furthermore, the pedagogical interventions designed and the adjustments that raised in the process showed the way forward. The learning activities were undertaken in groups of two students, considering structure elements of the backbone strategy and the visions of curriculum, language, learning, and classroom developed in chapter 4.

**Table 2**

### *Hermeneutic Cycles Plan*

<b>Hermeneutic Cycle</b>	<b>Starting Date</b>	<b>Finishing date</b>
1 (First approach)	September 16th, 2019.	September 23rd, 2019.
2 (Introduction to the first attempt of Bansho)	September 30th, 2019.	October 4th, 2019.
3 (Bansho adaptation 1)	October 15th, 2019.	October 22nd, 2019.
4 (Bansho adaptation 2)	November 4th, 2019	November 11th, 2019.
5 (Bansho adaptation 3)	November 28th, 2019	January 17th, 2020.
6 (Bansho adaptation 4)	February 10 <sup>th</sup> , 2020	February 18 <sup>th</sup> , 2020

**Figure 8**

*Hermeneutic cycle 1*

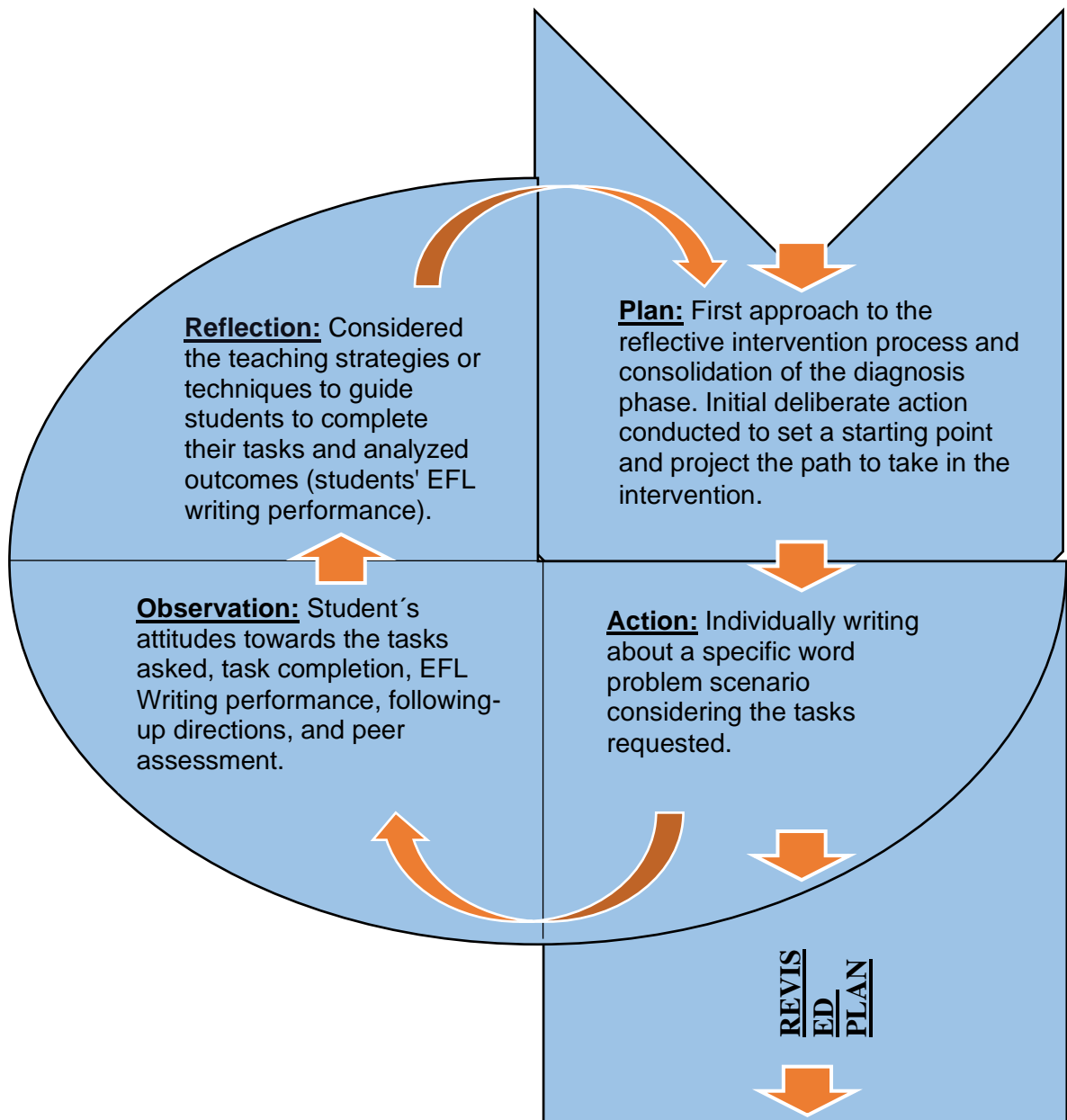


Figure 9

*Hermeneutic cycle 2*

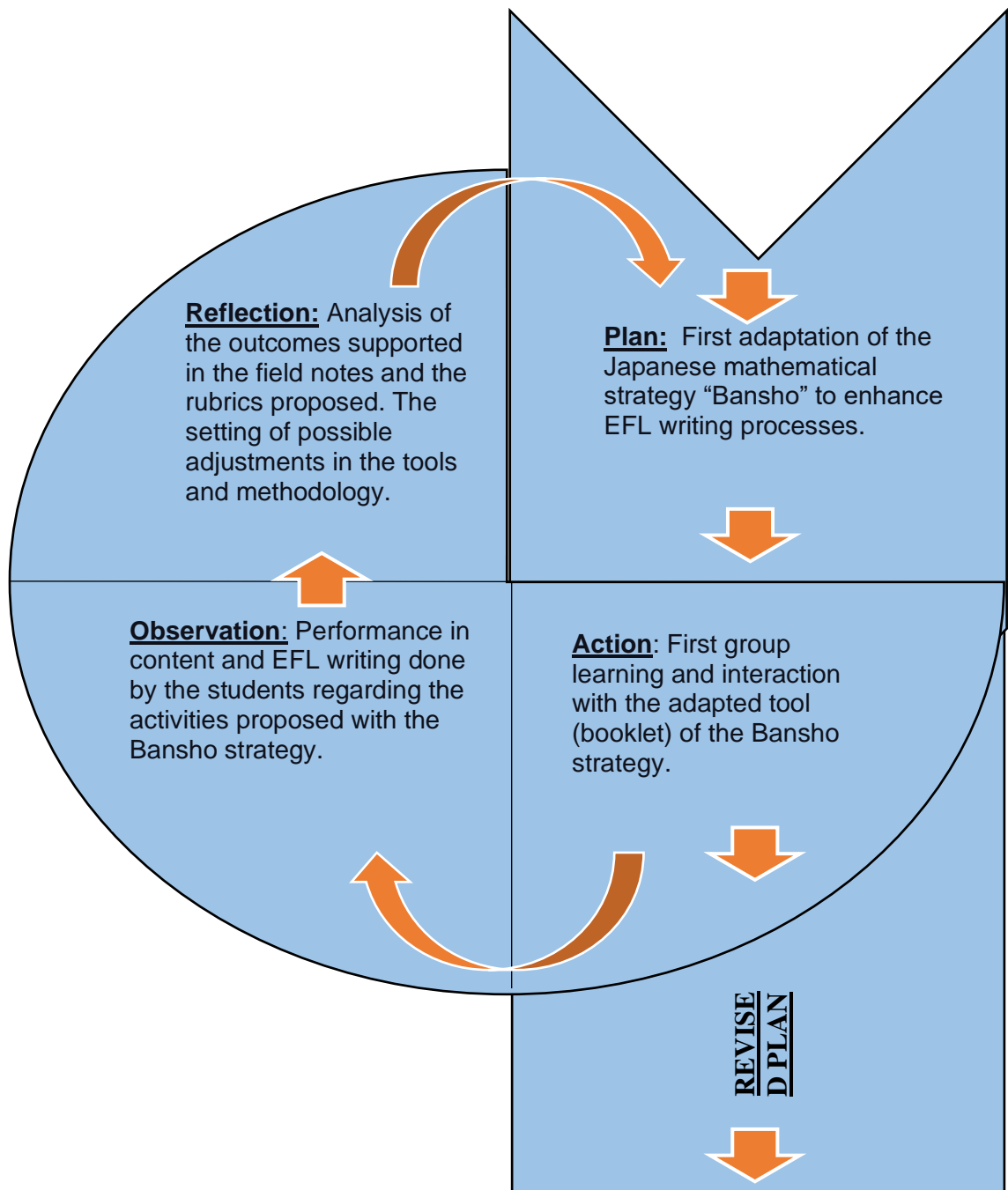


Figure 10

*Hermeneutic cycle 3*

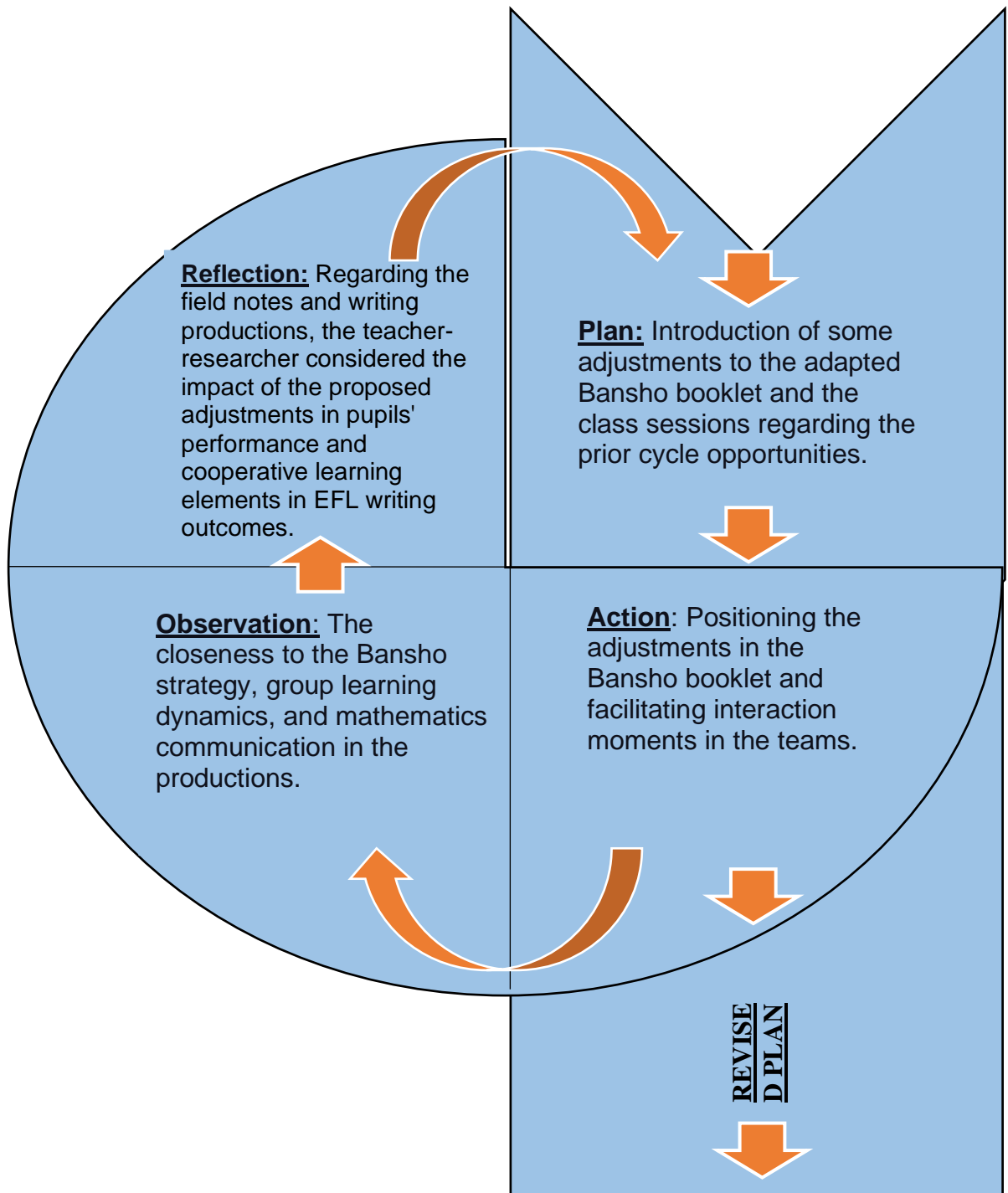


Figure 11

*Hermeneutic cycle 4*

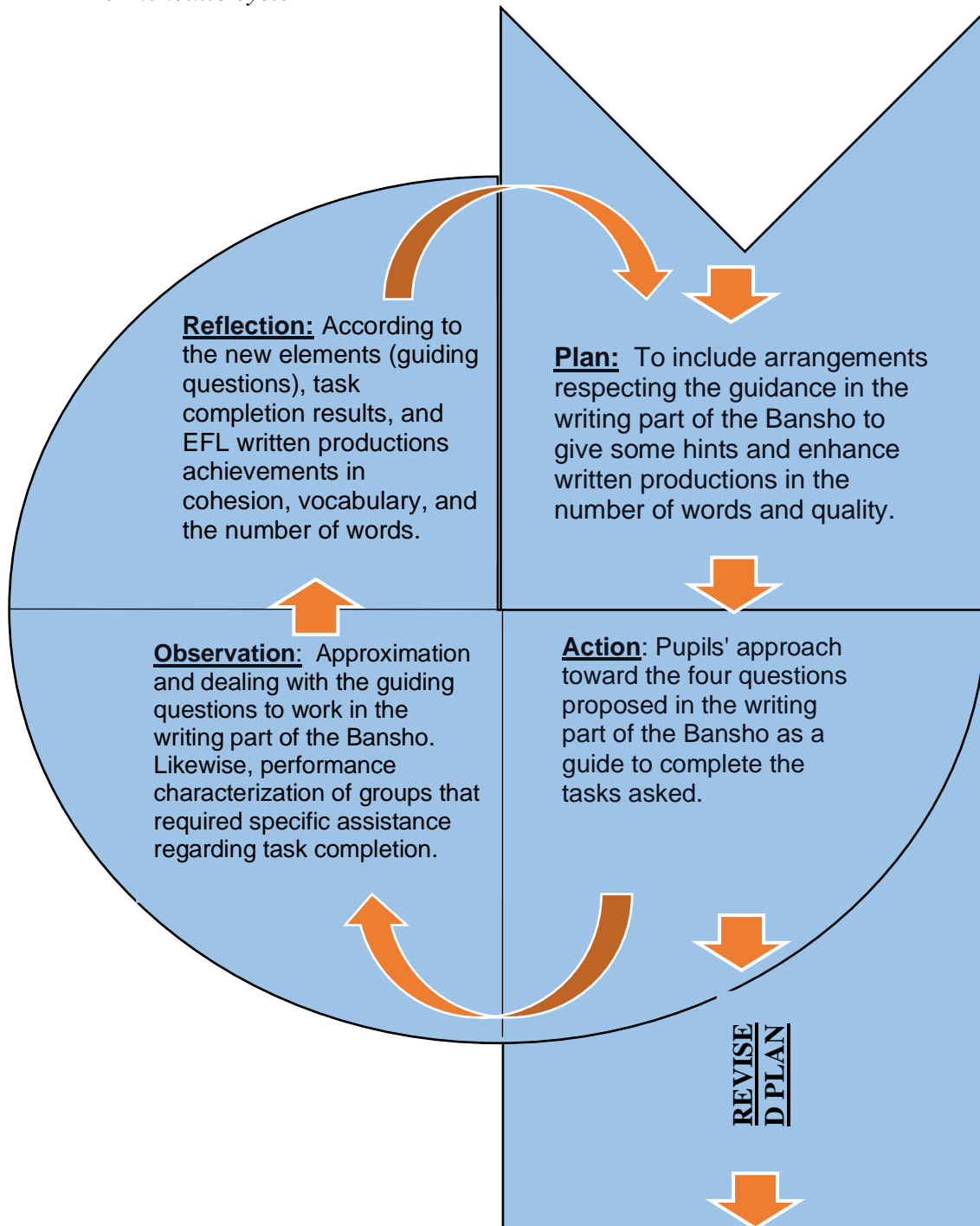




Figure 12

*Hermeneutic cycle 5*

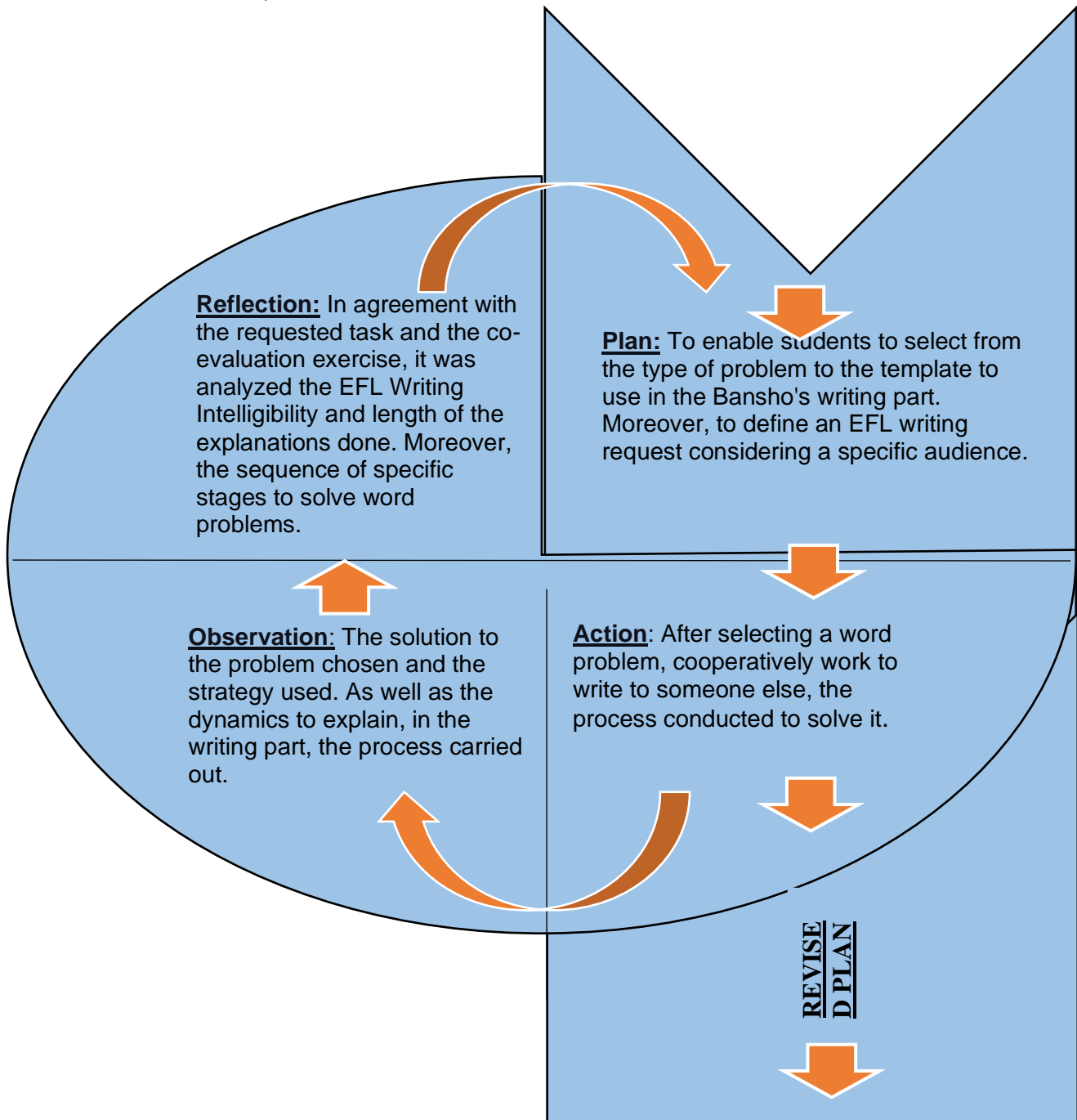
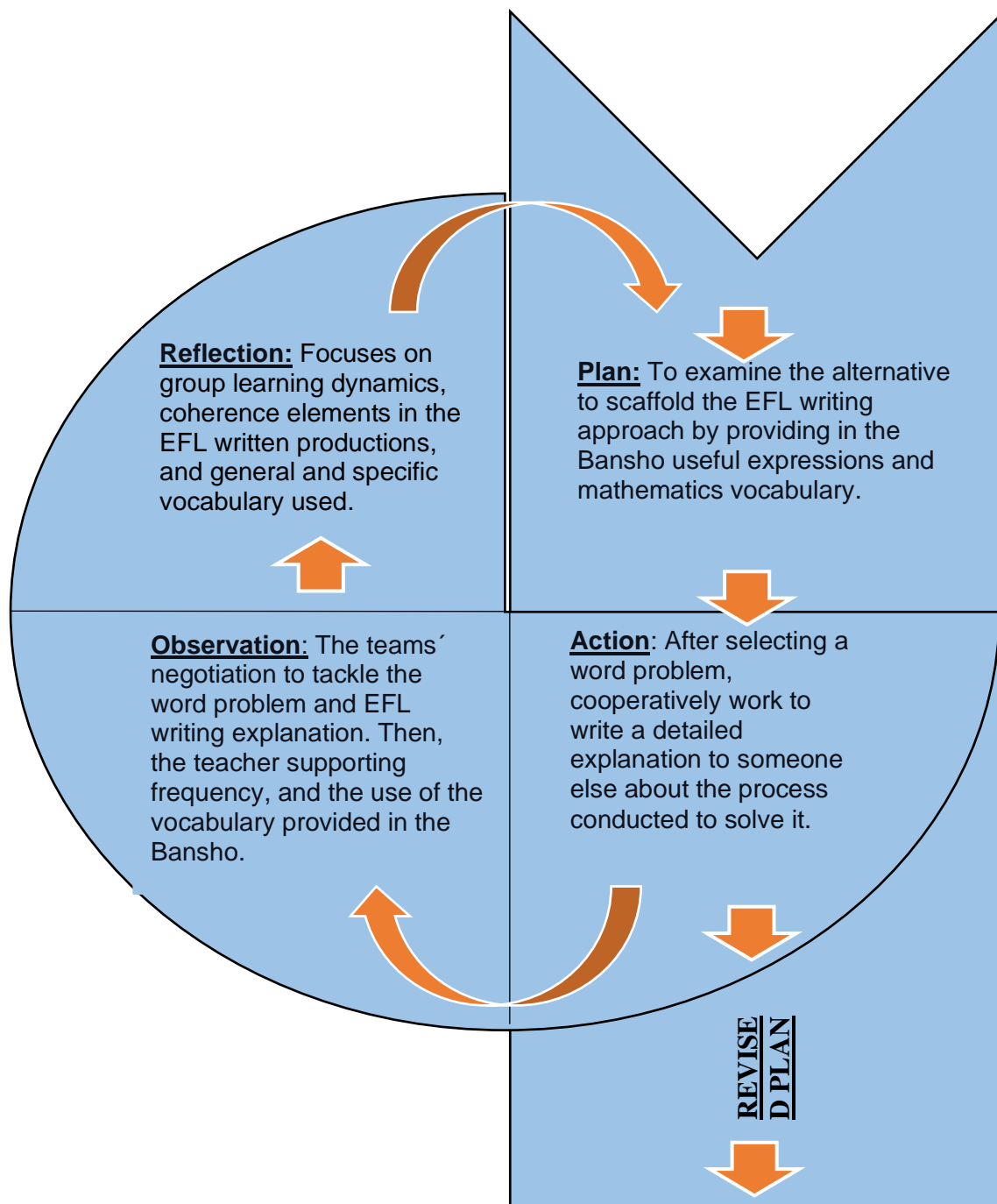


Figure 13

*Hermeneutic cycle 6*



***Validity and Reliability***

As with other qualitative research methods, this action research relies on methodological triangulation to address trustworthiness issues since one method's strengths may compensate for another's weaknesses (Gay et al., 2012), thereby increasing the validity and reliability of the results.

Triangulation was carried out based on all the data collected during the research process to verify the matching effectiveness between goals and information. For this research, triangulation started during the design of the data collection instruments. It means that the variety of instruments selected ought to gather information to answer the research question and fulfill the study's objectives. The field notes template, the artifacts (Bansho), the rubrics, and the focus groups' questions were carefully designed to find plenty of evidence that allows the teacher-researcher to explain what happens in the classroom during the pedagogical interventions. Later, the researcher compared the analysis of the lessons observed with the analysis of the information obtained from the focus groups and the artifacts. Finally, the researcher analyzed how the information collected could answer the research question.

Due to the nature of this research, the data to answer the research question aimed to show the dynamics of the mathematics strategy from specific perspectives:

- What is expected to be achieved (artifacts and rubrics analysis)
- Participants assessment about the Bansho strategy (focus groups)
- Lesson dynamics (class observation, field notes)

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

Therefore, the teacher-researcher must have had the research question as a beginning point to analyze this data. Likewise, he considered the subsidiary objectives; each pedagogical intervention goal, read through the field notes regularly, reflected upon rubrics results, and contrasted with focus group answers while searching for themes within the same data.

Obtaining information from different sources validates the research and allows the researcher to analyze the phenomenon from more than one point of view. So, the instruments' reiterative and transversal data established the support patterns for the categorization process.

Chapter 5 (Data analysis and findings) will provide more detailed and deep information about this process. Furthermore, an invitation to understand that this research is a never-ending process will remain based on the findings. The researcher will interact with the outcomes and, indeed, will deconstruct some practices and implement others thanks to this experience.

## **CHAPTER 4**

### **Instructional Design**

This chapter's objective is to present the theoretical support of the pedagogical intervention in the research study. It describes the views of curriculum, language, learning, and classroom that guided, in high proportion, the researcher's intentions. Likewise, it describes the hermeneutic cycles deployed to answer the research question: How does the Bansho Mathematics teaching strategy influence second graders' EFL writing skills in a CLIL class at private school?

### ***Vision of curriculum***

The research objective suggested a curricular perspective that seeks to develop proficiency in both the non-language subject (Mathematics) and the language in which it is taught (English), attaching the same importance to each. So, a suitable approach aims at content- based instruction (CBI). For practical purposes, it can be argued that content and language integrated learning (CLIL) and content-based instruction (CBI) share the same essential principles (Cenoz, 2015).

At the core of this curriculum vision, language instruction is most effective when it ensures that students learn the language for communication in meaningful and significant social and academic contexts (Genesee, 1994)

There are differences regarding the grade in which the CBI/CLIL program starts, and the teaching methodology and materials used. Consequently, its contribution to this study is the guideline to perform activities linked to a curricular scheme that fosters sustained and in-depth explorations of specific content topics. Expressly, this outline focuses on getting the teacher- researcher to identify appropriate content activities (to

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

teacher-researcher purposes the Bansho strategy) and then take that theme as the organizing principle for intervention development.

In this specific context, CBI implies a curricular perspective in which the constant reflection was to integrate language and content. Also, to attend to both instruction and assessment, rather than merely using a content theme to contextualize language instruction or vice versa. The pedagogical proposal's goal was to develop some new content appropriate to pupils' cognitive level and teach them language in that content context. This curricular model, which represents an attempt to give priority to meaning within the context of language instruction, 'stands in contrast to traditional approaches to language teaching in which language form is the primary focus of the syllabus and of classroom teaching' (Richards & Rodgers , 2001, pág. 209)

Therefore, the teacher-researcher used this perspective because it fostered the benefit of promoting cross-curricular skills by focusing on inquiry, information processing, and problem- solving. Likewise, it goes hand in hand with La Montaña (2020) Bilingual Program that points:

The school's tendency in its pedagogical project has been to stimulate the students' development of critical thought. Therefore, most of our curricula deal with XXI Century Skills. CLIL operates very well within it. On the one hand, centering the emphasis on the cognitive processes and content reflects the School's global perspective to learning and contextual relevance for the student. On the other hand, communication to learn is fed with language awareness both in the language class and the subject-area class. The innovation here is to use language and subject areas didactics to obtain a meaningful learning process that integrates both (p.2).

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

### ***Vision of language***

Framing with the meaningful curriculum perspective, a functional view of language would fit the course to support the mathematics CLIL interventions. The functional approach to language is intimately related to the communicative approach features. "Functionalism can be defined as the belief that the forms of natural languages are created, governed, constrained, acquired and used in the service of communicative functions" (MacWHINNEY, 1991, p. 1).

Thus, and according to functionalists, it can be argued that language is foremost an instrument for communication. Thereby it supports the research view enabling primarily to orally exchange pupils' ideas to tackle a mathematics situation and then communicate in writing the procedures conducted when solving the situations, having as reference the level of EFL development of participants (second graders).

Complementary to this, EFL writing skills are likely to be encompassed by this functional perspective; (Grabe & Kaplan, 1996) comments contribute to this language vision by stating that any functional approach's primary goal is to communicate. They present their view as follows: "Most writing is usually undertaken to communicate with one or more readers for a variety of informational purposes." Moreover, they add, "Theories of communicative language use or communicative competence provide an important resource for developing a model of writing (Grabe & Kaplan, 1996, p. 224).

Due to the relevance of language in CLIL as the vehicle to express content knowledge and skills, the process conducted in the classroom demanded a defined language-related assessment position, which, indeed, leaned for language function. Systemic Functional Linguistics (SFL) —an approach to linguistics centered around the notion of language function— views language beyond the fact of communicating; it

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

prevails language as a source to relate and create meaning within society (Fontaine et al., 2019).

### ***Vision of learning***

This research study embraced the social cognitive view of learning. It guided the practice of cooperative work and reciprocal interactions throughout class interventions. On the one hand, Social cognitive theory Bandura ( 2001) views cooperation as the common belief of group members in their collective power to obtain intended results. On the other hand, it supports developing a sense of agency. For instance, pupils could pick the student that complemented or boosted their performance when working in the Bansho method. They were not merely acted upon by external forces but instead chose to place themselves in environments that they believed were conducive for their learning. Such self-regulative capabilities are a hallmark of Bandura's theory (Bandura, 1997). In this sense, it could be inferred that individuals work cooperatively to achieve what they cannot accomplish independently.

From this perspective, an important point is considered in this study. The learner - ideally- will cognitively rehearse and restructure information. Then he/she explains the material being learned to a collaborator as the pedagogical intervention progressed. Doing so facilitates retaining the material in memory and incorporating it into existing cognitive structures (Wittrock, 1990) .

An extension of social cognitive theory is situated cognition theory (Suchman, 1987), which assumes both the physical and social environment; they influence cognitive activity.

Through the social environment, that is, cooperative groups, members develop shared cognitions that are the group's property, not of any individual member. In that



## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

regard, Johnson et al., (2015) asserts that cooperation implies building and maintaining a shared conception of the problem being solved. Beginning from dialogue, group members learn to understand each other and create shared cognitions. It is the joint search to build the solution to a problem that creates understanding.

For instance, it may benefit those who learn best through social processes, or conversely, those who need to be encouraged to cooperate in groups. Based on this idea and considering that the study participants are learning a foreign language, interaction lies at the heart's social- cognitive approach. Interaction is the fundamental basis for human sociality, including language learning (Van , 2004). It indicates that interaction underlies and supports human social behavior in intensive and complex ways from a social cognitive perspective. In other words, interaction supports language learning, too, if language learning is related to the form of social or sociocognitive behavior (Van , 2004).

### ***Vision of classroom***

The pedagogical interventions were aimed at a learner-centered classroom view in which the students are actively involved in the activities proposed. Since they are required to be active agents of their learning, they participated in problem-solving activities having the opportunity to make decisions, express opinions, and show agreement or disagreement with their partners about the ideas and information to depict in the Bansho. Such collaborative learning is an essential aspect of learner-centered teaching. *Collaboration* is a social process believed to help students develop problem-solving skills, challenge their beliefs by considering many viewpoints in the classroom, and construct deeper personal understandings of contents (Brown, 2003).

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

Following this line, in the CLIL classroom, students must work cooperatively with others, appealing to each person's strengths and weaknesses and operating effectively in groups. These aspects promote life-skills development, such as dealing with unexpected events, observational skills, and constructing knowledge built on interaction with the world (Coyle et al., 2010).

From this learner-centered perspective, students prefer to have a sense of ownership and control over their learning experiences; they should also receive opportunities to teach each other what they have learned (Weimer, 2002). Thus, the teacher's emotional support in the classroom may create a safe environment where students can develop a positive self-image through their interactions with the teacher and their peers, enhancing the learners' participation in the co- construction of academic knowledge in the L2.

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

**Table 3**

*Pedagogical Intervention*

<b>CLASSES CONDUCTED</b>	<b>CLIL DEVELOPMENT</b>	<b>FOCUS</b>	<b>EFL WRITING SKILLS</b>	<b>FOCUS</b>
1 - (2B)	Classwork regarding Mathematical problem with mistakes in the solution. Participants had to find them and write about the accurate solution.	Correctness when addressing a problem situation. Determine EFL writing status.	Writing regarding the mistakes found in and 2-step addition and subtraction problem.	Message clarity and Peer-feedback.
2 - (2C) 2 – (2B)	First approach to the Bansho strategy. Participants tackled the problem situations in groups of 2 students. After solving it. They had to report the process conducted in a writing task.	Problem Solving. To follow specific stages to solve problems.	Writing in the Bansho artifact without following a specific model.	Writing Intelligibility and length
3 – (2B) 3 – (2C)	First adaptation of the Bansho artifact. Participants tackled the problem situations in the same groups of 2 students.	Algorithms. Addition and subtraction. Cooperative work	Writing in the Bansho artifact sharing the methods used to solve the problem situation proposed.	Coherence and Cohesion in EFL writing
4 - (2C) 4 – (2B)	Second adaptation of the Bansho artifact. Solving 2-step word problem they tackled in the previous Bansho approach if that group of students did not finish it or made several mistakes when solving the problem.	Relevance, Adequacy, and specific vocabulary	Including arrangements respecting the guidance in the writing part to give some hints and enhancing written productions in the number of words and quality.	Cohesion and General Vocabulary.
5 - (2B) 5 – (2C)	The third adaptation of the Bansho artifact. Solving 1-step word problem with the teammate. Use of the linking words to explain with higher quality their process.	Word problems. To follow specific stages to solve problems. Peer feedback regarding the explanation process.	To write in the Bansho booklet to someone else, in this case, classmates from other grades.	Writing Intelligibility and length. Peer feedback regarding readability.

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

---

6 - (2C)	6 – (2B)	Last adaptation of the Bansho artifact. Solving a 1- step word problem with the teammate. Use of the linking words to explain with higher quality their process.	Addition and subtraction of fractions.	To write in the booklet to someone else, in this case, first-grade students. As the audience changes, the writing may have some adjustments.	EFL writing coherence and general vocabulary.
----------	----------	--	--	--	---

---

In the annexes document you will find in detail the description of the hermeneutic cycles conducted.

## **CHAPTER 5**

### **Data Analysis and Findings**

This chapter describes the procedures carried out to analyze the gathered data and the resulting categories of such a process. In the first place, the data analysis approach chosen and the steps that guided the categorization are presented. Then, the categories that emerged from the analysis and samples of data to support them are presented.

#### ***Data Analysis approach***

Patton (2002) points out that when data collection has formally ended, the researcher has two primary sources to guide the analysis: (1) the question(s) generated during the first stages of the study, before fieldwork, and (2) analytic insights and interpretations that emerged during data collection. Likewise, the author highlights that just as "each qualitative study is unique, the analytical approach used will be unique" (p.433). In this concern, Johnson & Christensen (2014) claim that qualitative data analysis is much more eclectic than others. Hence, there is no single "right" way to analyze the data due to the nature of the data gathered.

Therefore, the present data analysis was carried out bearing in mind the study's central question: How does the Bansho Mathematics teaching strategy influence second graders' EFL writing skills in a CLIL class?

The data analysis process used in the present qualitative study matched the inductive analysis; it agrees with the qualitative data collection instruments used. In the inductive data analysis, the researcher develops patterns, categories, and themes from an ascending perspective by organizing the data into progressively more abstract information units (Creswell, 2009). This approach is prevalent in qualitative data

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

analyses, most notably grounded theory (Strauss & Corbin, 1998).

Consequently, the teacher-researcher considered the three coding levels of the Grounded theory on the data analysis process. Strauss & Corbin (1998) explained that the first is Open Coding. It helped the teacher-researcher to segment the data into similar groupings to form preliminary categories of information about the phenomenon to address. Thus, this research began by creating tentative labels (words or short phrases) for pieces of data that summarized what was noticed, for instance, "Negotiation."

The second level is Axial Coding, through which the researcher begins to bring together the precursory categories identified into groupings as "Bansho work in pairs." Consequently, groups were created by examining the frequency in which some commonalities appeared and considering their connection to the objectives proposed for the study.

The third level, Selective Coding, allows the researcher to understand and explicate a story from the organization and integration of these categories. Therefore, it was required to classify the units of meaning from generals to specifics, as seen in the relation between Bansho in CLIL and cognitive and metacognitive elements that intervened. For this purpose, colors were used to identify and compare each unit of meaning. Using colors is a practical technique for carrying out the axial coding, that is, grouping those units that were similar to one another (Strauss, 1987).

### ***Procedures of data analysis***

Once the implementation of the pedagogical intervention proposed in this action research finished, the data analysis began with a first reading to the data gathered with the instruments previously designed, adjusted, validated, and deployed: Field notes, focus groups, and the documentary matrix of students' artifacts (Bansho) and rubrics. This first

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

reading was done concerning the research's general objective, which consisted of examining how the Bansho mathematics teaching method influences the EFL writing skills of second-grade students at a Private School. This process aimed to trace the first striking signs from the strategies performed and the possible impacts of the content method implemented.

Then, according to the established plan, data was separated into four groups: (1) Focus groups transcripts, (2) field notes, (3) students' artifacts (First Word problem scenario), and (4) students' artifacts (Bansho) and rubrics. These were recorded in computer files to analyze the main aspects constantly repeated in all the instruments. To identify these recurrent topics, words, or descriptions the teacher-researcher assigned codes to each instrument to track the origin of the categories and make the information approachable. (See table 4)

Correspondingly, it was crucial to identify the type of data each instrument showed to guarantee triangulation. Regarding the field notes, it was found that this instrument provided aspects such as the attitudes the participants expressed and how they performed during the intervention. The audio transcriptions from the two focus groups evidenced perceptions and impressions about the experience. Besides, they showed how the participants expressed their insights regarding EFL writing dynamics, mathematics performance, and group learning. The artifacts, supported in the analytic rubrics, revealed the possible improvements in the students' EFL writing skills and communicative purposes coupled with the achievements in the problem- solving process in the framework of CLIL classes.

**Table 4**

*Instruments' Coding Sample*

INSTRUMENT	CODE
Semi-structured interview to focus group No. 1	SSF01
Field Notes Pedagogical intervention 2	FN02
Student artifact No. 1 (First Word problem scenario)	SA01
Students' artifact (Bansho) No. 1	BO1
Rubrics per cycle (Hermeneutic Cycle 2)	2HC02

Subsequently, the teacher-researcher followed the three iterative, or repeating, steps suggested by Gay et al., (2012), reading/ memoing, describing, and classifying research data. The reading and rereading of the data enabled identifying some recurrent patterns about the events, meanings, or contents present in the already codified instruments. Such patterns were highlighted with different colors, and new colors were added when new patterns emerged. This process was conducted with all the instruments information. Then, different colors were labeled with a name that allowed the teacher-researcher to establish a preliminary list of categories, as seen in the following excerpts from the field notes (FN) and focus groups (SSF):

**Juan Ma:** *Ehh is like at the beginning I do not understand nothing of Bansho, nothing. And now, I understand ... is like como se... este bansho fuera más fácil que el otro.*

[Excerpt from SSF01]

**Mary:** *eh...it is good... ehm ...sometimes difficult because...ehh...we were.../eh we were two persons, so the other think other thing so we were like.../ {Mimic of conversation} ehh but we use our strategy that was reading first and then make like a conclusion and then eh - write ehh - what was good.*



[Excerpts from SSF02]

*Samu: The banshos in pairs are easy and helpful because when you give ideas to your part.../ friend it- it helps us to finish the work very quick.*

[Excerpt from SSF01]

*Sofi: Ok ehh... when I did the first it was a little be difficult, and I remember that I read the problem and solved with bars, but Maca, my pair, do base- ten blocks*

[Excerpt from SSF01]

*In this group now can be seen larger texts and more information in the description process, possibly with the rubric evaluation higher performances may appear*

[Excerpt from FN05]

Regarding this coloring process, it was evident that some units prevailed over others considering both the number of excerpts and the relevance given in the different instruments, for instance, "metacognition" and "writing in pairs. "

**Table 5**

*Color Coding Label's Example*

COLOR	Preliminary list of categories
Green	Metacognition elements
Yellow	Writing in pairs dynamics pros and cons
Blue	Improvement perceptions and evidence
Orange	Bansho usefulness insights.
Red	Negotiation
Purple	Bansho work in pairs
Grey	Mathematics problem solving process
Brown	Challenges

The coded information was also transferred into tables in MS Word to compare the information provided by the instruments and analyze them in further detail. Another critical point is to keep track of the research question and fulfill an accurate analysis

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

taking advantage of the information gathered. With this intention, the teacher-researcher also drew guiding questions from the subsidiary objectives proposed in chapter 1 (See table 6). Hence, data and preliminary categories had to be constantly contrasted to evidence significance, relevance, and illustration for the problematic established, allowing the researcher to develop overarching patterns and themes under the research question and sub-questions.

**Table 6**

### *Objectives and questions*

<b>Subsidiary objectives</b>	<b>Guiding questions</b>
To identify the Bansho elements that intervene when integrating the mathematics problem-solving process and the EFL writing skills development in a CLIL class.	Which Bansho elements operate in the pedagogical intervention regarding Content and EFL purposes?
To characterize the Cooperative Learning practices within the framework of Bansho activities.	What features of cooperative learning are unfolded in second graders when Bansho based lessons are implemented?
To document and describe second graders' EFL writing performance when being involved in a Bansho activity.	How is EFL writing performance in second-grade students during Bansho activities?

The chart above allowed the teacher-researcher to compare the first categories set with the evidence in both the data and the guiding questions. It helped determine, among other things, which ones would respond to similar elements, whether they were kept as an isolated category or a subcategory of another category. The process of comparing the data and the preliminary categories resulted in proposing a second list where the initial categories were kept, added, renamed, or reorganized as subcategories of other

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

categories.

**Table 7**

*Preliminary List of Categories*

Guiding questions	Category	Subcategory
Which Bansho elements operate in the pedagogical intervention regarding Content and EFL purposes?	Bansho in Clil	Metacognition elements
		Mathematics problem-solving
What features of cooperative learning are unfolded in second graders when Bansho based lessons are implemented?	Team work dynamics	Writing in pairs dynamics pros and cons
		Negotiation
		Useful perspectives
		Bansho work in pairs
How is EFL writing performance in second-grade students during Bansho activities?	Upward continuum	Improvement perceptions
		Rubrics and evidences
		Challenges

Considering that this list of categories still showed a broad view of the data, a careful analysis of the research objectives enabled an interpretation process to establish links and plug-ins. Creswell J., (2013) describes interpretation as "abstracting out beyond the codes and themes to the larger meaning of the data" (p. 187). Olsen, (2012) adds that interpretation is processing data by presenting it differently to deliver new meaning (p. 56). As a result of this coursework, the following three (3) final refined categories and their corresponding subcategories emerged as shown in the Table (7):

**Table 8**

*Final List of Categories and Subcategories*

General Objective	Research Question	Subsidiary Objectives	Categories	Subcategories
To examine how the Bansho mathematics teaching strategy influences the EFL writing skills of second-grade students at a Private School.	How does the Bansho mathematics teaching strategy influence second graders' EFL writing skills in a CLIL class at a private school?	To identify the Bansho elements that intervene when integrating the mathematics problem-solving process and the EFL writing skills development in a CLIL class.	<b>1. Prominent Bansho elements that intervene in the mathematics CLIL classes.</b>	1.1 Cognitive Processes in CLIL classes. 1.2 Evidencing Metacognition Skills.
		To characterize the Cooperative Learning practices within the framework of Bansho activities.	<b>2. Cooperative learning fashions fostered through the Bansho activities</b>	2.1 Negotiation 2.2 Writing in pairs dynamics.
		To document and describe second graders' EFL writing performance when they are involved in a Bansho activity.	<b>3. Students' EFL writing performance according to the task demanded in the framework of Bansho activities.</b>	3.1 Performance assessment according to the established criteria 3.2 Steady Growth

**Findings**

The categories presented in Table 7 are the foundation of analysis for the present research, showing their correspondence with the research question and the guiding questions proposed to provide a consequent reflecting and answering process.

**Category 1: Prominent Bansho elements that intervened in the mathematics CLIL classes**

The observations and the data collected evidenced that the students carried out

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

various cognitive processes inherent to problem-solving. Likewise, the adapted version of Bansho conducted allowed the emergence of scenarios that facilitated the use and development of metacognitive processes.

Therefore, both aspects cognitive and metacognitive processes will be addressed in greater detail and specificity in the subcategories related. The following subcategories will explain each of the elements mentioned by taking examples from the different supporting instruments.

### *Subcategory 1.1: Cognitive Processes in CLIL Classes*

As its name implies, this subcategory includes specific cognitive processes of problem- solving. These processes permeate performances and results in the EFLwriting task proposed in the Bansho activity. In the six (6) interventions, students worked on this aspect; however, five (5) of these were systematically addressed with the proposed strategy (Bansho). Hence, this subcategory deals with the cognitive process involved when working with the Bansho strategy and its correlation with the CLIL approach.

Thus, through the information collected during the pedagogical intervention, it was found that the recurrent cognitive processes that the students performed to solve problems in the Bansho booklet were related to the UPAC strategy. It is part of the curriculum, and they started to work on it more frequently due to the emerging possibilities provided by the Bansho. This strategy is linked with the set of strategies explicit by (Poyla, 1945) for solving mathematical problems. They are a set of heuristics cast in the form of brief questions and commands within a frame of four problem-solving stages summarized below: 1) Understand the problem. In this step, Poyla<sup>4</sup> (1945) says it

---

<sup>4</sup>This author is taken as a reference because he supports the problem-solving program in mathematics in the institution where the research was carried out.

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

is necessary to question: what is the unknown? What are the data? What is the condition?

2) Devise a plan. When devising a plan, Polya (1945) proposed to find the connection between the data and the unknown. 3) Carry out the plan. On that point, it is essential to carry out the plan derived from steps 1 and 2. While carrying out the plan, it is crucial to check each step and determine if they are right? 4) Look Back at the solution. We should examine the solution obtained; more importantly, can it be proved correct?

Similarly, The UPAC strategy divides the problem approach into four (4) moments (Understand the problem, Plan what to do, work out the Answer, and Check).

The following field entrance depicts the spirit of the UPAC:

*For this intervention, it is no longer the addition and subtraction by the algorithm only but brought to a context. It is done through problem situations located in specific contexts; that is what has been working with children. The students have been working on a specific procedure in mathematics called UPAC, and from that procedure, I hope that the process that is going to be carried out today with the Bansho will be nurtured.*

**[October 1<sup>st</sup>, 2019, FN02]**

*For the most part, the students used the UPAC strategy to solve mathematical problems since this is a commonly used strategy. This strategy, in turn, allows them to monitor and check their process, which would be framed within the metacognitive processes that students make of their learning.*

**[October 4<sup>th</sup>, 2019, FN02]**

*The students feel familiar with the UPAC, which is significantly evidenced when solving the problems presented since they are aware of each stage and allow them to monitor their process constantly. They use this tool as a guide and checklist; in turn, the bar model method is evidenced to solve these problems through visual representations, which are later analyzed using the UPAC.*

**[October 16<sup>th</sup>, 2019, FN03]**

Based on the rubric criteria, the following graphs summarize two noticeable

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

aspects: the first shows the progression from intervention two (2) to intervention five (5) in extracting relevant information, which is a cognitive process considered from the UPAC strategy (understand) and as mental activity (See discussion part). The second aspect refers to the high performance in both interventions having as reference the descriptors.

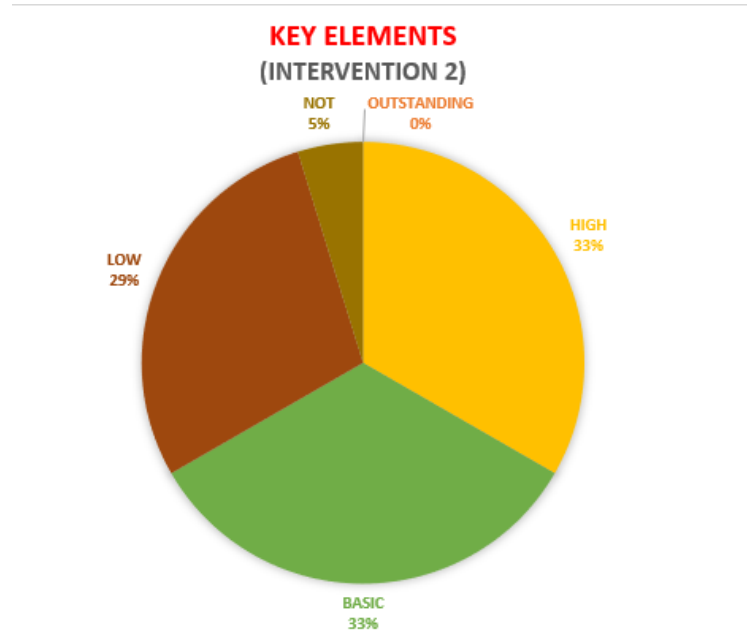
**Table 9**

### *Key Elements Classification Rubric*

<b>Criteria</b>	<b>Outstanding</b>	<b>High</b>	<b>Basic</b>	<b>Low</b>
Key elements classification	The students identify the key elements, classify them, and formulate a correct, verifiable plan on process/problem-solving.	The students identify most of the key elements, classify them, and formulate an adequate verifiable plan on process/problem-solving.	The students identify the key elements, classify them, and formulate an imprecise plan on process /problem-solving.	The students have difficulties identifying and classifying key elements and formulate a plan on incorrect process/problem-solving.

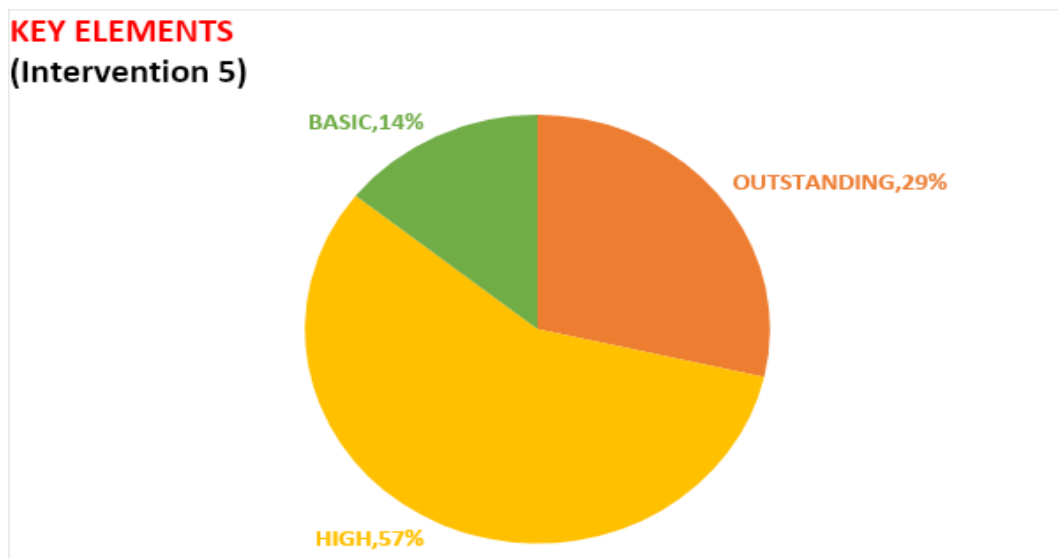
**Figure 14**

*Key Elements- Intervention 2*



**Figure 15**

*Key Elements- Intervention 5*





## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

Accordingly, the artifact sample below B03 (Bansho No. 3) shows the use of the UPAC strategy by a team of students, more specifically, the strategy of highlighting the essential information to understand the problem.

**Figure 16**

*Students' artifact (Bansho) No. 3*

**IN THE PARK**

In the park Marco saw some plants and trees. If  $\frac{2}{12}$  of the park is covered by tall trees, and  $\frac{5}{12}$  is covered by smaller trees, what fraction of the park is covered by trees?

**SOLUTION**

$\frac{2}{12}$	$\frac{5}{12}$	?
----------------	----------------	---

$\frac{2}{12} + \frac{5}{12} = \frac{7}{12}$       $\frac{7}{12} - \frac{2}{12} = \frac{5}{12}$

There are  $\frac{7}{12}$  of the park covered by trees.

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

The following graphs reveal rubrics' results regarding using the UPAC strategy to solve word problems in interventions two (2) and five (5). As happened with the sequence criteria in the previous graphs, there was evident progress in using the UPAC to solve problems and support the writing structure. Likewise, the number of participants above the average in intervention number five (5) is considerable.

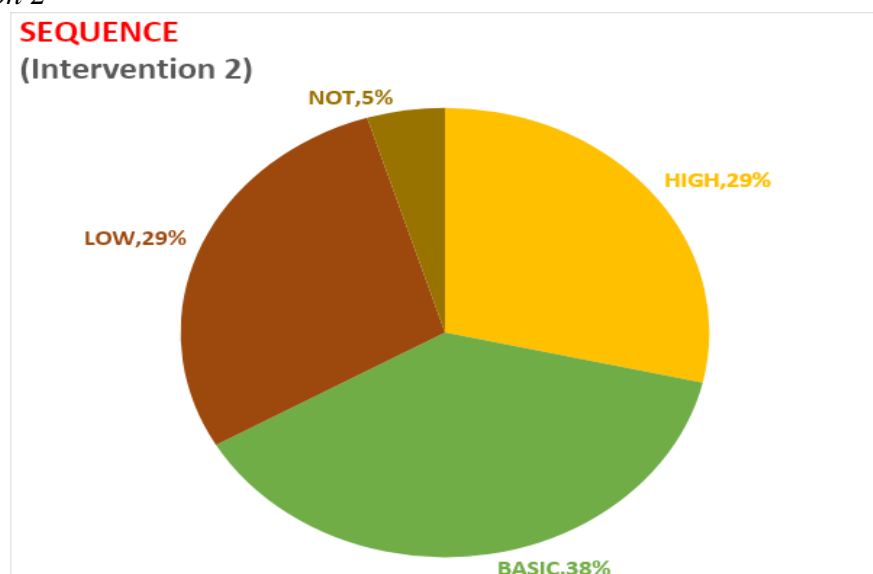
**Table 10**

### *Sequence Rubric*

Criteria	Outstanding	High	Basic	Low
Sequence	The students smoothly perform the procedures of the UPAC strategy to organize data, plan and answer. They make correct conclusions.	The students perform procedures of organizing data, planning, and answering. They make appropriate conclusions	The students perform the procedures of organizing data, planning, and answering. They make wrong conclusions.	The students have difficulties in performing the procedures of organizing data, planning, and answering. They make it wrong or did not arrive at any conclusions.

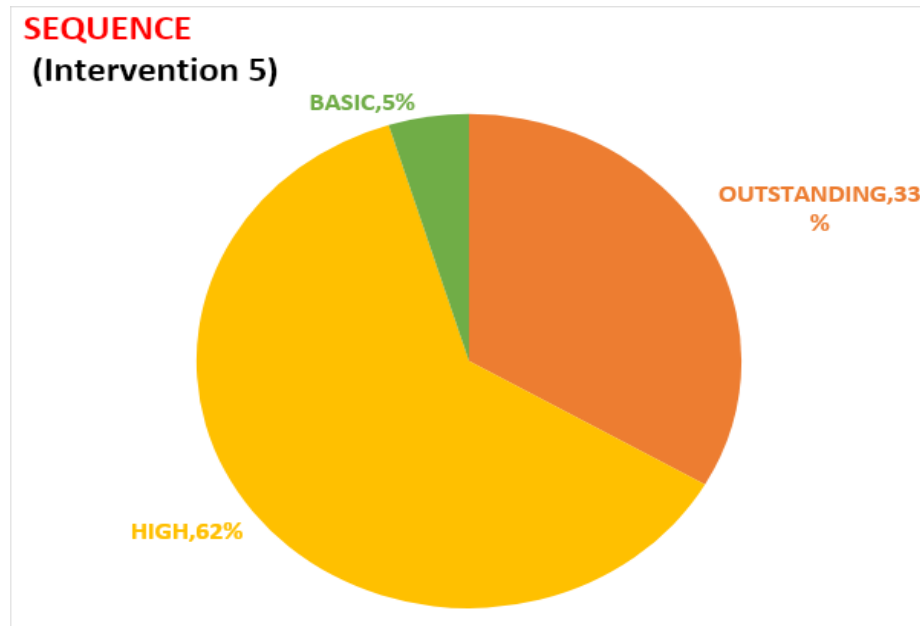
**Figure 17**

### *Sequence- Intervention 2*



**Figure 18**

*Sequence- Intervention 2*



The UPAC and the bar model strategies support the word problem solution in the following artifact sample B18. However, most notably, the UPAC is used as a reference to structure the writing sequence, as seen in the first lines of each paragraph. According to the data, it is worth mentioning that when this strategy was applied, students explicitly showed every step in the problem-solving situation as well as in the writing task logical organization, situation treated in detail further on.

Figure 19

Students' artifact (Bansho) No. 18

**IN THE PARK**  
 In the park Marco saw some plants and trees. If  $\frac{2}{12}$  of the park is covered by tall trees, and  $\frac{5}{12}$  is covered by smaller trees, what fraction of the park is covered by trees?

**SOLUTION**

$\frac{2}{12} + \frac{5}{12} = \frac{7}{12}$

UP  
P  
A  
C

Bar model 1:  $\frac{2}{12} + \frac{5}{12} = \frac{7}{12}$

Bar model 2:  $\frac{7}{12} - \frac{2}{12} = \frac{5}{12}$

Bar model 3:  $\frac{7}{12} - \frac{5}{12} = \frac{2}{12}$

**IMPORTANT!**  
 Explain your process and how you figure out to a second-grade student:

**First**  
 I understand the problem and make a map to say me in which step I can do the problem

**Then**  
 I plan how to solve the problem in here I plan a bar model to help me

**After**  
 I do an operation to answer the problem and to be in the checked the problem

**Last**  
 I do an operation to check the problem with the answer I have

**Useful Mathematics vocabulary:**  
 Whole, numerator, denominator, half, simplest form, add, subtract, plus, minus, equal, result, part, bar, multiply, divide.

**Useful expressions:**  
 We, first, next, then, last, with, because, so, but, after, when, also.

In the following excerpts, the participants confirmed the processes carried out even without the formal designation (cognitive processes) or conceptualization. They were also subject to a recall in explaining the development of the problem-solving tasks. The following were some of the answers obtained after the six hermeneutic cycles in the focus group stage, where some students were asked to answer questions regarding their experience:

**Teacher -Researcher:** What is Bansho?

**Sarita:** Martin, ehh is like a type of problem solving that you need to explain your

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

*process and you need to do like a UPAC, and do bar models, or adding, or fractions or subtracting, something like that and then you need to ehh, yes that...*

**[Excerpt from SSF01]**

***Teacher- researcher:*** *First, explain me how was, how did you do Bansho in pairs?*

***Sofi:*** *Ok ehh... when I did the first it was a little be difficult, and I remember that I read the problem and solved with bars, but Maca, my pair, do base-ten blocks.*

**[Excerpt from SSF01]**

(In the Planning part of the UPAC strategy, students use the Bar modeling Method<sup>5</sup> to detach the information and define the operation to carry out)

When students are aware and express the specific cognitive processes conducted, it can be noticed how those have been systematically treated and how they are part of an active and committed attitude to apply and practice their learnings as expected in the CLIL framework. The communication vehicle, in this case, is the writing production which is the focus skill of the study. Thus, it is also benefitted with the awareness of cognition processes.

There are a couple of fundamental elements to highlight about the cognitive processes carried out and, consequently, the UPAC strategy in the students' performance. The mainstreaming and strategic thinking pupils displayed when using it as an object of guidance for the written task requested in the Bansho. After being very familiar and progressively working with this strategy, it was evident that most of the students found it feasible to consider this sequence (UPAC) as a prompt to give a written account of how they solved the problem and organize their productions based on the steps they had at

---

<sup>5</sup> The bar model method is a distinctive feature of the Singapore Primary Mathematics Curriculum. It was an innovation in pedagogy that the Ministry of Education developed to address a nationwide problem in the 1980s to raise mathematical competencies and improve problem-solving abilities (Kho, Yeo & Liz, 2009). Since its introduction, it has played an essential role in Singapore's primary school mathematics curriculum.

Bansho Mathematics strategy as a means for enhancing writing skills in second graders

hand. Therefore, the following samples will show how they worked.

Figure 20

Students' artifact (Bansho) No. 14

**Important!**  
Explain your process and how you figure out to a classmate:

**First, Understand**

First we figure it out if where going to  $\times$ ,  $\div$ , or  $+$ .

In the jungle, I saw 35 elephants and 48 tigers. How many legs did I see. so now we know we have to  $\times$  and  $+$

**Next, Plan**

second we write the numbers and we start doing the progres that we have to do.

$$\begin{array}{r} 35 \quad 48 \quad + \\ \times 4 \quad \times 4 \quad \quad \end{array}$$

**Then, answer**

third start writing the answer.

$$\begin{array}{r} 35 \quad 48 \quad 140 \\ \times 4 \quad \times 4 \quad 140 \\ \hline 140 \quad 192 \quad 332 \end{array}$$

**Last, check**

fourth we check the answer.

$5 \times 4 = 20$	$8 \times 4 = 32$	140
$3 \times 4 = 12$	$4 \times 4 = 16$	+ 192
$12 + 2 = 14$	$16 + 3 = 19$	332

Figure 21

Students' artifact (Bansho) No. 2

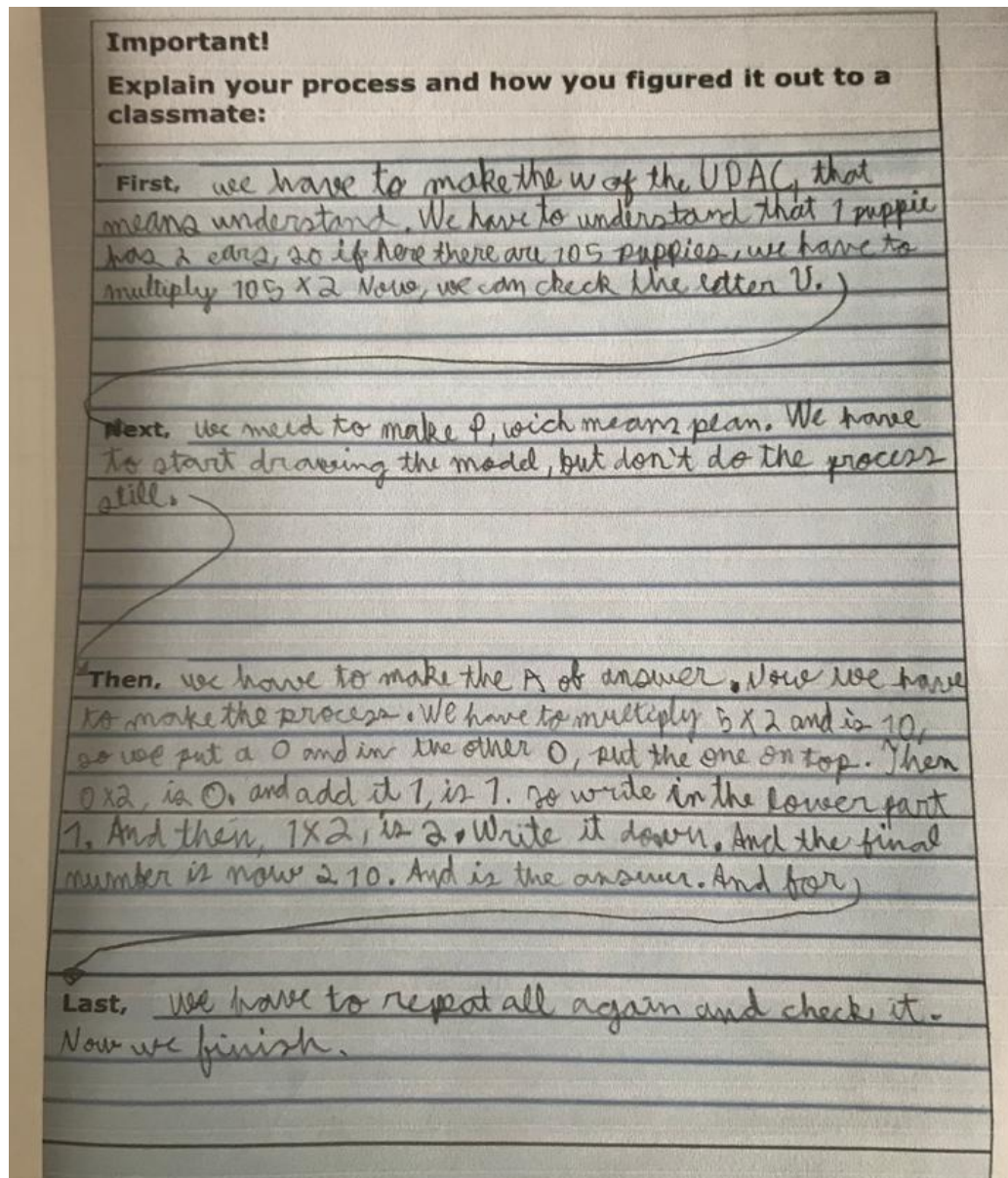


Figure 22

Students' artifact (Bansho) No. 19

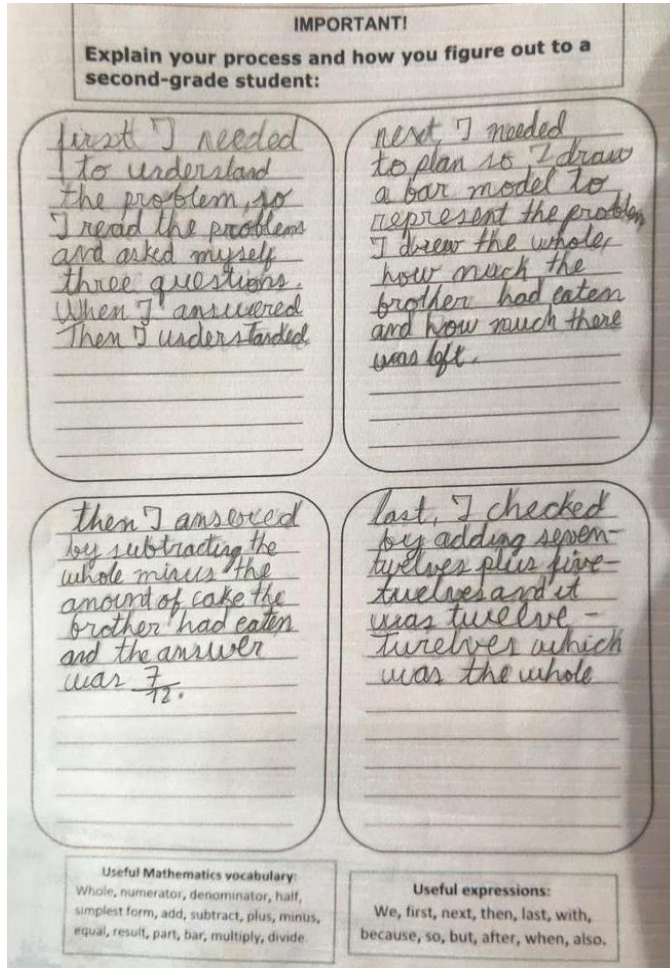
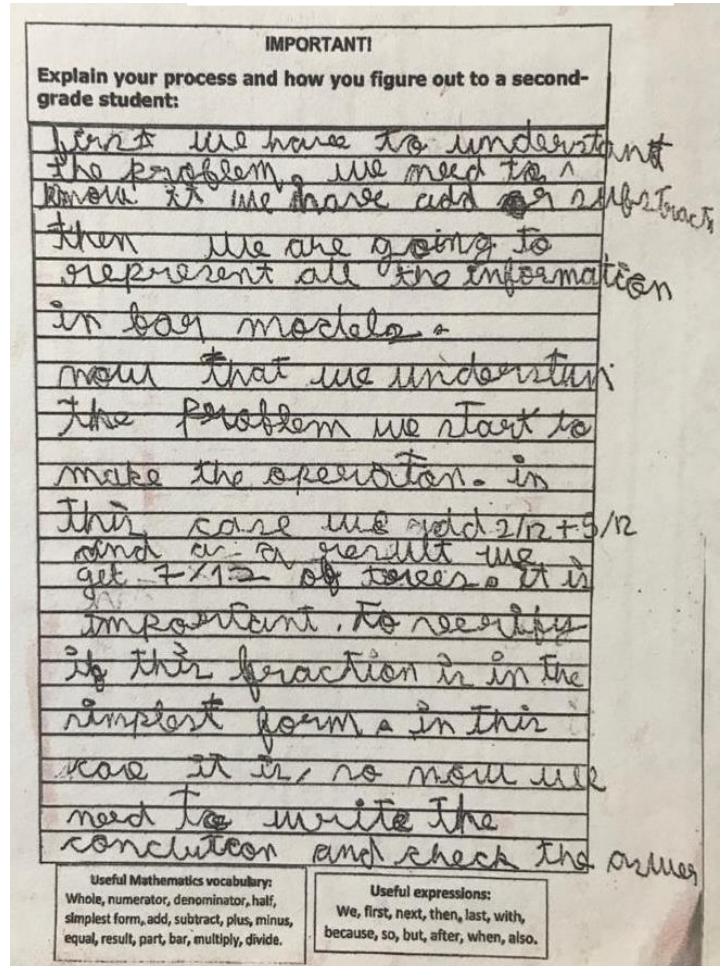


Figure 23

Students' artifact (Bansho) No. 5



According to these samples, it is clear how students' written headings in each paragraph preserve the UPAC strategy sequence carried out when solving the word problems.

Shortly, it was possible to determine that students showed evident cognitive process in the problem-solving requirements, which assisted them in developing the content and foreign language activities proposed for each intervention. Besides, how they used the UPAC strategy confirmed learners' confidence progression and EFL writing



## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

skills scaffolding.

### *Subcategory 1.2: Evidencing Metacognition Skills*

This subcategory describes the use of metacognitive skills as a part of students' repertoire to reach a more reflected level on how they proceed in solving the tasks requested under the Bansho framework. Thus, the adapted version of this strategy fulfills these features because apart from the mathematics solving-process demanded, and it also requires explaining in a written form such conducted process, allowing to evidence the road referred.

In this example, can be seen how during the interventions the students revealed some metacognition processes with their attitudes, inquires and decisions.

*Due to the number of teams that had to repeat the same problem, this group's metacognition processes were most noticeable. These metacognition processes were supremely evident in the dialogues and the reflections when explaining to each other when something was wrong and finding the mistakes without the teacher's help. With Pride in their expressions, some students approached the teacher to ask if they were okay this time, but according to the structure of the Bansho, the teacher was not the one who would determine it at this point; they must do it through self-monitoring exercise.*

**[November 5<sup>th</sup>, 2019, FN04]**

*Juan Martin and Elena, not having an explicit instruction on how they should approach the problem, referred to their math book and saw an example on the use of UPAC, and they shared this idea with two other of their classmates' teams..*

**[October 1<sup>st</sup>, 2019, FN02]**

In the following excerpts, the participants recognize the strategies they used or may use to cope with some of the problem-solving tasks they will face, such as bar model use or being aware of the exercises done to replicate the approach done. (Self-Instruction):

**Teacher -Researcher:** *Do you think that Bansho helps? Contributes in something?*

**Ss:** *yes*

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

**Teacher -Researcher:** *ok, one by one, let's start with Bartico, then Sarita, then Alejis.*

**Bartico:** *Yes, because you ...you understand more with bars, and you are.... is like your problem and you... ehh and you explain the others... ehh... like the UPAC and ...*

**Teacher -Researcher:** *Ok ..Thank you Bartico. Sarita.*

[Excerpt from SSF01]

**Teacher -Researcher:** *ahh ok. Somebody else wants to add something? María Alejandra.*

**María Alejandra:** *Ehh... that when we already do the ... like the work, we have it there, so if we have a problem of all that like with the same multiplications or the same problems, we have it there, so we... it would be more easier and we were more secure.*

[Excerpt from SSF02]

In the coming excerpts, students evaluated the proper use of specific strategies, tracked their general performance, and the accuracy in solutions, for example, by identifying the crucial aspects to solve a problem or the tools that make it easier to address. (Self-Monitoring):

**Teacher -Researcher:** *ok, I am going to repeat the question, do you think Bansho helps?... help you?*

**Juan Ma:** *Ehh ... yes*

**Adriana (science teacher):** *And how? how did it help you Juanmis?*

**Juan Ma:** *Because Bansho is like a... a form to ... and form to learn more fast with bars.*

[Excerpt from SSF01]

**Teacher -Researcher:** *Good, thank you, thank you. Would you like to have that more frequently? Matías or Sofi.*

**Matías:** *Hmm... Yes, cause sometimes the problem is like... you need to understand the data to do the, the problem.*

[Excerpt from SSF02]

Finally, there was evidence of the internal dialogue for analyzing problem information and regulating the execution of cognitive strategies, as asking themselves

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

what they have to do or how to solve the problem (Self- questioning), as can be seen in the following excerpts:

***Teacher -Researcher:** ok, thank you. Eeh very good, Ma...eh...Mariana Tascón which one you prefer...the explanation or the problem?*

***Mariana Tascón:** Emm... I prefer the explanation because... eeh...the explanation is like the problem, because when you do the problem, you think like...ehh... how are going you to do it, so...ehh... you are ehh...explicando to you.*

**[Excerpt from SSF02]**

***Maleja:** I also have one obstacle, that when I explained to other kids it's difficult to me to also understand what I do, What I do...it is difficult to me to understand it, to explain to other kids, so, I have some difficulties when you send me to explain... but we finished.*

**[Excerpt from SSF02]**

The artifacts outlined below are some samples of how writing provides means to observe crucial processes, establishing itself as a level of reflection that promotes students' attention to their thinking about mathematical processes.

Figure 25

Students' artifact (Bansho) No. 21

**PUPPIES**  
I see 105 puppies. How many ears do they have?

**SOLUTION**

One puppy has 2 ears and I have 105, so I have to multiply 105 by 2.

$$\begin{array}{r} 105 \\ \times 2 \\ \hline 210 \end{array}$$

The 105 puppies have 210 ears.

**Important!**  
Explain your process and how you figure out to a classmate:

**First,**  
I underline the important words.

**Next,**  
I don't analyze what if a dog has 2 ears and I have 105 I have to multiply 105 by 2.

**Then,**  
I multiply 105 by 2, it give me 210 and it was correct.

**Last,**  
I don't right that 105 have 2 to ears.

Figure 26

Students' artifact (Bansho) No. 1

**IMPORTANT!**

**Explain your process and how you figure out to a second-grade student:**

First i identified that the problem was counting that Marcos saw  $\frac{2}{12}$  of the park covered by tall trees and  $\frac{5}{12}$  of the park covered by smaller trees. The question was, what fraction of the park is covered by trees? what that i understood that it was a addition.

Then what the information that i had i start making the problem what was, it was simple because it had the denominator equal, so i make the bar divided in 12 parts equal.

After i put the part of  $\frac{2}{12}$  and  $\frac{5}{12}$  in the bar. I also make the addition and it was  $\frac{2}{12} + \frac{5}{12} = \frac{7}{12}$ . When i finish to make the addition i check the addition by doing a subtraction and it was  $\frac{7}{12} - \frac{2}{12} = \frac{5}{12}$ .

At last i make the conclusion remembering all the process that i make in the problem. What all the information that i gathered i make my conclusion and it was, There are  $\frac{7}{12}$  of the park covered by trees.

**Useful Mathematics vocabulary:**  
Whole, numerator, denominator, half, simplest form, add, subtract, plus, minus, equal, result, part, bar, multiply, divide.

**Useful expressions:**  
We, first, next, then, last, with, because, so, but, after, when, also.

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

The last artifact is highly representative because the participants described in a written way, the questioning process undertook to unveil the main information and establish the algorithm to be used. Moreover, the assessment students did regarding the problem difficulty and how it was manifested in the second paragraph is remarkable, in their words: *“Then with the information that I had I start making the problem with UPAC, it was simple because it had the denominator equal, so I make the bar divided in 12 parts equal”*. Finally, the writers metacognitively scooped, in the closure paragraph, the steps conducted to solve the problem.

Text composition, in contrast to mere ‘writing down’, requires that thoughts become activated in structured relations, and an adequate formulation of thought is found; in this, the task to compose a text resembles a complex and ill-defined problem (Heine, 2010, p. 42).

### ***Category 2: Cooperative learning fashions fostered through the Bansho activities***

This category describes how CL was developed during the pedagogical intervention and features the main elements that emerged in such a process. First, Negotiation and its incidence in knowledge building and writing tasks. And then, the group work dynamics unfolded under the adapted Bansho structure. The following subcategories will support the elements mentioned by taking examples from the instruments' pieces of evidence.

#### ***Subcategory 2.1 Negotiation***

This subcategory leads twofold: by one side, the negotiation to co-construct knowledge in the group work conducted and the other side the meaning negotiation to unveil the messages and descriptions of the EFL written productions.

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

In that respect, the following excerpts exemplified how Negotiation is latent among participants during CL, employing mainly explanations, clarifications, and consensus to fulfill the proposed tasks.

Working in groups allowed students to be more conscious of the processes that led them to complete the assignments. They could mention the main achievements and feelings, such as the reaching agreements sense or the excitement to work with friends. The examples below showed some students' perceptions when they were asked about their experience in cooperative work and the activities conducted.

**Teacher -Researcher:** *Very Good, Ok. How do you feel about solving problems with somebody else?*

**Maleja:** *Emm... I like it, I was fun because eh...we... ponernos de acuerdo.*

**Teacher -Researcher:** *Ok*

**Maleja:** *... I like to do work of the school...eh... in groups, in groups with my friends.*

**[Excerpt from SSF02]**

**Teacher -Researcher:** *Ok, eehh...Which one you prefer? The explanation or the problem? which one you prefer?*

**Anto:** *The two, is like the explanation because you explain to the others, because you know so much, and the problem...it, is because...is...is like...hmm...how can I say it?*

**Teacher researcher:** *Say it in the words that you want, don't worry*

**Anto:** *Hmm...like Emocionante to do it.*

**[Excerpt from SSF02]**

Building Knowledge through Negotiation also allowed participants to identify and recognize the different points of view and depict the strategies carried out to reach agreements. Likewise, recognizing the process' challenges and freely establishing opinions about specific moments, as shown in the following examples:

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

**Teacher -Researcher:** *Ok. How did you work by couples? Could you explain me how you did it? how were the roles*

**Mary Tascón:** *I was working with Mariana Granados, and it was good because... eh... first we...eh... have to make the problem...eh... and, first we talk and then we did the problem because...eh... sometimes the other one think other things, so it was like...we need to talk first and then do the problem, also for the explanation, but it was good because everybody explain their ideas.*

[Excerpt from SSF02]

**Teacher -Researcher:** *Vale, how do you feel about solving problems with somebody else?*

**Valentina:** *eehm...that...eh...look that it's good, but sometimes, eh... I don't know, one time with Vale Botero, it was...She didn't understand, I explained and not, I explained and not. Sometimes it's hard.*

[Excerpt from SSF02]

**Teacher-researcher:** *Ok, Catica?*

**Catica:** *We did like ... so many things.. ehh to like we were ...Perdida we were like*

**Teacher researcher:** *A little be lost*

**Catica:** *DIVISIONS, MULTIPLICATIONS, SUBTRACTIONS, ADITTIONS and nothing but the good thing do it in pairs is that you say an idea your pair can say you another idea or switch*

[Excerpt from SSF01]

The following events confirm how participants establish negotiation features to build

knowledge:

*It was very curious to note that many children already had a strategy, but their partners preferred another strategy. This negotiation and that dialogue that took place between them were very interesting because it was imposed that the child who had the strongest arguments - it should be noted was more straightforward this way - then co-worker would let himself be led down that path and normally this work was carried out by one of the two. From the 11 groups that were formed in this classroom it was evident that in seven (7) groups, there was a specific leader who was the one who led and marked the course of how the problem should be carried out. There was negotiation in the other five (5) groups, and everyone participated more equitably; this led to a little longer work.*

[October 2<sup>nd</sup>, 2019, FN02]



## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

*It was observed that a couple of students had difficulties in answering the questions (in one of the prompts). A classmate immediately assisted them. She explained by showing them the advances she was wearing on their Bansho and comparing it to her other partner's.*

**[October 17<sup>th</sup>, 2019, FN03]**

The context of the research activities emphasizes the communication through the written productions that described the process performed to solve a numeracy word problem; this situation leads to finding a scenario of Meaning Negotiation, scaffolding a type of biliteracy development under the support of CLIL.

The following evidences consider the elements mentioned above and exemplifies how Meaning Negotiation took part in CL and the crucial communication goal represented in the planned writing tasks. Thanks to the consciousness of delivering understandable messages from their written productions, participants developed a sense of clarity, focusing more on the explanation than the problem's answer. They also assessed this phenomenon by sharing the emerging sensations when thinking on the writing tasks:

***Teacher-researcher:*** *Ok my friends, so let's start...the first thing... ehh...What is the Bansho strategy? Raise your hand and I give you the opportunity to speak...What Bansho strategy is? Maleja.*

***Maleja:*** *To... ehh.. like do first our problem, we solve the problem, and then we explain for other persons to do it.*

***Teacher-researcher:*** *Ok, Thank you very much for your answer, Maleja. Matí What is the Bansho strategy for you?*

***Matí:*** *Bansho strategy for me is... one problem that you need to solve and explain very good.*

**[Excerpt from SSF02]**

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

**Teacher researcher:** *ok, ok, nice, nice. Mati what do you prefer? explanation or problem?*

**Mati:** *Problem, cause It...so... when you do the explanation...eh you think that you are to other, eh writing something to other kids and to other teachers and, and that is so much pressure, and sometimes you get nervous, and the words forgot, and I prefer the problem.*





[Excerpt from SSF02]

One way to obtain data in two hermeneutic cycles implied that a group of students assessed with a rubric under two criteria (the students' writing clarity and detailed explanation) the achievement of the goals. Peer feedback, in this case, allowed the teacher-researcher to see Negotiation for Meaning elements. It was an activity where students could enrich the feedback and the research by selecting the most accurate descriptor according to their impressions

The following graphs gather the information regarding peer feedback in intervention number five (5); compared with the first intervention, there are substantial improvements, especially in readability criteria.

**Figure 27**

*Co- evaluation Readability Rubric*

<b>X</b> Mark one option			
<b>Your classmate writing was...</b>			
Very clear	clear	hard to read	Incomprehensible
			





**Figure 28**

*Readability*



**Figure 29**

*Co- evaluation Explanation Rubric*

✓	<i>How clear was the explanation given by your partner regarding the problem solution?</i>			
	<i>Mark one option</i>			
	<b>VERY CLEAR</b>	<b>CLEAR</b>	<b>A BIT UNCLEAR</b>	<b>HARD TO UNDERSTAND</b>
				

**Figure 30**

*Explanation*



The following field notes entrances depicted part of the process of peer feedback conducted in the hermeneutic cycles one (1) and five (5). In these excerpts, pupils' empowerment, supporting ideas, and meaning negotiation unveiled the main achievements.

*The work was a little more motivating for the learners since being able to co-evaluate a pair generates a certain importance range. They were very rigorous in the evaluation using the rubric of emoticons with four levels, and according to the level where they locate their classmates, the analysis continued.*

**[September 17<sup>th</sup>, 2019, FN01]**

*The teacher directly asks these students why he gave "basic" or "high" assessment, so they clarify why he had given it according to their criteria. The most interesting part about this exercise was the negotiation of meaning that occurred when reading and*

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

*understanding the written productions. Most of what the children write there is perceptible to the teacher because, first, they know part of the letter styles and second, because they could anticipate the message, but it was not such a simple exercise for these children. However, several of them understood what their classmates wrote despite the obvious transfer, spelling, or linguistic construction errors, such as cohesion or coherence. In this first phase of the intervention, the negotiation of meaning was very high; this is a point that draws strong attention.*

**[September 17<sup>th</sup>, 2019, FN01]**

*The teacher explains to them that for this Bansho there were some specific adjustments, the most important, the written production that they are going to carry out. Other groups classmates will read it, and they will also evaluate them. Today, they must make a significant effort in writing, with more complete, more detailed, and, above all, more readable productions.*

**[December 4<sup>th</sup>, 2019, FN05]**

### *Subcategory 2.2 Writing in pair dynamics.*

This subcategory unveils two approaches: Cooperative Learning principles and social perspective of writing.

The excerpts below allowed it to see, on the one hand, the CL and social writing elements that intervened regarding the discussion on their language use and the contributions in the solution of their language-related problems and task completion. On the other hand, the challenges and possible difficulties in the group learning dynamics.

The joint writing activity and the need to agree on what to say and how to say it pushes students to talk about language, discuss their use of language, and collaborate in solving the related task. It can be seen in the following excerpts:

**Teacher-Researcher:** *Ok how were, how were the dynamics when doing the Bansho strategy in pairs? Explain me how did you do it? How was that? do you remember how did you do it? Ok Bartico, Bartico and then Ines and Samu.*

**Bartico:** *ehhh yo con Rocha eh hh eh hhh... like eh hh... uno de eh hh. Era como escribe*

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

esto, escribe esto y el otro le daba ideas

**Teacher-Researcher:** *Ok, interesting*

**Bartico:** Empezaba en la cabeza y cuando escribia le decíamos a Rocha que escribiera esto era y tal...esto y esto y esto.

[Excerpt from SSF01]

**Teacher-Researcher:** *Ok, Matías and then Mary, Mary Tascón*

**Mati:** *I was with...Peter I was...and When I was writing I thought that I was writing that he was agree or not agree and then he give me ideas, or I write and.*

**Teacher-Researcher:** *Ok. Mary Tascón*

**Mary Tascón:** *eh....it is good... ehm ...sometimes difficult because...ehh...we were...eh we were two persons, so the other think other thing so we were like... (Mimic of conversation) ehh but we use our strategy that was reading first and then make like a conclusion and then ehh...write ehh...what was good.*

[Excerpt from SSF02]

The emerging conditions support the strengthening of interdependence features.

More specifically, task interdependence, resource interdependence, and role

independence. It may contribute to the participants' feelings of ease or possible hardship

and acts as an encouragement to persevere when learning new strategies and

cooperatively constructing new ideas becomes challenging:

**Teacher-researcher:** *the questions is how do you feel about writing with somebody else?*

**Bartico:** *I want Martin*

**Teacher-researcher:** *ok, Sarita and then Bartico and then Sofi*

**Sarita:** *“Look, I think that writing with another person is... for me was easy because we want writes and the other kids and we rotate, the one that wants give the idea writes and the one that was writing gives the idea so, no nos confundimos because to write first la mano se nos puede enredar and second no sabemos las ideas del otro entonces podemos poner muchos temas diferentes”*

[Excerpt from SSF01]

**Teacher-researcher:** *the questions is how do you feel about writing with somebody*

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

*else?*

**Ines:** *it is not so easy,*

**Teacher-researcher:** *why*

**Ines:** *because we need to like repartir*

**Teacher-researcher:** *ah ok to divide the work*

**Ines:** *... a little be confused because we don't know that she or he writes*

**Teacher-researcher:** *Ok*

**Ines:** *but, I LIKE.*

**Teacher-researcher:** *thank you*

[Excerpt from SSF01]

**Teacher-researcher:** *Ok, now to finish the last question...How about writing with somebody else?*

**Anto:** *It was facil because... one say you the ideas and the other write.... (Writing in pairs)*

**Teacher- researcher:** *in order, in order please. Then, Matí.*

**Anto:** *One say you the things, and the other write, but you can like... divide the problem and one do one things and one do the other, and one write one part and the other write one part, so that was for me more...eh... facil.*

[Excerpt from SSF01]

**Teacher-Researcher:** *Ok. Valentina.*

**Valentina:** *ehh, in the part of writing, eh...I love writing but in the Bansho sometimes we want...we have ideas but then we in one Bansho we didn't have some much ideas for writing, so we were like... (bewilderment face)*

[Excerpt from SSF02]

Talking about positive interdependence, in Azzoui (2016) words, "Students in cooperative learning must perceive that they "sink or swim together" that is, feel that they need each other in order to complete the group's task." (p. 62)

**Teacher-researcher:** *how do you feel about solving a problem with another person, how do you feel about that? You know Because... you got an idea and the other person has another idea, so how do you feel?*

**Anto:** *More funny and...is like dos personas in one person, so...one do one and one things, and the other do the other things, but is like this...is like one person in two persons.*

**[Excerpt from SSF02]**

***Teacher-Researcher:** Ok thank you, thank you try to... ok Catica, and then Sofi... sorry Samu, Samu first, explain me how was, how did you do Bansho in pairs?, I remember that you were very good and you finish so fast*

***Samu:** The Banshos in pairs are easy and helpful because when you give ideas to your part... friend it ...it helps us to finish the work very quick.*

**[Excerpt from SSF01]**

The below field notes entrances display the dynamics and interaction evidence during some pedagogical interventions:

*In these three groups, I noticed that there are two types of handwriting because a child was writing while his classmate was dictating to him. However, the most interesting thing was that in the groups of Catalina with Inés, Verónica with Sofía, and Tomás with Simón, everything was built between the two of them. They discussed everything beforehand and wrote it down afterward.*

**[October 2<sup>nd</sup>, 2019, FN02]**

*I am also observing that the first differences emerged between a student and his classmate regarding the space and what they could do; they are trying to reach a consensus to divide their work. It means that someone does the representation of her and then the other pupil does the other one respectively, and thus they take better advantage of the time. While one of the children is doing the representation, the other stops, walks around, watches what others are doing, and returns to his workplace.*

**[October 2<sup>nd</sup>, 2019, FN02]**

*Martin's group continues having some specific situations because they cannot agree on how the activity should be carried out. Due to this, Martin approaches the teacher to request a change of group. However, the teacher-researcher tells him that the objective is that all those differences that he may have with his classmate should be solved through dialogue, so it is important to find an agreement point between the two.*

**[October 2<sup>nd</sup>, 2019, FN02]**

*As with the group of the second C, they begin to wonder and help each other, but the dynamism, intention, and enthusiasm for these activities in this group are much more*



## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

*noticeable and evident. In many cases, they achieve adequate specific interactions regarding metacognition and the need to find and point out some classmates' errors. However, they do it in an increased diplomatic and less blunt way, the dialogue has been much more open, and it is the most evident when the teacher makes the tour and the review.*

**[December 4th, 2019, FN05]**

### ***Category 3. Students' EFL writing performance according to the tasks demanded in the framework of Bansho activities***

The adapted Bansho strategy provided opportunities to work on the EFL writing skills due to its character of explanation registering tool of the process conducted when solving numeracy word problems. So, for this study's purposes, the writing task asked looked for a detailed description of how problems were addressed and solved. This writing task aimed to develop learners' EFL writing skills under mathematics classes context. Participants cooperatively had to use their knowledge of the mathematical problem-solving process and communicate their work in a written way.

This category renders account of the performance and results of the participants (second graders) concerning the scenario proposed. Two subcategories emerged to give some ideas about the elements that came into play when doing the respective analysis; one related to the assessment derived from the rubrics and the criteria and the other as evidence of progress and improvement perceptions.

#### ***Subcategory 3.1 Performance assessment according to the established criteria***

This subcategory emerged from the data provided by rubrics and the results learners obtained while carrying out the intervention. Also, some utterances in the field entrances served as a complement to give more strength to this subcategory.

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

It is crucial to underline that to evaluate EFL writing, paramount aspects such as the level of the learners, the type of task, and the evaluation's focus must be considered. Each teacher has a different set of criteria for what he qualifies as good writing versus low writing (Lumley, 2006).

Thanks to the contributions from the thesis advisor, it was possible to determine the need to implement rubrics to focus the written productions on specific essentials regarding the performance in this skill. Rubrics document the scales and criteria of what is being assessed and represent the assessment construction of whoever created or implemented them. Rubrics show the essential assessment criteria, and their simplicity or complexity can illustrate the goal of what is being sought (Jeong, 2015).

*The intervention ends, and everyone manages to finish the proposed tasks (problem resolution and written production). This time the role played by the four questions that were used to facilitate the writing process did not impact so much concerning the idea of increasing writing. Nevertheless, other aspects of the rubric will be addressed in terms of what is written as linking elements and organization. Other aspects evaluated were related to the content as the level answers relevance and the use of the mathematical vocabulary worked on throughout the term.*

**[November 5th, 2019, FN04]**

*We end this session with the complete Bansho and the learners that managed to carry out the two proposed tasks in the estimated time. The first is problem-solving, and the second is to describe in detail the process carried reflecting on the process carried out for the problem resolution.*

**[December 4th, 2019, FN05]**

### *Subcategory 3.2: Steady growth*

This subcategory contains the artifacts samples and perceptions that both the teacher- researcher and the participants had on the group learning productions they submitted. The hermeneutic cycles represent a process of adjustments looking to establish the writing skills improvement through the proposed tool.

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

This subcategory relies on the continuum improving seen in the artifact and highlights participants' engagement towards the Bansho. Students developed strategic plans to reach their writing goals in the last hermeneutic cycles supported in selecting the problem and the template to do the writing.

The instruments that provided these findings were the focus groups, the artifacts (Banshos), and the field notes. This set of examples shows the perception of progress the participants claimed to have in the problem-solving process and express their perception about the benefits of the Bansho:

***Teacher-researcher:** Ok, thank you. Anto, would you like to do this strategy more frequently, or not?*

***Anto:** Yes, because it's funny and... is like you can demonstrate that you can, that you don't have like...you can, that you have...that you... know that topic and that things... and that is.*

**[Excerpt from SSF02]**

***Teacher-Researcher:** Do you think that Bansho helps? contributes in something?*

***Ss:** yes*

***Teacher-Researcher::** ok, one by one, let's start with Bartico, then Sarita, then Alejis*

***Bartico:** Yes, because you ...you understand more with bars, and you are .... is like your problem and you... ehh and you explain the others ehh like the upac and ...*

***Alejis:** Yes, because... ehh, it helps you and help the other to, is like a practice and advanced and advanced one to practice.*

**[Excerpt from SSF01]**

***Teacher-Researcher:** Ok, thank you, that happens in your personal case. Other cases, do you think that Bansho strategy is useful? Ehh... Vale, give me a minute... tell me Vale.*

***Vale:** ehh... that yes, that yes... because it helped us to understand more the mathematics, so then we can pass to another level and learning more.*

***Teacher-Researcher:** ahh ok, somebody else wants to add something? Maleja.*

***Maleja:** Ehh... that when we already do the ... like the work, we have it there, so if we have a problem of all that like with the same multiplication or the same problem, we have it*

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

*there, so we... it would be more easier and we were more secure.*

### **[Excerpt from SSF02]**

During this implementation, students realized they experienced a process in which the tool used to work on the problem-solving (the Bansho) became easier after each intervention. Therefore, in the end, they obtained better outcomes, as manifested in the following excerpts:

**Teacher- Researcher:** *Ok Juan Ma*

**Juan Ma:** *Ehh is like at the beginning I do not understand nothing of Bansho, nothing*

**Teacher-Researcher:** *And now?*

**Juan Ma:** *And now, I understand ... is like como se... este Bansho fuera mas fácil que el otro*

### **[Excerpt from SSF02]**

**Teacher-researcher:** *OK... I need you tell me it was; it was easy or difficult to carry out a Bansho? Was easy or difficult? Tell me*

**Samu:** *Easy, easy*

**Ss:** *What is carry out?*

**Teacher-Researcher:** *Carry out is to perform something, to do it, yeah, Sofi, Sofi?*

**Sofi:** *the first Bansho in the school ehh..so, so, the second one more easy*

**Teacher-Researcher:** *easy, ok... Catherine what do you think? and then Juan Ma, and then Juan ma.*

**Catherine:** *The first Bansho eh I was like stress but then I, I sentirme mejor.*

### **[Excerpt from SSF01]**

The following field notes excerpts describe the evident progress results in the last interventions.

*Throughout the interventions, the students experienced gradual and continuous progress. This is surely more evident in section 4 since there were not many changes between intervention 2 and 3, but from 3 to 4 the first advances were already noticed. Students still definitely need to practice more in future classes to consolidate these achievements in CLIL, especially their oral interaction. However, as a research teacher, I believe that it is normal and is part of the gradual learning process that children have.*

**[February 11<sup>th</sup>, 2020, FN06]**

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

*During the development of activities, the strengthening of group work and the commitment to quality products were noted. From the ten teams in this group, five groups write very well and take great care about their calligraphy and legibility. It is undoubtedly due to the initial reflections where it was unlikely to understand much of what they wrote. Everyone finished the activity with 10 minutes to spare some texts look longer, very long compared to the first writings, quite a lot of texts with a lot of content; this is welcome if we only focus on quantity.*

**[February 11<sup>th</sup>, 2020, FN06]**

*In the teams, the work was excellent compared to the prior hermeneutical cycles; the children were supremely connected, and the instruction that some of their classmates were going to read influenced their spirit. They began to write using technical vocabulary, and the volume of words in the production in all the groups increases.*

**[December 4<sup>th</sup>, 2019, FN05]**

The following artifacts samples show the steady growth that most participants experience through the interventions using the mathematics strategy Bansho.

Bansho Mathematics strategy as a means for enhancing writing skills in second graders

Figure 33

Students' artifact (Bansho) No. 10

Explain your process

We use addition to find the answer and we added to the total.

Explain your process

We use base ten blocks to represent the thousands, hundreds, tens and ones.

Criteria	Outstanding	High	Basic	Low
Logical organization of ideas				
Linking elements				

WHAT DO I NEED TO FIND OUT?      WHAT DO I NEED TO DO?

the answer of the problem and how to solve it.

the sum subtraction with the answer.

HOW I SOLVE IT?      MY ANSWER AND HOW I KNOW IT IS RIGHT

reading the problem and adding the Answer

check and observe

Figure 34

Students' artifact (Bansho) No. 10

**Important!**  
 Explain your process and how you figured it out to a classmate:

**First,** I read the problem and I read to understand how many dogs there were and how I gain to do the operation.

**Next,** I think if it was division or multiplication and then I know multiplication then I start to do it.

**Then,** I think what can be the possible answers and then I start to write the answers.

**Last,** I do the operation again to see if it is correct and then I finish.

**IMPORTANT!**  
 Explain your process and how you figure out to a second-grade student:

First I identified that the problem was counting that Marco saw  $\frac{2}{12}$  of the park covered by tall trees and  $\frac{5}{12}$  of the park covered by smaller trees. The question was, what fraction of the park is covered by trees? what that I understood that it was a addition.

Then what the information that I had I start making the problem what up, it was simple because it had the denominator equal, so I make the bar divided in 12 parts equal.

After I put the part of  $\frac{2}{12}$  and  $\frac{5}{12}$  in the bar I also make the addition and it was  $\frac{2}{12} + \frac{5}{12} = \frac{7}{12}$ . When I finish to make the addition I check the addition by doing a subtraction and it was  $\frac{7}{12} - \frac{2}{12} = \frac{5}{12}$ .

At last I make the conclusion remembering all the process that I make in the problem. What all the information that I gathered I made my conclusion and it was, There are  $\frac{7}{12}$  of the park covered by trees.

**Useful Mathematics vocabulary:**  
 Whole, numerator, denominator, half, simplest form, add, subtract, plus, minus, equal, result, part, bar, multiply, divide.

**Useful expressions:**  
 We, first, next, then, last, with, because, so, but, after, when, also.

(In the document of the annexes, there are more evidence artifacts concerning the subcategories developed in this chapter).

***Discussion***

***Category 1: Prominent Bansho elements that intervened in the mathematics CLIL classes***

As developed in the theoretical framework, Bansho is an appealing instructional strategy for mathematical communication and collective problem-solving (Literacy and Numeracy Secretariat, 2010). Kubota (2011) has interpreted and adapted the Japanese Bansho approach to complement the Ontario curriculum's emphasis on teaching and learning Mathematics through problem-solving situations and support the collaborative approaches to knowledge building in the classroom. To the effect of this research, this adapted view of Bansho suits the basis of the pedagogical intervention conducted.

Moreover, she remarks that the Bansho is:

- A mathematics instructional strategy that makes explicit students' Mathematical thinking and provokes students' collective knowledge production through ideally articulated discussions, organization, and mathematical annotation of students' solutions to a problem.
- An assessment for or learning strategy which enables the teacher and students to discern the range and relationships between Mathematical ideas, strategies, and representation models.
- A classroom artifact that is constructed collectively by the teacher and students in order to display the Mathematical relationships derived from students' solutions; it can be organized and used as a Mathematics learning landscape or as a mathematics anchor chart.
- A job-embedded professional learning strategy that develops the teacher's knowledge of mathematics for teaching through the anticipation and construction of a Bansho that depicts the breadth, depth, and complexity of mathematics elicited throughout



## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

a three-part problem-solving lesson.

In that respect, in the context of learner-centered pedagogies, making students more aware of how they learn and how they can learn more efficiently is one of the fundamental tenets of the CLIL methodology (Zarobe & Zenotzb, 2015). Thus, the present research aims to analyze the effect of a mathematics instructional strategy within the CLIL classroom, using the content subject materials and through the foreign language (English) as a medium. In a CLIL classroom, apart from promoting linguistic competence, students learn subjects through the vehicular language; If it is cognitively supported, students can achieve a greater sense of authenticity and independence (Coyle et al., 2010).

### *Subcategory 1.1: Cognitive Processes in CLIL Classes*

An increasing number of studies indicate that CLIL facilitates and influences cognitive development, resulting in better outcomes in mathematics performances (Peña, 2016; Van de Craen et al., 2007; Surmont et al., 2016). Moreover, it can have an impact on conceptualization. Thinking about something in different languages can enrich our understanding of concepts and help broaden our conceptual mapping resources (Marsh & Lange, 2000).

In the pedagogical interventions, it was noticeable that CLIL classes boost students' involvement in activities that allow them to scaffold new understandings. They usually evidenced their cognitive processes and practiced what they learned simultaneously. CLIL provides a desirable learning environment where learners can get a chance to use their cognitive skills and to construct their knowledge (Hanesova, 2014). So, CLIL classrooms should bring practices in support of student-centered classes to have

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

an active and committed attitude towards acquiring knowledge and skills through a process of inquiry and by using complex cognitive processes and means for problem-solving (Marsh et al., 2015). The above elements allow the activation of a wide range of cognitive and metacognitive processes through CLIL.

First, it should be noted that cognitive processes in this study are understood as internal mental processes hardly observable but susceptible to analysis through specific pieces of evidence. Smith & Kelly (2015) affirm: "Cognitive processes are internal mental processes that are engaged after a stimulus in the environment is encountered and before an overt behavioral response can be observed."(p1). In the same vein, Cognitive processes may be described as online mental activities that are proactive in nature (the "to do" strategies) (Montague, Krawec, Enders, Dietz 2014).

To better understand their role in this study, it is necessary to know more about their background. Thus, cognitive processes for mathematical problem solving are procedural methods or tools that help individuals plan and solve a problem. Possible cognitive strategies and processes can include finding the algorithm, estimating the problem, or drawing a diagram (Montague & Bos, 1990).

Likewise, Montague (2002) describes cognitive processes in some stages: comprehending linguistic and numerical information in the problem, translating and transforming that information into mathematical notations, algorithms, and equations, observing relationships among the elements of the problem, formulating a plan to solve it, predicting the outcome, regulating the solution path as it is executed, and detecting and correcting errors during problem solution.

Furthermore, Montague (2003) developed an intervention program to improve

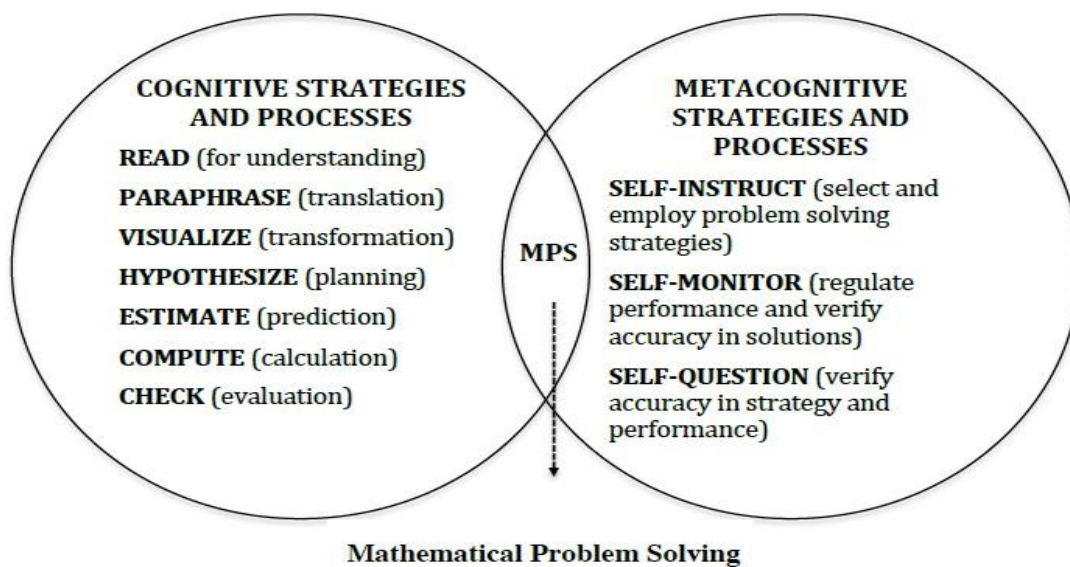
## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

students' word-problem solving skills in middle school. The "Solve it" program incorporates a cognitive and metacognitive theoretical framework that matches most of the UPAC strategy elements (see Figure 35) for the diagram of the cognitive-metacognitive model of mathematical problem solving).

Therefore, this schema supported a substantial part of the analysis regarding this subcategory and related the elements considered to channel the samples.

### Figure 35

*Diagram of the cognitive-metacognitive model of mathematical problem solving (Montague, 2003)*



Under these CLIL interventions, participants -as seen in the findings- had opportunities to articulate their learning with the linguistic task demanded. In the CLIL Language Triptych, a paramount perspective remarks that language is linked to cognitive processing: language through learning. Language through learning deals with the idea that students in the necessity of communicating, orally or written when applied content

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

have a cognitive demand that requires students to call upon their existing knowledge, concepts, skills, and strategies, thereby increasing their learning and retention, (Coyle et al., 2010).

### *Subcategory 1.2: Evidencing Metacognition Skills*

In this connection, the aspects of materials and task design in CLIL points out that the choice of a method carefully structured and materials that enable the scaffolding to move towards more advanced tasks, by doing a metacognitive revision of their processes, promotes the achievement of higher-level thinking in learners, (Coyle et al., 2010).

Therefore, CLIL boosts metacognitive skills since it urges teachers to devise and implement tools to develop an awareness of the process needed to address a task. Likewise, due to its condition of student-centered approach, it invites students to monitor their learning. In student-centered learning activities, for students to actively participate in their progress, they must develop self-monitoring and other metacognitive skills which are not necessarily inherent in every individual (Hannafin & Hill, 1997).

A significant number of definitions of metacognition refer to Flavell (1976), who introduced the term. He defined metacognition as "one's knowledge concerning one's own cognitive processes and products, or anything related to them." (p. 232). He also referred to it as the "active monitoring and consequent regulation and orchestration of these processes in relation to the cognitive objects or data on which they bear, usually in the service of some concrete goal or objective" (Flavell, 1976, pág. 232). Later, Brown et al., (1983) defined metacognition regarding metacognitive knowledge and metacognitive strategies. They compared the latter with metacognitive skills, denoting people's abilities and strategies to regulate cognitive processes.

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

That regulation, according to Wilson & Clarke (2004), takes place when individuals draw knowledge about the self, possessed strategies, and executive skills such as planning, self- correcting, and setting goals. For instance, a student might plan the possible way to solve a given problem before tackling any particular cognitive action (drawing the situation, using bar models, making a chart).

In the present study, the aforementioned metacognitive skills approach meets specific demands of this subcategory analysis development, specifically in the focus groups answers. It occurs thanks to the connection and logical sequence concerning the last subcategory (Cognitive Processes in Numeracy problem-solving). Likewise, a coherent model that encompasses cognitive processes and metacognitive skills would make approachable the sense of these findings. So, at this point, it is necessary to highlight and return precisely to the diagram of the cognitive and metacognitive model of problem-solving proposed by (Montague, 2003) presented in figure 35.

In that concern, the main elements in the **metacognitive strategies and processes** diagram part evidence a structure that might explain how the problem-solving process works. Other authors distinguished similar purposes structures; Tan & Limjap (2018) identified similar metacognitive skills regarding this matter: self-instruction, self-questioning, self- monitoring, and self-evaluating. Garofalo and Lester, as cited by Pugalee (2001), categorized a cognitive metacognitive framework consisting of four phases of activities or behaviors involved in performing a mathematical task: orientation, organization, execution, and verification. Each category is linked to a particular metacognitive behavior related to problem-solving.

Thereby, there is a likeness in the approaches, descriptions, and features to make

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

these metacognitive issues more visible. Congruently, the primary basis provided by (Montague, 2003) diagram guided this side of the analysis.

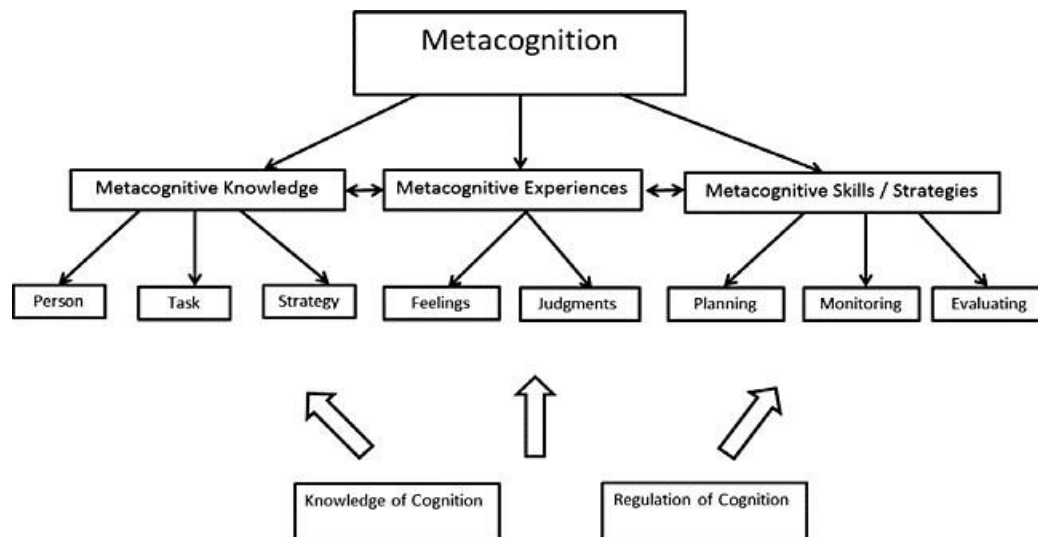
Now, it is crucial to go towards the evident metacognition elements when explaining, in a written way, the processes conducted in the problem-solving situations. To this end, it is essential to go over some approaches that define metacognition considering this objective and perspective. For example, Lee & Mak (2018) defined metacognition in terms of metacognitive knowledge, metacognitive experiences, and metacognitive strategies. They proposed a diagram (see figure 36) which the metacognitive skills are closely related to the planning, monitoring, and evaluating elements treated previously.

Likewise, the control of cognition or metacognition involves various decisions and strategies, including such identifiable behaviors as predicting, planning, revising, selecting, checking, guessing, and classifying (Allen, 1991). In that concern, Pugalee (2001) notes that between the techniques that enhance metacognition, writing seems to be a supportive means for providing the types of experiences necessary to promote the development of those considered metacognitive behaviors.

The principles and standards for school Mathematics Joyner & Reys (2000) remarks, “writing in mathematics can also help students consolidate their thinking because it requires them to reflect on their work and clarify their thoughts about the ideas” (p. 61).

**Figure 36**

*Lee and Mark Elements of metacognition. 2018*



***Category 2: Cooperative learning fashions fostered through the Bansho activities***

As developed throughout this thesis, the Bansho strategy is a problem-solving source that enables individuals to construct, revise, and combine ideas through interaction with their peers and teachers. The participants' ages allow seeing these features more concretely. They learn by talking about what they are thinking and doing and sharing their ideas (Joyner & Reys, 2000).

Cooperative problem-solving benefits school-age children's learning about problems and problem-solving strategies. Cooperation also allows school-age children to solve challenging and complicated tasks in more formal settings (Ramani , 2002, pág. 5). Therefore, the results obtained from this study are consistent with the findings in the related literature.

This category evidenced how CL was developed during the pedagogical intervention and features the main elements that emerged in such a process. As

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

mentioned before, by means of negotiation and its incidence in knowledge building and writing tasks. And then, the group work dynamics unfolded under the adapted Bansho structure.

### *Subcategory 2.1 Negotiation*

This subcategory leads two possibilities in the present study, by one side, the negotiation to co-construct knowledge in the group work conducted and the other side the meaning negotiation to unveil the messages and descriptions of the EFL written productions.

Regarding the first slope, the link and the primary role of interaction are evident with the concern of building knowledge by discussing, conflicting, arguing, and cooperating. Negotiating what counts as shared knowledge is an essential element of cooperative knowledge work and collaborative learning (Stahl, 2003).

Negotiation to steer conjectures or solutions in mathematics problem-solving scenarios, precisely the adapted Bansho strategy scenarios, allow environments of knowledge scaffolding and student-centered classrooms. According to Stahl (2003) knowledge is co-constructed by interactions among people and their shared artifacts, including relevant negotiation practices that establish common ground for understanding.

The second slope, Meaning Negotiation, urges to highlight its linguistic character and role in foreign language learning. Agreements to understand and decode messages lay the foundations to approach its definitions. Thus, Negotiation for Meaning is when speaking or writing calls upon sending or interpreting messages correctly.

Gee (2012) argues that meaning is not fixed in mind like any other concept; it is



## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

primarily the result of social interaction, negotiations, contestations, and agreements. It is inherently variable and social. According to Doughty (2000), in foreign language learning, Negotiation has referred primarily to the Negotiation of meaning, a process of incidental acquisition in a contextualized speech level during communication tasks.

Similarly, Gee (2007) gives an idea of the core of the issue:

Literacy events are any event involving print, such as group negotiation of meaning in written texts (e.g., an ad), individuals “looking things up” in reference books, writing family records in the Bible, and dozens of other types of occasions when books or other written materials are integral to interpretation in an interaction (p. 85).

The date gathering purposes implied that a group of students assessed the productions of their classmates with a rubric under two criteria (the students' writing clarity and detailed explanation) the achievement of the goals. Peer feedback allows students to experience different knowledge through reading each other assignments and help students work with different types of errors. Yu & Lee (2016) suggest that peer feedback contributes to students' abilities in skill improvement, language acquisition, self- monitoring, and confidence-building.

### *Subcategory 2.2 Writing in pair dynamics*

This subcategory unveils two approaches: Cooperative Learning principles and social perspective of writing.

When discussing Cooperative Learning (CL) contexts, understanding its fundamental elements, including positive interdependence, is essential. Johnson et al., (1998) explain positive interdependence regarding the importance of feeling that every team member is as important as the team itself. To consolidate this idea, it should be an

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

assigning of mutual goals (goal interdependence); dividing labor (task interdependence); dividing materials or resources among group members (resource interdependence); assigning students' roles (role independence) and giving joint rewards (reward interdependence). Likewise, Dillenbourg (1999) explained that cooperation involves learners dividing the task individually by solving sub-tasks and assembling the parts into the final product.

In this connection, Cooperative Writing (CW) refers to students working collaboratively in teams on written assignments or projects (Camargo & Camacho, 2018). In addition, CW is also seen as a social stage in which interaction and negotiation of meaning are focused on a group of writers working on a document to target specific goals (Cassany, 2001; Landone, 2004; Van Waes, 2004).

Therefore, according to them, students should write in a safe, supportive environment where they help each other and point out their strengths. Furthermore, the most effective and engaging method of helping students to generate ideas for writing assignments is to have them discuss the topics in pairs, small groups, or as a whole class (Clark, 2003).

A perspective change should be done when seeing the possibility of writing as a collective process. A social perspective of writing may enhance processes of dialogical construction and co-regulation. Hence, co-regulation activity extends beyond face-to-face interaction processes and mediates individual writing regulation activity that students engage in without the physical presence of another person in the (McCaslin & Hickey, 2001; Pressley, 1995).

Dynamics through the pedagogical intervention and participants' insights

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

evidenced co- regulation. The regulation activity of writing is mediated by the dialogue that the writer has with other voices in an inter psychological space or plane and by internalized cultural aids and tools, which allow the writer to make strategic decisions (Castelló, 2007; Flower, 1994; Monereo, 2007; Pressley, 1995).

To put it simply, cooperative learning and its approaches towards writing can work together with the social perspective of writing to achieve common goals in writing a text. Both promote interdependence, co-regulation, self-confidence, low anxiety levels, and high opportunities for finding better skills to support teamwork.

### ***Category 3. Students' EFL writing performance according to the tasks demanded in the framework of Bansho activities***

In general, the processes involved in text composition are modeled as problem-solving activities and integrate both linguistic and content-focused processes, albeit to varying degrees. Thus, although they are related to a specific linguistic activity, the writing models clearly show that in the composition of the text, there is an interaction between activities focused on content and those focused on language (Heine, 2010).

#### ***Subcategory 3.1 Subcategory 3.1 Performance assessment according to the established criteria***

As mentioned in the literature review, the writing activities in mathematics boost mathematical thinking organization and enable the transmission of thoughts mediated by language (Sierpiska, 1998).

Accordingly, Learners must be instructed and practice writing, as writing skills cannot be acquired naturally (Emig, 1997; Raimes, 1983). Teachers must include various activities in their teaching materials that enable learners to practice writing effectively (Abd El Motaal, 2001). So, the adapted Bansho is a response to that requirement.

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

These graphs gather the information of the written performance based on two (2) criteria: Logical organization of ideas and General Vocabulary in three different pedagogical interventions.

When contrasting cycle six and cycle three graphs of the logical organization of ideas, growth in the high and superior criteria is observed, going from having 43% in these margins to 77%. It reflects that the processes and adjustments of the six interventions affected students' EFL writing coherence processes and therefore contributed to answering the research question. It also provides clear elements to document the performance in EFL writing skills under the framework of Bansho activities.

A similar phenomenon occurred with the graphs of general vocabulary. When contrasting cycle four and cycle six graphs, growth in the high and superior criteria is observed, having 43% in these margins and moving to 77%. It could be the closing milestone of this intervention. The results establish a closing milestone for the intervention and clear the path to answer the research questions.

**Table 11**

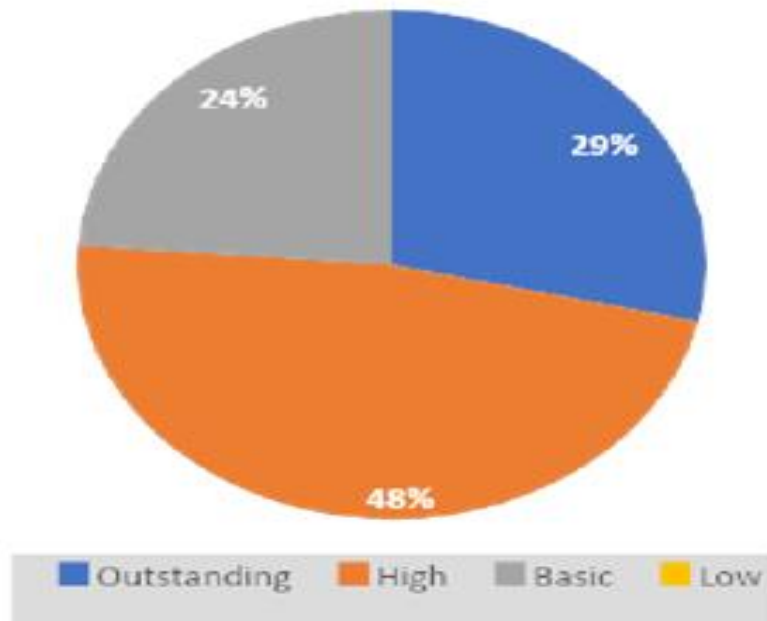
### *Logical Organization of Ideas Rubric*

<b>Criteria</b>	<b>Outstanding</b>	<b>High</b>	<b>Basic</b>	<b>Low</b>
Logical organization of ideas	The text evidences clear ideas. These follow one another logically.	There is an attempt to write clear ideas; some of these follow one another logically.	Some ideas can be extracted from the text. However, some of these do not follow one another logically.	It is not easy to find clear ideas. Furthermore, there is a lack of connection between these ideas.

**Figure 37**

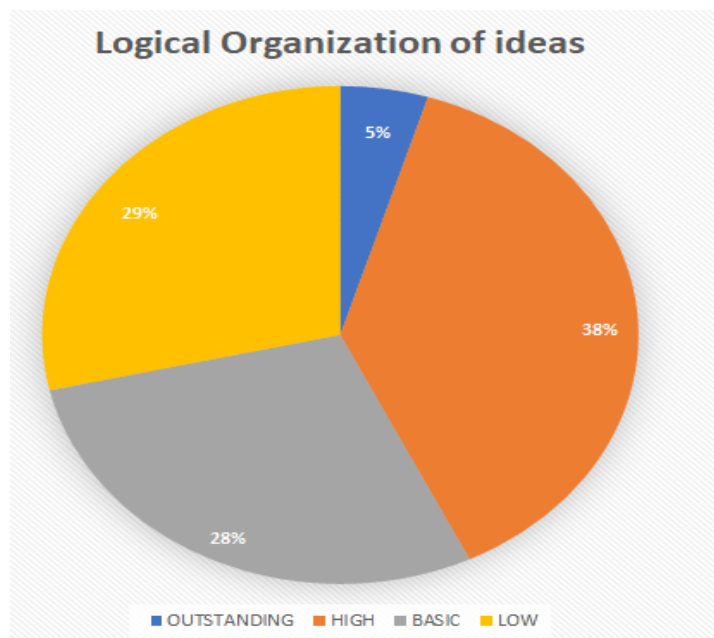
*Logical Organization of Ideas Cycle 3*

### Logical organization of ideas



**Figure 38**

*Logical Organization of Ideas Cycle 6*



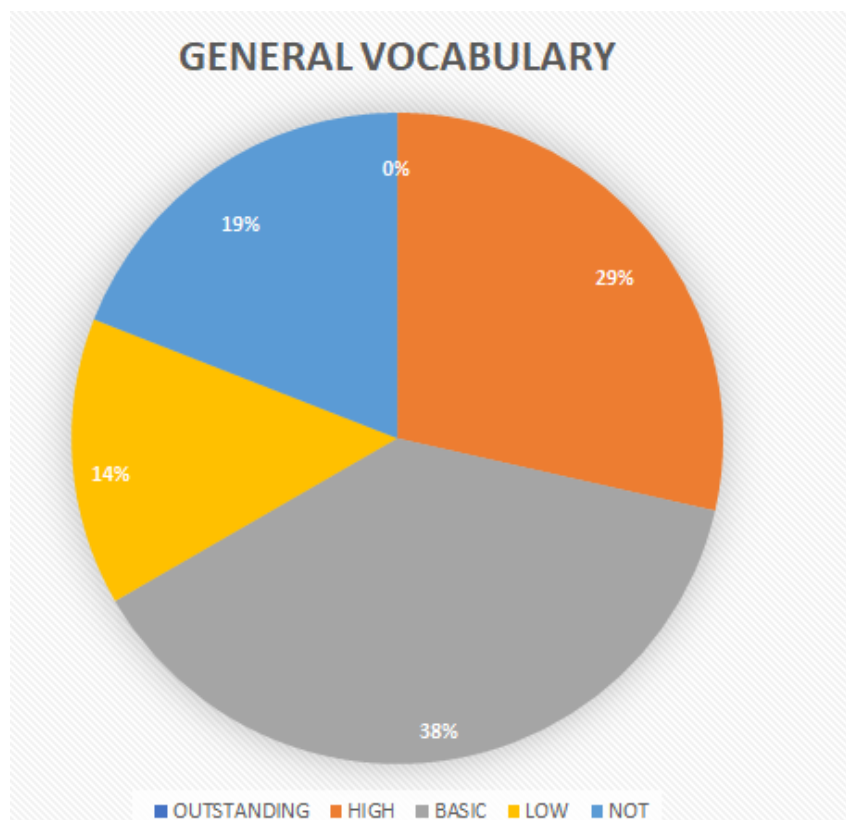
**Table 12**

*General Vocabulary Rubric*

Criteria	Outstanding	High	Basic	Low
General vocabulary	Vocabulary is relevant to the task, extensive repertoire of vocabulary and terms.	Vocabulary adequate for most of the intended communication.	Basic vocabulary is used, the repertoire is limited. There are some words frequently repeated.	Inappropriate use of basic vocabulary. Several words-usage inhibits understanding.

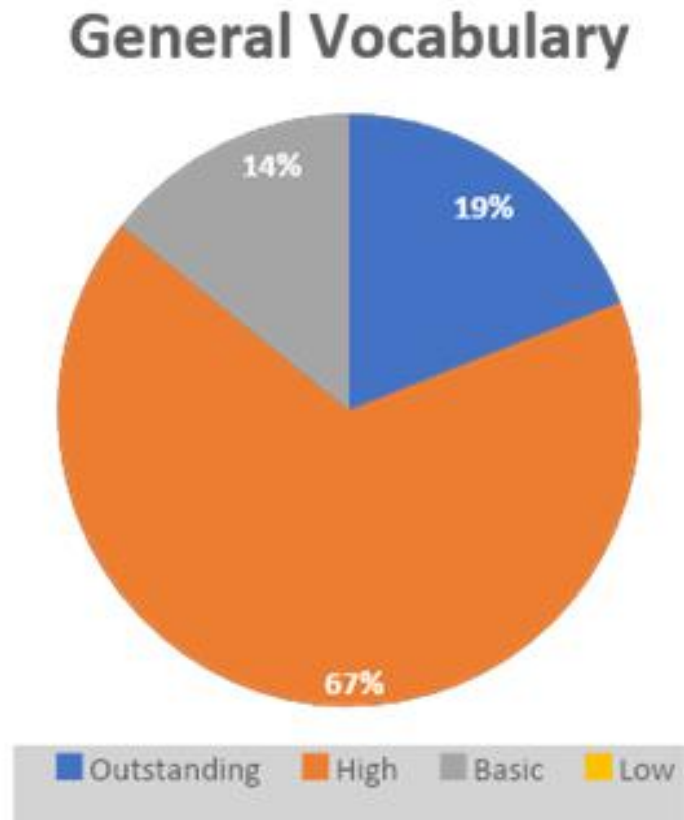
**Figure 39**

*General Vocabulary Cycle 4*



**Figure 40**

*General Vocabulary Cycle 6*



## **CHAPTER 6**

### **Conclusions and Implications**

After analyzing the findings, and the results, this chapter presents the main conclusions of the research based on the implementation in the CLIL classes of the Bansho mathematics solving-problem strategy as a resource to enhance EFL writing skills. In addition, it includes implications for the ELT community in Colombia, for the institution where the study was carried out, and for the participants. This chapter also reflects upon some limitations encountered throughout the pedagogical intervention and gives recommendations for further research.

### **Conclusions**

The purpose of this study was to examine how the Bansho mathematics teaching strategy influences the EFL writing skills of second-grade students at a Private School. In support of this objective, six hermeneutic cycles were conducted, and three (3) subsidiary objectives led the way forward to answer the research question. Each cycle allowed the teacher- researcher to find essential information and determine the effects regarding the proposal.

The first subsidiary objective is to identify the Bansho elements that intervene when integrating the mathematics problem-solving process and the EFL writing skills development in a CLIL class. Findings show that participants foster their cognitive skills in every intervention by developing problem-solving strategies already internalized up to the level of speaking and writing about them.



## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

The Teacher-researcher concluded that students showed evident cognitive process in the problem-solving requirements, which assisted them in developing the content and foreign language activities proposed for each intervention. Also hypothesized that due to the familiarity with the steps to solve word problems, participants used them smoothly as a reference structure to the written productions; such a transfer at first seemed complex or more demanding. It confirms the confidence and progression in scaffolding EFL writing skills.

Using and transferring the cognitive strategies for different purposes and tasks, as the cohesive structure aforementioned, reflects the intervention of metacognitive processes.

Metacognitive elements were more evident throughout the interventions than in the initial impression of the group working paces. It does not mean that participants did not dispose or use them prior to this study, but they were more aware of their use, and some degree of consciousness was latent. The regular dialogues about the best way to address a problem or ask about the accuracy of some terms in writing allow permanent monitoring and group questioning, which undoubtedly impact the individual way to conduct this kind of task. In essence, metacognition is considered a person's knowledge about the cognitive task and what strategies to use to complete the task successfully (Schoenfeld, 1985).

Due to the Bansho dynamics, the teacher-researcher amount of help the students requested lowered progressively. The intention some participants had on including the Teacher in their discussions led to the conclusion that he was part, as well, of the positive interdependence claimed by the theory of CL and the student-centered classroom

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

promoted from the CLIL and the school policies. It was deduced because both the participants and the Teacher- researcher had specific roles in achieving the common goal: to foster the EFL writing skill through the Bansho activities. So, the interaction had co-constructing connotations under the premise and principles of action research. The conceptual and cultural tools offered in CLIL provided the teacher-researcher interesting basis for taking risks in bringing diverse pedagogical practices in the future.

As support for the Bansho elements that intervened, it is necessary to consider participants' perceptions regarding how attractive or valuable the Bansho strategy was for solving problems and developing writing skills in the foreign language. The teacher-researcher increasingly recognized that high-level engagement occurred when bringing something unknown, groundbreaking, or infrequent to the classroom. It evidences the value Bansho strategy gained through the intervention, especially engaging pupils to work supported on it. The participants in the study learned and developed meaning as they implemented the adapted Bansho version in their problem-solving classes. The emerging conditions supported learning in complex ways that contributed to the participants' feelings of safety, motivation, and satisfaction. They supported perseverance when learning new strategies and cooperatively constructing new ideas became challenging.

Regarding the second subsidiary objective, to characterize the Cooperative Learning (CL) practices within the framework of Bansho activities. This study has shown the learners' negotiation during activities development interaction and the employment of various strategies, such as explaining or consensus, which help them in the task completion process. Moreover, age, instructional setting, and task type have played

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

significant roles in these children's strategies.

It is still difficult to draw from this study robust conclusions regarding vocabulary meaning negotiation or the negotiation of meaning in speaking interaction despite observing resources such as translating, L1 transfers, and negative transfers. However, the teacher- researcher highlighted how students overcame intelligibility during the application process and were able to find the main messages in the written productions of their classmates. Even though some students made mistakes when writing in the Bansho booklet, their peers managed to omit them and create natural communicative spaces.

Initially, the teacher-researcher supported part of the study setting giving the central role to the school model of foreign language teaching, the communicative approach method.

Nevertheless, fostering scenarios of cooperative learning through writing in CLIL goes far beyond this perspective of language teaching because, more than showing a plausible communication, participants seek to enter a knowledge community, in effect, a cultural apprenticeship served through language. In addition to the formal curriculum as the basis of teaching/orientation, the enacted curriculum in the classroom is where the actual negotiation between content and language goals is realized. The talk of the classroom was the location in space and time where learning happened.

In this sense, the teacher-researcher confirmed the endorsement character of CLIL in boosting the cooperative nature of learning in the classroom and the conceptual tools that this approach offers. The primacy of language not only supports both content and language learning but provides a fundamental basis for the negotiated relationship between these dual goals.

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

Furthermore, the cooperative nature of learning takes the classroom's available didactic and human resources in terms of interdependence. For example, the possibility of incorporating the Bansho method and promoting work in pairs, after adapting it to the needs of the target participants, the context, and the research, allows for a growing CL culture in the classroom.

CL culture is mainly observable in the student's role, moving from passive to an active agent when constantly participating in knowledge co-construction. Likewise, that scenario allowed changing the prominent figure the Teacher had and gave students confidence and leading roles in dynamics of feedback and argumentation in search for accurate answers.

A striking aspect to remark is the willingness in some teams to divide the writing process to respond to specific parts of the text individually. Considering that division of tasks is part of the positive interdependence in CL, writing following this path may affect the progressive logic of the text. However, it was not evident, and different from the handwriting styles those texts keep the sequence. Possibly it happened because of their prior planning and team concertations.

Concerning the third subsidiary objective, to document and describe second graders' EFL writing performance when they are involved in a Bansho activity. The findings revealed some outstanding aspects as well as improvement opportunities. Though the positive effects of the Bansho strategy activity are a lot more than the recommended adjustments, it should not necessarily mean the irrelevance of the latter.

Based on the results, the teacher-researcher concluded that the Bansho strategy improved the students' writing skills, particularly text cohesion. Thus, it clearly remarks

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

that the Bansho may promote possibilities to guided text structures. The process also gave the participants the confidence to write freely, avoiding giving too much attention to spelling and grammar mistakes.

Another relevant aspect to remark is the gradually increasing number of words participants reach in the last part of the intervention process. This result might be crucial in this study because standardized test weaknesses in the diagnosis phase pointed to the generally limited extension of the texts produced. This study has also made it clear that the Bansho activity fosters students' intelligibility by leading them to think in their expected readers. The instruction dynamics to accomplish the proposed tasks positively affect learners' autonomy, urging commitment and a team sense of responsibility.

The adaptations conducted when looking for increasing the number of words impacted the participants' strategy thinking because they triggered their productions thanks to the vocabulary's availability. Vocabulary knowledge, which was also a theme with the highest number of entrances in the field notes, is, according to the teacher-researcher, the most determining aspect to succeed in the writings task completion. As a consequence of the attention given to this aspect and the adaptations made to the Bansho, the students began to detail, refine, and polish their written productions, achieving outstanding levels of quality evident in the hermeneutic cycles five (5) and six (6).

Finally, despite the intention of carrying out linguistic and mathematical processes in a blurred way, in the interventions, it became evident that the most students could distinguish one task from the other. They also made reflections regarding which one they preferred, or which was more important than the other, henceforth the context of the subject. It can be concluded that the teacher-researcher made evident the importance

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

he gave to the writing task, influencing in a certain way the interest that some students gave to solving the numeracy problem.

### ***Implications***

The present research shows how the Bansho mathematics teaching strategy influences second graders' EFL writing skills at a private school. After analyzing data and examining findings, the teacher-researcher identified different implications for the ELT community and bilingualism field for Gimnasio La Montaña school, the study participants, and the teacher- researcher as a bilingual teacher and as a novice researcher.

It is necessary to widen the picture in education policies and schools to incorporate approaches as CLIL focusing on other languages different from English, especially in these times of inequity. Likewise, it will serve as an invitation for teachers to move from traditional practices to different ways to approach Foreign Language Teaching. This opportunity may scaffold trending classroom programs such as Project-Based Learning, Primary Years Program in the International Baccalaureate, Problem Based Learning, and serving as a model to be replied not only in high-income institutions.

Reflecting on the practices, the historical bias towards mistake focusing is noticeable when teaching writing. So, learners displayed this background with their exclusive concern of not making mistakes and obtaining good grades over communication and free writing priorities. This phenomenon is added to the grading influence in the assessment. Thus, the results may be interesting, transforming, and innovators when these two aspects are not the main anchors in the teaching/ learning relationship.

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

The findings reported here might also help EFL primary school teachers understand children's conversational strategies while completing a writing task and move the task along thanks to those strategies. For example, tasks involving numeracy and language skills, as the Bansho itself, might provide learners with more opportunities to negotiate for meaning, which has been claimed to lead to language learning. Thus, this type of task might bear better choices than others for primary EFL learners. However, more research on appropriate tasks for different populations needs to support this suggestion.

A cooperative learning classroom is not a quiet place; on the contrary, the dialogue and different dispositions create a safe environment to foster students' lively exchanges where the mistake is the basis of the learning. It requires the co-construction of agreements to guarantee group cohesion and goals achievements.

It is necessary to have clear routes to differentiate in both scenarios, the learners that go beyond the tasks and those who need specific support in the necessary pre-concepts or instructional different approaches as images or paraphrasing.

Taking the risk of exploring other subject strategies, models, methodologies, materials to approach Foreign Language Teaching/learning may lead teachers to discover or adapt innovative resources in the everyday goal of doing better pedagogical practices every day.

### ***Limitations***

Understanding that each investigation is unique, some of the limitations that the teacher- researcher had at the time of carrying out this study will be mentioned.

There were specific constraints to ensure data collection and analysis in the

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

dynamics of adapting the Bansho mathematics problem-solving strategy. Those did not allow the participants to make some changes. For instance, the groups' conformation established in the first intervention remained up to the last pedagogical intervention. This situation, in some cases, led to disagreements or requests for change manifestations and limited the opportunity to broaden the analysis regarding the cooperative learning styles that could occur.

The available time to carry out each hermeneutical cycle meant that the participants did not have complete freedom to enrich their writings as their progress was consolidated. This was evident in the last two hermeneutic cycles, where there was motivation and greater engagement with the activity, and the search for high-quality work increased. Some participants took time off from their breaks to polish and detail their productions.

The age of the participants and the insipid autonomy processes resulted in specific moments of indiscipline in one of the groups. Those participants demanded parallel work of understanding and forming habits in group work. By the third hermeneutic cycle, this group managed to advance in this objective and consolidated best practices.

The situation of the COVID 19 pandemic limited access to the artifacts, delaying the process for some months. A specific time had to be requested and approved to take them home and do the corresponding analysis.

### ***Further research***

In the spirit of the action research, this study should continue to establish, possibly, cross- curricular projects to enhance EFL and content progress. As this research experience was rewarding talking about writing skills improvements, how it would be



## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

using the Bansho strategy to examine its impact on speaking skills. Like this proposal, there are plenty of opportunities to assess content tools' impact on the EFL skills, so the gap of using content strategies to foster higher performance in EFL will be reduced.

Since co-construction of knowledge and meaning negotiation and scaffolding were present in this proposal, the Teacher- researcher suggests a speaking-based proposal to complement this literature references.

As mentioned in this chapter, this study looked for a functional view of language; striking research may point to the formal view regarding grammar and syntaxis in written productions.

Also, exploring Cooperative learning features regarding narratives from the students will give another point of view and dimension analysis.

## References

- Abigail Armstrong, K. M. (2018, Jan 09). *Content Area Literacy in the Mathematics Classroom*. Retrieved from Tandfonline: <https://www.tandfonline.com/doi/full/10.1080/00098655.2017.1411131?src=recsys>
- Abdel-Motaal, M. (2002). Academic freedom and civil society: some personal reflections. *Higher Education Policy*, 15 (4), 365 – 370. doi:[http://dx.doi.org/10.1016/S0952-8733\(02\)00051-X](http://dx.doi.org/10.1016/S0952-8733(02)00051-X)
- Allen, N. (1991). A Study of Metacognitive Skill as Influenced by Expressive Writing in College Introductory Algebra Classes. *LSU Historical Dissertations and Theses*. 5220. Obtenido de [https://digitalcommons.lsu.edu/gradschool\\_disstheses/5220](https://digitalcommons.lsu.edu/gradschool_disstheses/5220)
- Al-Zankawi, M. (2018). *An Investigation of EFL Writing Strategies and Cohesion of Kuwaiti Undergraduate Students. (A thesis submitted for the degree of PhD in Education, Trinity College University of Dublin)*. Institutional research repository.
- Armon, J., & Morris, L. (2008). Integrated Assessments for ELL Students – and teachers – benefit from incorporating writing and drawing in science. Methods and Strategies. *Science and Children*, 45(8), 49-53.
- Armon, J., & Morris, L. j. (2008). Integrated Assessments for ELL. *Proquest*, 49-53.
- Arroyo, G. H. (s.f.). Dificultades de aprendizaje: La Disgrafía .
- Azzioui, A. (2016). The Effect of LT Cooperative Learning Model and Teacher’s Feedback on EFL Students’ Writing: The Case of Second Year Students of English at the Mentouri Brothers University, Constantine.
- Bandura. (1997). *Self-efficacy: The exercise of control*. New York: W H Freeman/Times Books/ Henry Holt & Co.
- Bandura, A. (2001). Social Cognitive Theory: An Agentic Perspective . *Annual Review of Psychology*, 52(1), 1-26. doi:10.1146/annurev.psych.52.1.1
- Barwell , R., Kubota, Z., & Culotta, D. (2018). Teaching and Learning Secondary School Mathematics. In A. Kajander, J. Holm, & E. Chernoff, *Learning Mathematics When Students Are New to Schooling and New to English. En Kajander, A., Holm, J., & Chernoff, E.J., Teaching and Learning Secondary School Mathematics: Canadian Perspectives in an International Context* (pp. 101-116). Springer International Publishing.
- Binterová, H., & Kominkova, O. (2013). *ERIC*. Obtenido de [https://eric.ed.gov/?q=%22CLIL+MATHEMATICS%22&ff1=subEnglish+\(Second+Language\)&ff2=eduElementary+Education&ff3=subElementary+School+Mathematics&ff4=subMathematics+Activities&id=EJ1053646](https://eric.ed.gov/?q=%22CLIL+MATHEMATICS%22&ff1=subEnglish+(Second+Language)&ff2=eduElementary+Education&ff3=subElementary+School+Mathematics&ff4=subMathematics+Activities&id=EJ1053646)
- Bowe, G. (2009). Knowing and teaching elementary language arts: A math lesson for English teachers. *Western Journal of Black Studies*, 33(4), 259-272.
- Brandenburg, . (2002). Advanced math? Write! *Educational Leadership*, 60(3), 67-68.
- Briesmaster, M., & Etchegaray, P. (2017). Coherence and cohesion in EFL students’ writing production: The impact of a metacognition-based intervention. *Ikala, Revista de Lenguaje y Cultura*, 22(2), 183-202. doi:10.17533/udea.ikala.v22n02a02

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

- Brown. (2003). From Teacher-Centered to Learner-Centered Curriculum: Improving Learning in Diverse Classrooms. *Education*, 124, 49-54.
- Brown, A., Bransford, J., Ferrara, R., & Cam. (1983). Learning, remembering and understanding. In J. H. Flavell, & E. M. Markman (Eds.), *Handbook of child psychology: Vol. 3. Cognitive development* (4th ed., pp. 77-166). New York: Wiley. *Handbook of child psychology: Vol. 3. Cognitive development*, 3, 77-166.
- Burns. (1995). *Writing in math class: A resource for grades 2 – 8*. Math Solutions.
- Burns, A. (2001). *Collaborative action research for English language teachers*. Cambridge, UK: Cambridge University Press.
- Camargo, L., & Camacho, G. (2018). The impact of Wikis & Videos Integration Through Cooperative Writing Tasks Processes. *English Language Teaching*, 11(5), 116.  
doi:<https://doi.org/10.5539/elt.v11n5p116>
- Cantera, E. H. (2009). Dislexia, el trastorno desconocido. Diagnóstico y tratamiento. 6.
- Cardenas, N. (2018). Perspectives for a study on bilingualism in Colombian regional universities. *Historia de la Educación Latinoamericana*, 20(31), 125-142.  
doi:<https://doi.org/10.19053/01227238.8566>
- Carter. (2009). Connecting Mathematics and Writing Workshop: It's Kinda Like Ice Skating. *Reading Teacher - READ TEACH*, 62(7), 606-610. doi:<http://dx.doi.org/10.1598/RT.62.7.7>
- Cassany, D. (2001). Decálogo didáctico de la enseñanza de la composición [Ten didactic rules for teaching composition]. *Revista on line de la Sociedad Española de Didáctica de la Lengua y la Literatura [En línea]*.
- Castelló, M. (2007). El proceso de composición de textos académicos. En M. Castello, A Iñesta, M. Miras, I. Sole, A. Teberosky y M. Zannoto (Eds.), *Escribir y comunicarse en contextos científicos y académicos. Conocimientos y estrategias*. Barcelona:Grao.
- Cenoz, J. (2015). Content-based instruction and content and language integrated learning: the same or different? *Language, Culture and Curriculum*, Vol. 28,( No. 1), 8–24.  
doi:10.1080/07908318.2014.1000922
- Chan, S. (2015). Linguistic challenges in the mathematical register for EFL learners: linguistic and multimodal strategies to help learners tackle mathematics word problems. *International Journal of Bilingual Education and Bilingualism*, 18(3), 306-318. doi:<https://scihub.se/https://doi.org/10.1080/13670050.2014.988114>
- Clark, I. (2003). "Invention". In I. L. Clark, with B. Bamberg, D. Bowden, J. R. Edlund, L. Gerrard, S. Klein, J. N. Lippman, J. D. Williams. *Concepts in Composition Theory and Practice in the Teaching of Writing*. Associates, Publishers.
- Cohen, L., Manion, L., & Morrinson, K. (2007). *Research Methods in Education*. New York: Routledge Taylor & Francis Group.
- Columba, L. (2012). Sorting mathematical representations: Words, symbols and graphs. *Learning and Teaching Mathematics*, 12, 3-8.
- Communication in the Mathematics Classroom. (2010). *ONTARIO*.
- Connor, U., & Mbaye, A. (2002). Available from IUPUI ScholarWorks. <http://hdl.handle.net/1805/2661>.  
*Annual Review of Applied Linguistics*, 22, 263-278. doi:DOI:10.1017/S0267190502000144
- Corzo, X., & Heidy, R. (2011). Approaches to Scaffolding in Teaching Mathematics in English. *Latin American Journal of Content & Language Integrated Learning*, 4(2), 13-20.  
doi:<http://dx.doi.org/10.5294/laclil.2011.4.2.2>

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

- Coulmas, F. (1991). *The Writing Systems of the World*. Wiley-Blackwell; Reprint edición (8 Enero 1991).
- COULMAS, F. (2003). *WRITING SYSTEMS- AN INTRODUCTION TO THEIR LINGUISTIC ANALYSIS*. CAMBRIDGE UNIVERSITY PRESS.
- Coyle. (2006). Content and language integrated learning: Motivating learners and teachers. *Scottish Languages Review*, 13, 1-18.
- Coyle. (2007). Content and Language Integrated Learning: Towards a Connected Research Agenda for CLIL Pedagogies. *International Journal of Bilingual Education and Bilingualism*, 10(5), 543-562. doi:10.2167/beb459.0
- Coyle, D., Hood , P., & Marsh, D. (2010). *CLIL Content and Language Integrated Learning*. Cambridge University Press.
- Craig, T., Morgan, C., Schuette, M., & Wagner, D. (2014). Language and communication in mathematics education: an overview of research in the field. *ZDM Mathematics Education*, 46(6), 843–853. doi:10.1007/s11858-014-0624-9
- Crandall, J. (1999). *Cooperative language learning and affective factors*. In Arnold, J. . Cambridge University Press.
- Creswell. (2014). Research Design. Qualitative, quantitative and mixed methods approaches. *Revista Peruana de investigación educativa*, 7, 185-189.
- Creswell, J. (2013). *Qualitative Inquiry & Research Design: Choosing among Five Approaches (3rd ed.)*. Thousand Oaks, CA: SAGE.
- Cumming, A. (1989). Writing expertise and second language proficiency. *Language Proficiency. Language Learning*, 39(1), 81–135.
- Cumming, A. (2001). Learning to Write in a Second Language: Two Decades of Research . *Internafional Journal of English Studies*, 1(2), 1-23. doi:https://tspace.library.utoronto.ca/bitstream/1807/32148/1/Learning%20to%20Write%20in%20a%20Second%20Language-Two%20Decades%20of%20Research.pdf
- Dalton-Puffer, C. (2007). *DISCOURSE IN CONTENT AND LANGUAGE INTEGRATED LEARNING* (Vol. 20). Amsterdam / Philadelphia: John Benjamins Publishing Company.
- Davison , D., & Pearce, D. (1998). Using writing activities to reinforce mathematics instruction. *The Arithmetic Teacher*, 35(8), 42-45.
- Denscombe, M. (2007). *The good research guide for small-scale social research projects*. New York: Open University Press.
- Díaz, P. S. (2006). *Dificultades de Aprendizaje*. Lima, Perú: Diseño, Ilustración e Impresión:Raul Peña S.A.C.
- Dillenbourg, P. (1999). Chapter 1 (Introduction) What do you mean by 'collaborative learning'? *Collaborative-learning: Cognitive and Computational Approaches*, 1.
- Doughty, C. (2000). Negotiating the linguistic environment. . *University of Hawaii Working Papers in ESL*, , 18(2), 47-85.
- Elliott, J. (2015). Educational action research as the quest for virtue in teaching. *Educational Action Research*, 23(1), 4-21. doi:10.1080/09650792.2014.994017
- Emig, J. (1997). Writing as a Mode of Learning. *College Composition and Communication*, 28, 122–128.
- Fageeh, A. (2003). Saudi college students' beliefs regarding their English writing difficulties. *Unpublished doctoral dissertation, Indiana University of Pennsylvania*. , 2, 31-48.
- Fernández. (2009). Spanish CLIL: Research and official actions. En A. Fernández-Fontecha, *Content and language integrated learning: Evidence from research in Europe* (pág. 3.21). Multilingual

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

Matters.

- Fernandez, C., & Yoshida, M. (2004). *Lesson Study A Japanese Approach To Improving Mathematics Teaching and Learning*. Routledge.
- Ferris, D., & Hedgcock, J. (2001). Teaching ESL Composition: Purpose, Process, and Practice. *John S. Hedgcock*, 35. doi:10.1016/S0889-4906(00)00006-5
- Flavell, J. (1976). Metacognitive aspects of problem solving. In L. B. Resnick (Ed.), *The nature of intelligence* (pp. 231-235). Hillsdale, NJ: Lawrence Erlbaum. 231-235.
- Flower, L. (1994). *The construction of negotiated meaning. A Social Cognitive Theory of Writing*. Southern Illinois: University Press.
- Fontaine, L., Schönthal, D., Bowcher, W., & Wendy, L. (2019). *Introduction to The Cambridge Handbook of Systemic Functional Linguistics, with dedication to Geoff Thompson*. Cambridge University Press.
- Fraenkel, J., & Wallen, N. (2003). *How to design and evaluate research in education*. New York: McGraw-Hill Company, Inc.
- Fraenkel, J., & Wallen, N. (2006). *How to design and evaluate research in education with PowerWeb (6th ed.)*. New York : NY: McGraw-Hill.
- Fraenkel, J., Wallen, N., & Hyun, H. (2012). *How to design and evaluate research In education (8th ed.)*. New York: Mc Graw Hill.
- Freeman, D. (1998). *Doing Teacher Research from Inquiry to Understanding*. Boston, Us: Heinle Cengage Learning .
- Gay, L., Mills, G., & Airasian, P. (2012). *Educational Research: Competencies for Analysis and Applications, 10th Edition*. Pearson.
- Gee, J. (2007). *Social Linguistics and Literacies: Ideology in Discourses (3rd ed.)*. Routledge.
- Gené-Gil, M., Juan-Garau, M., & Salazar-Noguera, J. (2015). Development of EFL writing over three years in secondary education: CLIL and non-CLIL settings. *The Language Learning Journal*, 43(3), 286–303. doi:doi: 10.1080/09571736.2015.1053278
- Genesee, F. (1994). *Educating Second Language Children: The Whole Child, the Whole Curriculum, the Whole Community*. New York: Cambridge University Press.
- Genesee, F. (1994). Integrating language and content: Lessons from immersion. *The National Center for Research on Cultural Diversity and Second Language Learning, Educational Practice Report*(11), 1-15. doi:Retrieved from <https://escholarship.org/uc/item/61c8k7kh>
- Goodnough, K. (2010). The role of action research in transforming teacher identity: modes of belonging and ecological perspectives. *Educational Action Research* , 18, 167-182 . doi:<https://doi.org/10.1080/09650791003740725>
- Grabe, W. (2001). Reading-writing relations: Theoretical perspectives and instructional practices. *Language Teaching*, 49(3), 15-47.
- Grabe, W., & Kaplan, R. (1996). *Theory and practice of writing : an applied linguistic perspective (Applied Linguistics and Language Study)*. New York: Longman; 1st edition.
- Guillén, D. Q. (2006). Alteraciones del lenguaje DISLALIAS. *Circulo Paraguayo de Médicos Medicina Pre-paga*, 5.
- Hanesova, D. (2014). Development of critical and creative thinking skills in CLIL. *JoLaCE : journal of language and cultural education*.
- Hannafin, M., & Hill, J. (1997). Student-Centered Learning and Interactive Multimedia: Status, Issues, and Implication. *Contemporary Education*, 68, 94-99.

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

- Heine , L. (2010). *Problem Solving in a Foreign Language: A study in content and language integrated learning*. De Gruyter Mouton.
- Herr, K., & Anderson, G. (2014). *The Action Research Dissertation*. U.S: SAGE Publications, Inc. SAGE Publications.
- Hitchcock, G., & Hughes, D. (1995). *Research and the Teacher: A Qualitative Introduction to School-based Research*. London: Routledge.
- Honnert , A., & Bozan, S. (2005). Summary Frames: Language. *Science Activities: Classroom Projects and Acquisition for Special Education and ELL Students*, 42(2), 19-29.  
doi:<https://doi.org/10.3200/SATS.42.2.19-29>
- Huettman, E. (1992). Book Reviews : A Sense of Audience in Written Communication. *The Journal of Business Communication*, 29, 85–90.
- Humphrey , M., & Hourcade, J. (2010). Special Educators and Mathematics Phobia: An Initial Qualitative Investigation. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 83(1), 26-30. doi:<https://doi.org/10.1080/00098650903267743>
- Infante, D. J. ( 2003/2004). *Dificultades en el Aprendizaje: Unificación de Criterios Diagnósticos*. TECHNOGRAPHIC, S.L.
- Janine M. Firmender, T. M., Firmender, J. M., Casa, T. M., & Colonnese, M. W. (2017, Oct). *Write On*. Retrieved from National Council of Teachers of Mathematics:  
<https://www.nctm.org/Publications/Teaching-Children-Mathematics/2017/Vol24/Issue2/Write-On/>
- Jeong, H. (2015). Rubrics in the classroom: do teachers really follow them? *Language Testing in Asia*, 5(1). doi:10.1186/s40468-015-0013-5
- Johnson , D., & Johnson, R. (2002). Learning Together and Alone: Overview and Meta-analysis. *Asia Pacific Journal of Education*, 22(1), 95-105. doi:[doi:doi.org/10.1080/0218879020220110](https://doi.org/10.1080/0218879020220110)
- Johnson, B., & Christensen, L. (2014). *Educational Research. Quantitative, Qualitative, and Mixed Approaches*. Thousand Oaks, California: SAGE Publications, Inc.
- Johnson, D., Johnson, R., & Holubec , E. (1998). *Cooperatiae Learning in the Classroom*. Association For Supervision and Curriculum Development.
- Johnson, D., Johnson, R., & Holubec, E. (2015). *Advanced Cooperative Learning*. Interaction Book Company.
- Joyner, J., & Reys, B. (2000). Principles and Standards for School Mathematics: What's in It for You? *National Council of Teachers of Mathematics*, 7(1), 26-29.
- Kemmis, S., & Mc Taggart, R. (1988). *The Action Research Planner*. Melbourne: University Press .
- Kirsch, G., & Roen, D. (1992). A Sense of Audience in Written Communication . *College Composition and Communication*, 43(1), 93-95. doi:<https://doi.org/10.2307/357370>
- Kress, G. (2010). “*The profound shift of digital literacies*”. In Gillen, Julia; Barton, David. *Digital Literacies. A research briefing by the technology enhanced learning phase of the teaching and learning research programme*. London: London Knowledge.
- Kristin Helstad, T. D. (2017, Oct 26). *Exploring teaching academic literacy in mathematics in teacher education*. Retrieved from Taylor & Francis Online :  
<https://www.tandfonline.com/doi/full/10.1080/20004508.2017.1389225?src=recsys>
- Krueger , R., & Casey , M. (2014). *Focus Groups A Practical Guide for Applied Research*. Thousand Oaks, California: SAGE Publications, Inc.
- Kubota, Z. (2011). *Translating Japanese teaching and learning practices for North American*

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

- mathematics educational contexts. It's not simple nor complicated.* Toronto, Ontario: Unpublished doctoral dissertation in progress.
- Kuzle, A. (2013). Promoting Writing in Mathematics: Prospective Teachers' Experiences and Perspectives on the Process of Writing When Doing Mathematics as Problem Solving. *CEPS Journal*, 3(4), 41-59.  
doi:[https://www.pedocs.de/volltexte/2014/8500/pdf/cepsj\\_2013\\_4\\_Kuzle\\_Promoting\\_writing\\_in\\_mathematics.pdf](https://www.pedocs.de/volltexte/2014/8500/pdf/cepsj_2013_4_Kuzle_Promoting_writing_in_mathematics.pdf)
- La Montaña, G. (2020). Bilingual Program. *Gimnasio La Montaña Bilingual Program*. Bogotá, Colombia.
- Lahuerta, A. C. (2017). Analysis of the effect of clil programmes on the written competence of secondary education students. *Universidad de Oviedo revista de filología*,, 169-184.
- Landone, E. (2004). El aprendizaje cooperativo del ELE: propuestas para integrar las funciones de la lengua y las destrezas colaborativas. *Revista Electrónica de Didáctica del Español como Lengua Extranjera (redELE)*, 1(0).
- Lave, J., & Wenger, E. (1991). *Situated Learning Legitimate peripheral participation*. Cambridge University Press. doi:doi/10.1017/CBO9780511815355
- Lee, I., & Mak, P. (2018). Metacognition and Metacognitive Instruction in Second Language Writing Classrooms. *TESOL Quarterly*. doi:<http://dx.doi.org/10.1002/tesq.436>
- Lumley, T. (2006). *Assessing second language writing : the rater's perspective*. Frankfurt am Main ; New York : P. Lan.
- Maggs Rapport , F. (2008). Combining methodological approaches in research: ethnography and interpretive phenomenology. *Journal Of Advance Nursing*, 219-225.
- MacWHINNEY, B. (1991). *Pragmatics of Language: Clinical Practice Issues*. Springer Science+Business Media Dordrecht. doi:[http://dx.doi.org/10.1007/978-1-4899-7156-2\\_5](http://dx.doi.org/10.1007/978-1-4899-7156-2_5)
- Mariño , C. (2014). Towards implementing CLIL (content and language integrated learning) at CBS (Tunja, Colombia). *Colombian Applied Linguistics Journal*, 16(2), 151–160.  
doi:<https://doi.org/10.14483/udistrital.jour.calj.2014>
- Marrs, S., Zumbunn, S., McBride, C., & Stringer, J. K. (2016, May-JuL). *Exploring Elementary Student Perceptions of Writing Feedback*. Retrieved from ERIC:  
<https://eric.ed.gov/?q=%22writing+feedback%22&id=EJ1131811>
- Marsh. (2002). *Content and Language Integrated Learning*. Edita: Servicio de Publicaciones de la Universidad de CórdobaA.
- Marsh. (2008). Language awareness and CLIL. *Encyclopedia of language and education*, 6(238), 233-246. doi:[https://doi.org/10.1007/978-0-387-30424-3\\_152](https://doi.org/10.1007/978-0-387-30424-3_152)
- Marsh. (2009). *Foreword*. En Y. Ruiz de Zarobe , & R. Jiménez Catalán, *Content and Language Integrated Learning Evidence from Research in Europe (pág. 7)*. . Bristol, Buffalo, Toronto: Multilingual Matters.
- Marsh. (s.f.). *Content and Languaje Integrated Learning (CLIL) A Development Trajectory*. Edita: Servicio de Publicaciones de la Universidad de Córdoba.
- Marsh, D. (n.d.). USING LANGUAGES TO LEARN AND LEARNING TO USE LANGUAGES. Retrieved from <http://archive.ecml.at/mtp2/clilmatrix/pdf/1uk.pdf>
- Marsh, D., & Langé, G. (2000). *Using languages to learn and learning to use languages : an introduction to content and language integrated learning for parents and young people*. University of Jyväskylä.

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

- Marsh, D., Perez, M., & Ráez-Padilla, J. (2015). *CLIL in Action: Voices from the Classroom*. Cambridge Scholars Publishing.
- Mathematics, C. i. (2010). ONTARIO MINISTRY OF EDUCATION. *Capacity Building Series*.
- McCafferty, S., Jacobs, G., & Iddings, A. (2006). *Cooperative Learning and Second Language Teaching*. Cambridge: Cambridge University Press.
- McCaslin, M., & Hickey, D. (2001). Educational psychology, social constructivism, and educational practice: A case of emergent identity. *Educational Psychologist*, 36(2), 133–140.
- McDougald, J. (2009). The state of language and Content Instruction in Colombia. *Latin American Journal of Content and Language Integrated Learning*, 2(2), 44–48.  
doi:<https://doi.org/10.5294/laclil.2009.2.2.15>
- Mejía, A. (2011). The National Bilingual Programme in Colombia: Imposition or opportunity? *Apples - Journal of Applied Language Studies*. 5(3), 7-17.
- Mercer, N., Dawes, L., & Staarman, J. (2009). Dialogic teaching in the primary science classroom. *Language and Education*, 23(4), 353-369. doi:<https://doi.org/10.1080/09500780902954273>
- Merriam, S. (2009). *Qualitative Research: A Guide to Design and Implementation*. C.A: Jossey-Bass.
- Merriam, S., & Tisdell, E. (2016). *Qualitative Research: A Guide to Design and Implementation*. San Francisco, CA: Jossey-Bass.
- Mertler, C. (2001). Designing scoring rubrics for your classroom. *Practical Assessment, Research, and Evaluation*, 7, 25. doi:<https://scholarworks.umass.edu/pare/vol7/iss1/25/>
- Mettetal, G. (2001). The What, Why and How of Classroom Action Research. *Journal of Scholarship of Teaching and Learning*, 2.
- Mills, G., & Airasian, P. (2012). *Educational Research: Competencies for Analysis and Applications*. Pearson.<https://www.tandfonline.com/doi/full/10.1080/00098655.2012.691568?scroll=top&needAccess=true>
- Mills, K. (2010). A review of the "digital turn" in the new literacy studies. *Review of Educational Research*, 80, 246- 271.
- Ministry of Education. (2005). *THE ONTARIO CURRICULUM, GRADES 1–8: MATHEMATICS*.  
Obtenido de <http://www.edu.gov.on.ca/eng/document/curricul/elementary/math1-8e.pdf>
- Misty, A., & Yj, Q. (2014). Language, Mathematics and English Language Learners. p. 11.
- Monereo, C. (2007). Hacia un paradigma del aprendizaje estratégico: el papel de la mediación social, del self y de las emociones. *Electronic Journal of Research in Educational Psychology*, 5(3), 497-534.
- Montague, M., Krawec, J., Enders, C., & Dietz, S. (2014). The Effects of Cognitive Strategy Instruction on Math Problem Solving of Middle-School Students of Varying Ability. *Journal of Educational Psychology*, 106(2), 469-48. doi:[doi:10.1037/a0035176](https://doi.org/10.1037/a0035176)
- Montague, M. (2002). *Mathematical problem solving instruction: Components, procedures, and materials*. In M. Montague, & C. Warger (Eds.), *Afterschool extensions: Including students with disabilities in afterschool programs*. Reston, Va.: Exceptional Innovations.
- Montague, M. (2003). *Solve It! A Practical Approach to Teaching Mathematical Problem Solving Skills*. Exceptional Innovations .
- Montague, M., & Bos, C. (1990). Cognitive and metacognitive characteristics of eighth grade students' mathematical problem solving. *Learning and Individual Differences*, 2(3), 371-388.  
doi:[https://doi.org/10.1016/1041-6080\(90\)90012-6](https://doi.org/10.1016/1041-6080(90)90012-6)
- Montaña, G. L. (2019). *Gimnasio la Montaña. Proyecto-Educativo-Institucional*. Recuperado el 6 de 12



## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

- de 2019. . Obtenido de <https://www.glm.edu.co/sobre-glm/pei/https://www.glm.edu.co/sobre-glm/pei/>
- Myra J. Linden, A. W. (1 September 1990). *Why Johnny Can't Write How to improve writing skills*. New York: 1st Edition.
- Noffke , S., & Somekh, B. (2009). *The SAGE Handbook of Educational Action Research*. London: SAGE Publications LTD.
- Novotná, J., Hadj-mousová, Z., & Hofmannová, M. (2001). . *eacher training for CLIL–Competences of a CLIL teacher. Proceedings SEMT,, 1*, 122-126.
- Nunan, D. (1999). *Second Language Teaching & Learning*. Boston: Heinle & Heinle.
- Olsen, W. (2012). *Data Collection: Key Debates and Methods in Social Research*. SAGE Publications Ltd. doi:<https://doi.org/10.1002/job.1792>
- Ontario Ministry of Education. (2006). Problem solving and communication. *A guide to effective instruction in mathematics, Kindergarten to grade 6, 2*. doi:[http://eworkshop.on.ca/edu/resources/guides/Guide\\_Math\\_K\\_6\\_Volume\\_2.pdf](http://eworkshop.on.ca/edu/resources/guides/Guide_Math_K_6_Volume_2.pdf)
- Ouazizi, K. (2016). the effects of clil education on the subject matter (mathematics) and the target language (english). *Latin American Journal of Content & Language Integrated Learning*, 9, 110-137. doi:10.5294/laclil.2016.9.1.5
- Pañi, M. G. (2019). *Trabajo de investigación, previo a la obtención del grado académico de magister en la enseñanza del idioma inglés como lengua extranjera. ( Universidad Técnica de Ambato)*. Institutional Research Repository, Ecuador.
- Patton, M. (2002). *Qualitative Research and Evaluation Methods*. London: SAGE Publications, Inc.
- Peña, A. (2016). INTEGRATING LANGUAGE AND CONTENT IN FIRST GRADE IN A COLOMBIAN SCHOOL. *INTEGRATING LANGUAGE AND CONTENT IN FIRST GRADE IN A COLOMBIAN SCHOOL*. Bogotá, Colombia.
- Pincas, A. (1982). *Teaching English writing. Essential Language Teaching Series*. MacMillan.
- Powell, A. (1997). Capturing, Examining, and Responding to Mathematical Thinking through Writing. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 71(1), 21-25. doi:<https://doi.org/10.1080/00098659709599317>
- Poyla, G. (1945). *How to solve it*. Princeton University Press, Princeton.
- Pressley, M. (1995). More about the development of self-regulation: Complex, long-term, and thoroughly social. . *Educational Psychologist*, 30(4), 207–212.
- Pugalee, D. (2001). Writing, Mathematics, and Metacognition: Looking for Connections Through Students' Work in Mathematical Problem Solving. *School Science and Mathematics* , 101(5), 236-245. doi:<https://doi.org/10.1111/j.1949-8594.2001.tb18026.x>
- Pugalee, D. (2005). *Constructing a Model of Mathematical Literacy*. Christopher-Gordon Publishers, INC.
- Raimes, A. (1983). *Techniques in teaching writing*. New York, NY : Oxford University Press.
- Ramani , G. (2002). COOPERATIVE PLAY AND PROBLEM SOLVING IN PRESCHOOL CHILDREN. University of Pittsburgh.
- Richards, J., & Rodgers , T. (2001). *Approaches and Methods in Language Teaching*. Cambridge University Press. doi:<https://www.novaconcursos.com.br/blog/pdf/richards-jack-c.-&-rodgers.pdf>
- Rodriguez , J. (2012). Content and Language Integrated Learning (CLIL): Considerations in the Colombian Context1. *Gist Education and Learning Research Journal* , 6, 177-189. Obtenido de Retrieved from <https://latinjournal.org/index.php/gist/article/view/432>

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

- Rosas, L. C. (2018). *Music videos and writing process in english as self-concept exploration and expression strategies for a 2 adolescent learners at a public school. (Universidad Pedagógica Nacional)*. Institutional research repository.
- Roux, R. (2013). Slicing the Onion: Foreign Language Education Policy in Colombia and Mexico. En R. Roux, *Slicing the Onion: Foreign Language Education Policy in Colombia and Mexico* (págs. 179-188).
- Ruiz, Z., & Jimenez, R. (2009). *Content and language integrated learning: Evidence from research in Europe*.
- Sams, C., & Mercer, N. (2006). Teaching Children How to Use Language to Solve Maths Problems. *Language and Education*, 20(6), 507-528. doi:<https://sci-hub.se/10.2167/1e678.0>
- Sasaki, M., & Hirose, K. (1996). Explanatory Variables for EFL Students' Expository Writing. *Language Learning*, 46(1), 137-174. doi:[doi:10.1111/j.1467-1770.1996.tb00643.x](https://doi.org/10.1111/j.1467-1770.1996.tb00643.x)
- Savignon, S. (1991). Communicative Language Teaching: State of the Art". *TESOL Quarterly*, 25(2), 261-277. doi:<https://doi.org/10.2307/3587463>
- Schleppegrell, M. (2007). The Linguistic Challenges of Mathematics Teaching and Learning: A Research Review. *Reading & Writing Quarterly*, 23(2), 139-159. doi:<http://dx.doi.org/10.1080/10573560601158461>
- Schoenfeld, A. (1985). Making sense of "Out Loud " Problem - Solving Protocols. *The Journal of Mathematical Behaviour*, 4, 171-191.
- Secretaria de Educacion., A. M. (2012). *Lineamientos curriculares para los colegios pilotos hacia el bilingüismo. Obtenido de Repositorio Institucional Secretaría de Educación del Distrito*.
- Serrano, M. C. (2010). ¿EN QUÉ CONSISTE LA DISORTOGRAFÍA? . *Temas para la Educación*.
- Shannon E.Bostiga, M. L. (2016, May). *Moving Math in the Write Direction*. Retrieved from National Council of Teachers of Mathematics: <https://www.nctm.org/Publications/Teaching-Children-Mathematics/2016/Vol22/Issue9/Moving-Math-in-the-Write-Direction/>
- Shimizu, S., Isoda, M., Okubo, K., & Baba, T. (2005). *Mathematics lesson study in Japan through diagrams*. Tokyo: Meiji Toshio.
- Shirley, T., Kumi, F., & Shiho, N. (2018). Development of bansho (board writing) analysis as a research method to improve observation and analysis of instruction in lesson study. *International Journal for Lesson and Learning Studies*, 7(3), 230-247.
- Sierpinska, A. (1998). *Sierpinska, A. (1998). Three epistemologies, three views of classroom communication: Constructivism, sociocultural approaches, int, Language and Communication in the Mathematics Classroom*. Reston, VA: NCTM.
- Smith, A., & Kelly, A. (2015). Cognitive Processes. *The Encyclopedia of Adulthood and Aging, First Edition*. Edited by Susan Krauss Whitbourne., 1-4. doi:<https://doi.org/10.1002/9781118521373.wbeaa213>
- Stahl, G. (2003). Knowledge Negotiation in Asynchronous Learning Networks. *Proceedings of the 36th Hawaii International Conference on System Sciences (HICSS'03)*. doi:[doi:10.1109/hicss.2003.1173632](https://doi.org/10.1109/hicss.2003.1173632)
- Stigler, J., & Hiebert, J. (1999). *The teaching gap: Best ideas from the world's teachers for improving education in the classroom*. New York: Summit Books.
- Stonewater, J. (2002). The Mathematics Writer's Checklist: The Development of a Preliminary Assessment Tool for Writing in Mathematics. . *School Science and Mathematics*, 102(7), 324–334. doi:[doi:10.1111/j.1949-8594.2002.tb18216.x](https://doi.org/10.1111/j.1949-8594.2002.tb18216.x)

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

- Strauss. (1987). *Qualitative Analysis For Social Scientist*. Cambridge University Press.
- Strauss, A., & Corbin, J. (1998). *Basics of qualitative research : techniques and procedures for developing grounded theory*. Thousand Oaks : Sage Publications.
- Suchman, L. (1987). *Plans and situated actions: The problem of human-machine communication*. New York: Cambridge University Press.
- Sun, , R., Mathews, R., & Lane, S. (2007). Implicit and explicit processes in the development of cognitive skills: A theoretical interpretation with some practical implications for science education. *En E. Vargios, Educational Psychology Research Focus*, 1.
- Surmont, Struys, E., Van Den Noort, M., & Van De Craen, P. (2016). The effects of CLIL on mathematical content learning:. *Studies in Second Language Learning and Teaching*, 6(2), 319-337. doi:10.14746/ssl.2016.6.2.7
- Taggart, G., Phifer, S., Nixon, J., & Wood, M. (1999). *Rubrics: A handbook for Construction and Use*. United States of America: R&L Education.
- Takahashi, A. (2006). Characteristics of Japanese mathematics lessons. . *Tsukuba journal of educational study in mathematics*, 25,(1), 37-44.
- Tan, D., & Limjap, A. (2018). Filipino Students' Use Of Metacognitive Skills In Mathematical Problem Solving: An Emergent Model. *International Journal for Development Research*,, 8(5), 20430-20439.
- Topping , K. (2009). Peer Assessment. . *Theory Into Practice*, 48(1), 20-27.  
doi:<https://doi.org/10.1080/00405840802577569>
- Torres, S. (2013). A role for lexical bundles in the implementation of Content and Language Integrated Learning programmes in Colombian universities. *English Today*, 29(02), 40–45.  
doi:10.1017/S0266078413000151
- Twining, P., Heller, R., Nussbaum, M., & Tsai, C. (2017). Some guidance on conducting and reporting qualitative studies. *Computers & Education*, 106, A1- A9.
- Urquhart, V. (2009). Using Writing in Mathematics to Deepen Student Learning. p. 24.
- Van , L. (2004). The semiotics and ecology. *UTBILDNING & DEMOKRAT*, 13(3), 79-103.
- Van de Craen, Piet, Mondt, Allain, & Gao. (2007). Why and how CLIL works. An outline for a CLIL theory. *Vienna English Working Papers*, 16, 70-78.
- Van Waes, L. (2004). Collaborative writing in a digital environment. *Information Design Journal*, , 12(1), 73–75.
- Wallace, Pearman, & Hail. (2007). Writing for Comprehension.
- Weimer, M. (2002). *Learner-Centered Teaching Five Key Changes to Practice*. Jossey-Bass.
- Wells , J. (2008). Trying to Meet the Demands of English in a Global Market. A Critical Discussion of the National Bilingual Programme in Colombia. *International Education Studies*, 1(1), 10.
- Whittaker, R., Llinares, A., & McCabe, A. (2011). Written discourse development in CLIL at secondary school. *Sage Journals*, 15(3), 343-362. doi:<https://doi.org/10.1177%2F1362168811401154>
- Widdowson, H. (1984). *Explorations in applied linguistics 2*. Oxford: OUP. Oxford : Oxford university press.
- Wilson, J., & Clarke , D. (2004). Towards the Modelling of Mathematical. *Mathematics Education Research Journal* , 16(2), 25-48. doi:<https://doi.org/10.1007/BF03217394>
- Witrock, M. (1990). *Handbook of research on teaching*. New York: Macmillan Publishing Company.
- Yasuda, S. (2019). Children's meaning-making choices in EFL writing: The use of cohesive devices and interpersonal resources. 85. doi:<https://doi.org/10.1016/j.system.2019.102108>

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

- Yoshida, M. (2002). Developing effective use of the blackboard study. *RBS Lesson Study Conference*.  
doi:[www.rbs.org/lesson\\_conference/2002/papers/yoshida\\_blackboard.shtml](http://www.rbs.org/lesson_conference/2002/papers/yoshida_blackboard.shtml)
- Yu, S., & Lee, I. (2016). Peer feedback in second language writing (2005–2014). *Language Teaching, Cambridge University Press* 20, 49(04), 461-493.  
doi:<http://dx.doi.org/10.1017/S0261444816000161>
- Zarobe, Y., & Zenotz, V. (2015). Reading strategies and CLIL: the effect of training in formal instruction. *The Language Learning Journal*, 43(3), 319-333.  
doi:[10.1080/09571736.2015.1053284](https://doi.org/10.1080/09571736.2015.1053284)

**Appendix A. Interview**

QUESTIONNAIRE UNIVERSIDAD PEDAGOGICA NACIONAL  
MAESTRIA EN LA ENSEÑANZA DE LAS LENGUAS EXTRANJERAS

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. What is your role in the school? Describe it.

---

---

---

---

2. What is your hourly intensity in each group?

---

---

---

---

3. How do you consider the level of proficiency of your students?

---

---

---

**Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

4. What opportunities of improvement do you find in the students' achievements?

---

---

---

---

---

5. Depict one successful class experience

---

---

---

---

---

**Appendix B. Answers from the Interview**

UNIVERSIDAD PEDAGOGICA NACIONAL MAESTRIA EN LA ENSEÑANZA DE LAS  
LENGUAS EXTRANJERAS

Name: Luisa Fernanda Cobos Date: September 18

1. What is your role in the school? Describe it.

I teach English in Second grade (there are 3 groups), and I'm group director of a Second grade class.

2. What is your hourly intensity in each group? I have 5 hours every week with each group.

3. How do you consider the level of proficiency of your students?

These kids communicate their needs in one way or another. In case they don't know a word, they switch to Spanish. At this point they don't have the conscious to self-correct, but some of them really try to use grammar structures in a proper way (Simple Present and some past forms so far).

The most difficult thing for them is asking questions since they constantly translate from Spanish.

4. What opportunities of improvement do you find in the students' achievements?

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

I think these kids could work on the proper use of Simple Present tense (third person conjugation and auxiliary words don't / doesn't), as well as the grammar structure of questions. When writing, they need to work on sentence completeness (subject – verb – complement).

### 5. Depict one successful class experience

The task was to write a letter. The first exercise was to write it in the way they thought it was supposed to be written. Then, kids had to compare their letter to one given by the teacher; they made changes related to the form. In order to check the content, I used collaborative work so kids worked with a partner making notes regarding the following aspects: spelling, capitalization, word order, sentences that sound weird. After this exercise, kids did a new and final version of their letter taking into account the feedback made by their classmates.

During the process, kids felt they were doing an important job and took it seriously. Besides, they were more conscious about grammar rules and verb conjugation.



**Appendix C. Teachers' answers from the questionnaire**

TOMMY CACERES

1. I teach English to 3<sup>rd</sup> grade students whose first language is not English. My typical responsibilities include \*among others;
  - Planning, preparing and delivering lessons.
  - Preparing, tailoring, and implementing teaching materials.
  - Helping students improve their skills through group sessions and reinforcement plans.
  - Checking and assessing student's work, then providing feedback.
2. 5 hours per week.
3. In general terms, students have an appropriate level of proficiency in relation to their age and context. In terms of fluency, the majority of students speak confidently and naturally with few interferences from L1, and they seem to know the desired words for specific moments. Their pronunciation is satisfactory; however, words starting with Y, or C sometimes have incorrect inflections, and are closer pronounced to Spanish. This same level of proficiency is noticeable in listening comprehension and reading decoding, but not quite so in writing activities.
4. Primary students could reach higher levels of fluency and spontaneity in speaking if the core curriculum wasn't based on grammar. I have experienced this through the use of materials and perspectives in unofficial lessons. There are scarce opportunities for students to talk and express ideas in L2, or to use writing elements such creativity with that purpose, so there aren't enough chances to assess, practice, and improve beyond grammar accuracy.

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

5. Last year I was teaching the difference between past and present tense to 2<sup>nd</sup> graders, the whole class was done through games. After explaining the rules for regular verbs and main irregular verbs, they had to play a game in distinguishing the past and present forms of verbs. Children had to catch some fish (each carrying a verb) as they swam by and drop them in the right bucket: past or present. By the end of the class (45 minutes) the proposed activities lead not only to greater involvement in learning and producing knowledge, but also to social affiliations in class, and emotional support provided by students.

**Appendix D. English Area Plan Document**

<b>School Year: (*)</b>	<b>Department: (*)</b>	<b>Head of Department: (*)</b>
2018-2019	ENGLISH	DEWI HERU

**COGNITIVE PRINCIPLES:**

**2.2. MEANINGFUL LEARNING**

Every single linguistic utterance should be learned and taught in a context. Many cognitive theories suggest that language in isolation is useless. Therefore, the student should be immersed in a real or simulated environment where the language use is the purpose of the learning situation. In the same way, structural aspects should be perfectly understandable for the student in agreement with his intellectual level of development.

The academic exposure should be enriched with a more significant spontaneous interaction.

“The notional-functional syllabus is based on the following premises: **(1)** communication is meaningful behavior in a social and cultural context that requires creative language use rather than synthetic sentence building, **(2)** language is constructed around language functions and notions; **functions** such as evaluating, persuading, arguing, informing, agreeing, questioning, requesting, expressing emotions and **semantic-grammatical notions** such as time, quantity, space, location, and motion are some examples. The aim of this approach is to transfer these functions to acts of communication.” (Tarfa Ash-Shammari and Dina Al-Sibai. November, 2005)

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

### **6.2.2. Specific methodological considerations for First and Second:**

The approach that has relevance in First and Second is basically phonetic and communicative in functional contexts (Notional-Functional Approach). The student reinforces the reading-writing process by using phonetic basis (Phonovisual Charts) and approaching texts following the global method and the first and secondary decoding strategies. He/she continues acquiring necessary lexicon, expressions and patterns covering his/her learning needs with the help of his/her teacher, who guides and promotes both phonic and decoding challenges. It is a requirement that the teacher in this level manage the language proficiently in all its contents: phonetics, morphology, grammar and syntax. These structural issues should be taught using the conceptual pedagogy strategies and instruments. It is fundamental to recall sounds from English language that may be similar to Spanish. The emphasis on initial and final clusters is necessary. The Phonovisual Charts become very useful tools to mechanize the phonetic structure. The school has simple story and informative books to efficiently work these drills too. It is advisable to enrich vocabulary by assigning lists to be read, spelled and used in context on a weekly basis.

## Appendix E. Mathematics Class Goals LEARNERS' PROGRESS

**Metas de transferencia** Los estudiantes podrán usar independientemente su aprendizaje para...

# TRA-ING-41672- ES 🔒 🔗 RP C 3 🗨️ ⋮  
 apply adequate lexicon, conventions and structures to describe events, characters or objects.  
 MR  
 TRA-ING-15358

**Metas de comprensión**

**Comprensiones** Los estudiantes comprenderán que...

# COM-ING-41673- ES 🔒 🔗 C 1 🗨️ ⋮  
 present continuous tense describes actions that are in progress.  
 MR  
 COM-ING-15367

# COM-ING-41688- ES 🔒 🔗 C 1 🗨️ ⋮  
 types of adjectives are useful to accurately compare, describe and add important information to the nouns.

**Preguntas esenciales** Los estudiantes seguirán considerando...

# PRE-MUL-41674- ES 🔒 C 🗨️ ⋮  
 How do I know which actions are in progress?

# PRE-MUL-41675- ES 🔒 C 🗨️ ⋮  
 How do adjectives help me describe nouns more accurately?

# PRE-ING-41676- ES 🔒 C 🗨️ ⋮  
 How do informative texts differ from narrative texts?

MU  
 CON-ING-15384CON-39284CON-ING-15383CON-ING-41677

# CON-ING-41679- ES 🔒 🔗 C 1 🗨️ ⋮  
 Types of texts.  
 MR  
 CON-ING-15409CON-ING-15412CON-ING-15411CON-ING-15418

# HAB-ING-41682- ES 🔒 🔗 RP C 2 🗨️ ⋮  
 using adjectives in descriptions.  
 MR  
 HAB-ING-15425HAB-ING-15431

# HAB-ING-41683- ES 🔒 🔗 C 4 🗨️ ⋮  
 proofreading assigned work.  
 MR  
 HAB-ING-15426

# HAB-ING-41684- ES 🔒 🔗 C 1 🗨️ ⋮  
 fulfilling assigned work according to established standards.  
 MR  
 HAB-145

# HAB-ING-41685- ES 🔒 🔗 RP C 5 🗨️ ⋮  
 creating narrative and informative texts.

## Bansho Mathematics strategy as a means for enhancing writing skills in second graders

COM-ING-41689-ES narrative texts differ from informative texts.

MR  
COM-ING-15375COM-ING-15376

### Metas de adquisición

**Conocimientos** Los estudiantes conocerán...

**Habilidades** Los estudiantes serán capaces de...

CON-ING-41677-ES Present continuous.

MR  
CON-ING-15380CON-ING-41678

MU  
CON-ING-15380CON-ING-41678

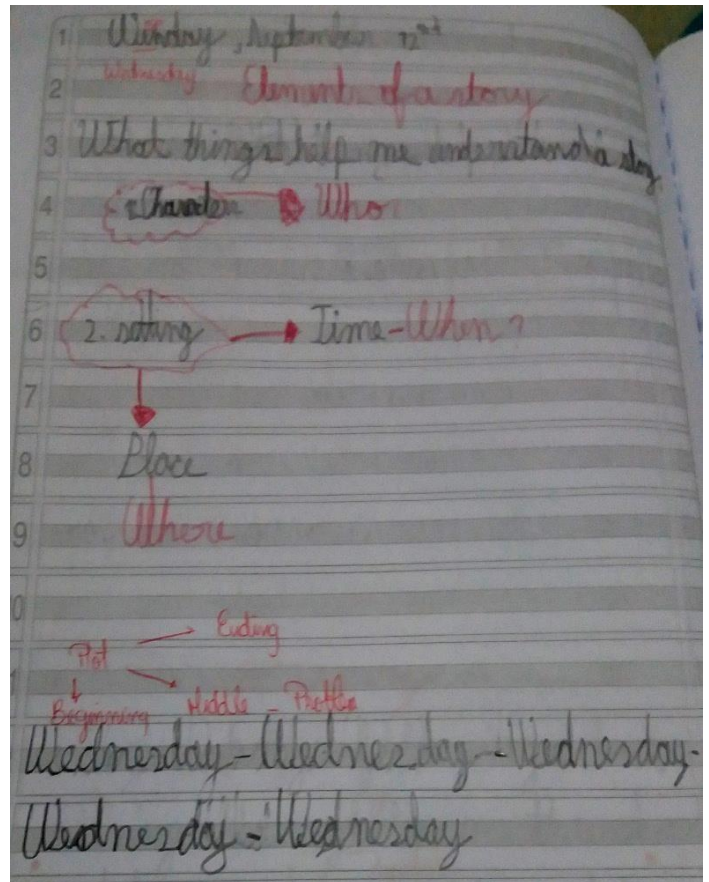
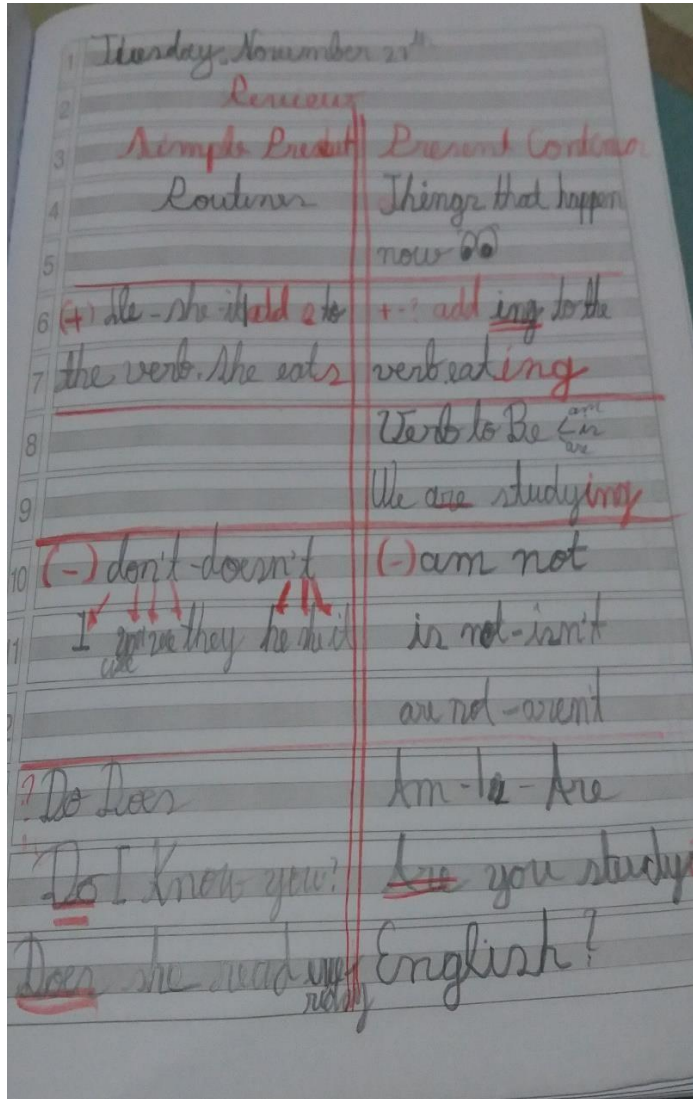
CON-ING-41678-ES types of adjectives.

HAB-ING-41680-ES speaking and writing sentences using the right structure and verb conjugation in present continuous.

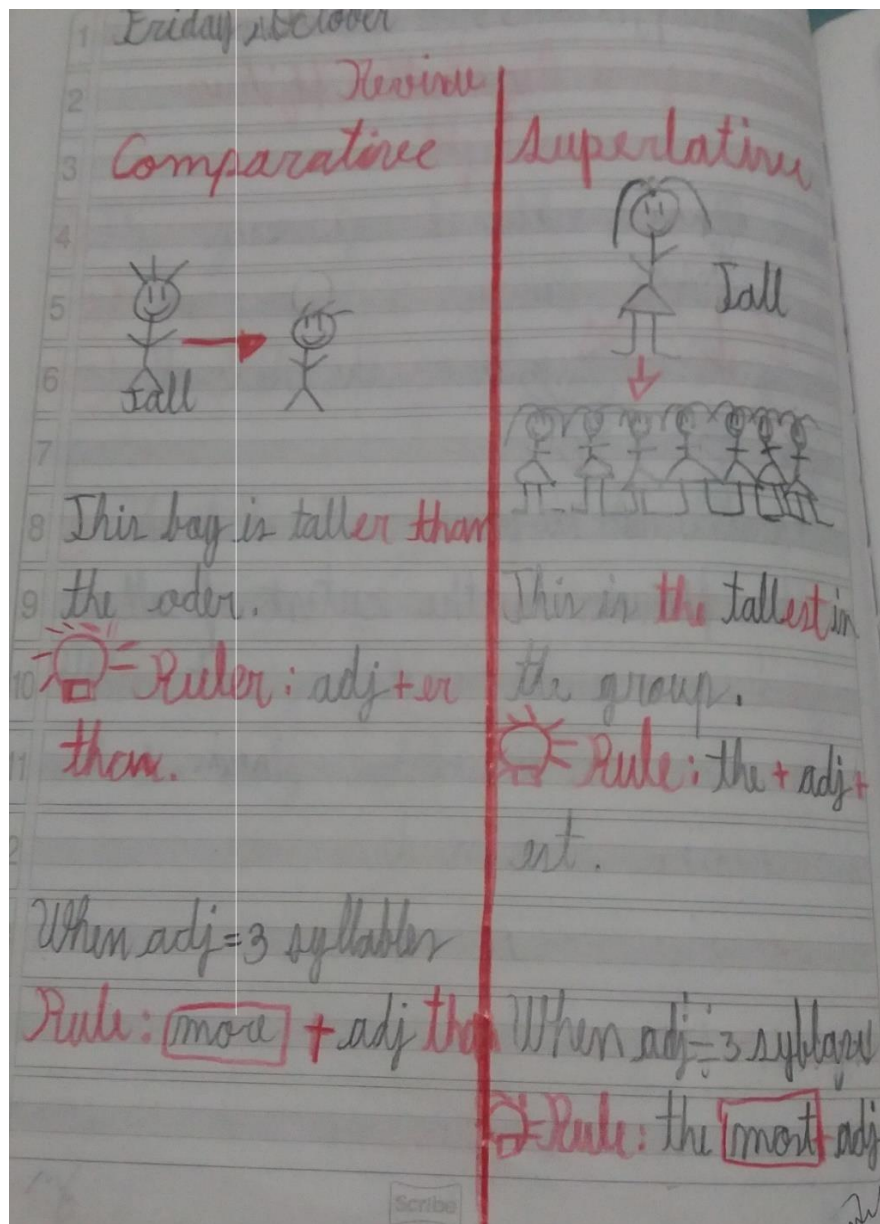
MR  
HAB-ING-15422HAB-ING-15425

HAB-ING-41681-ES using possessive adjectives correctly in both oral and written way.

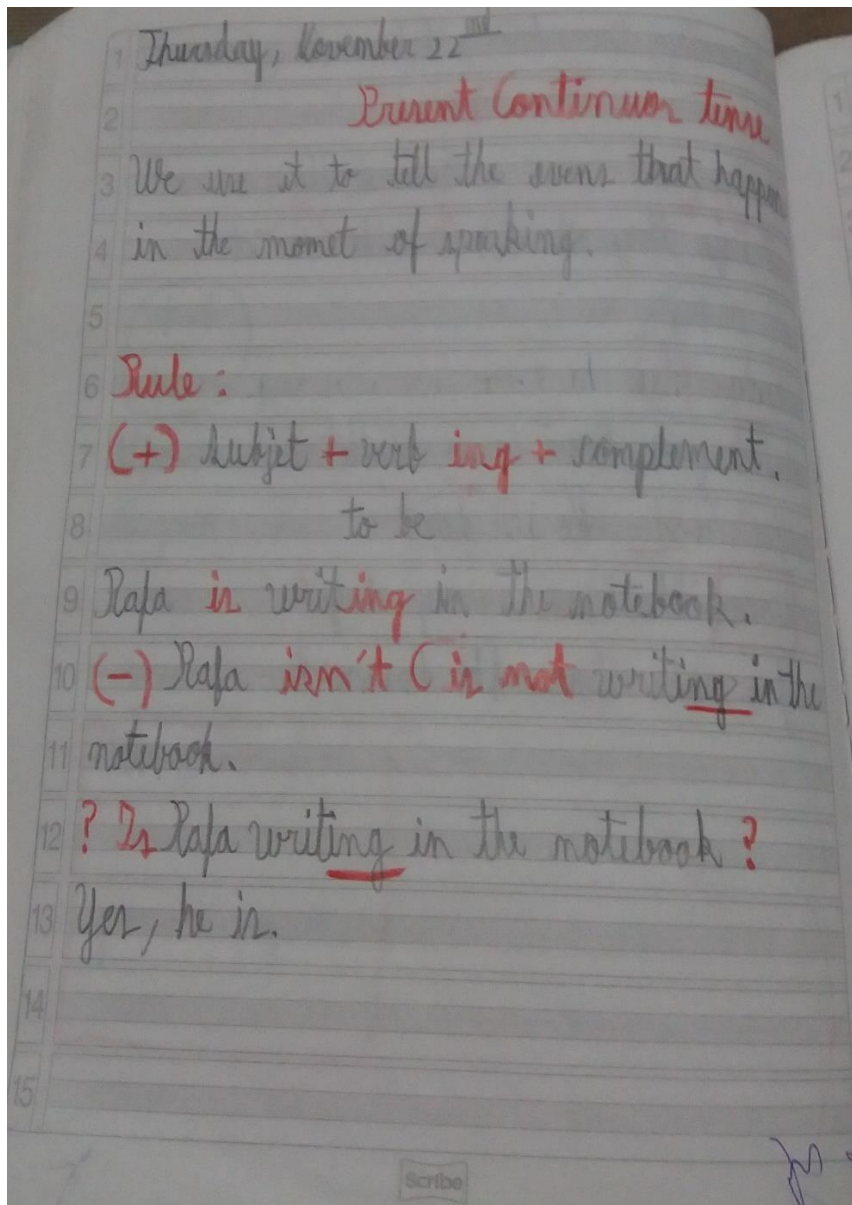
Appendix F. Artifacts (21 notebooks) and Board Transcription



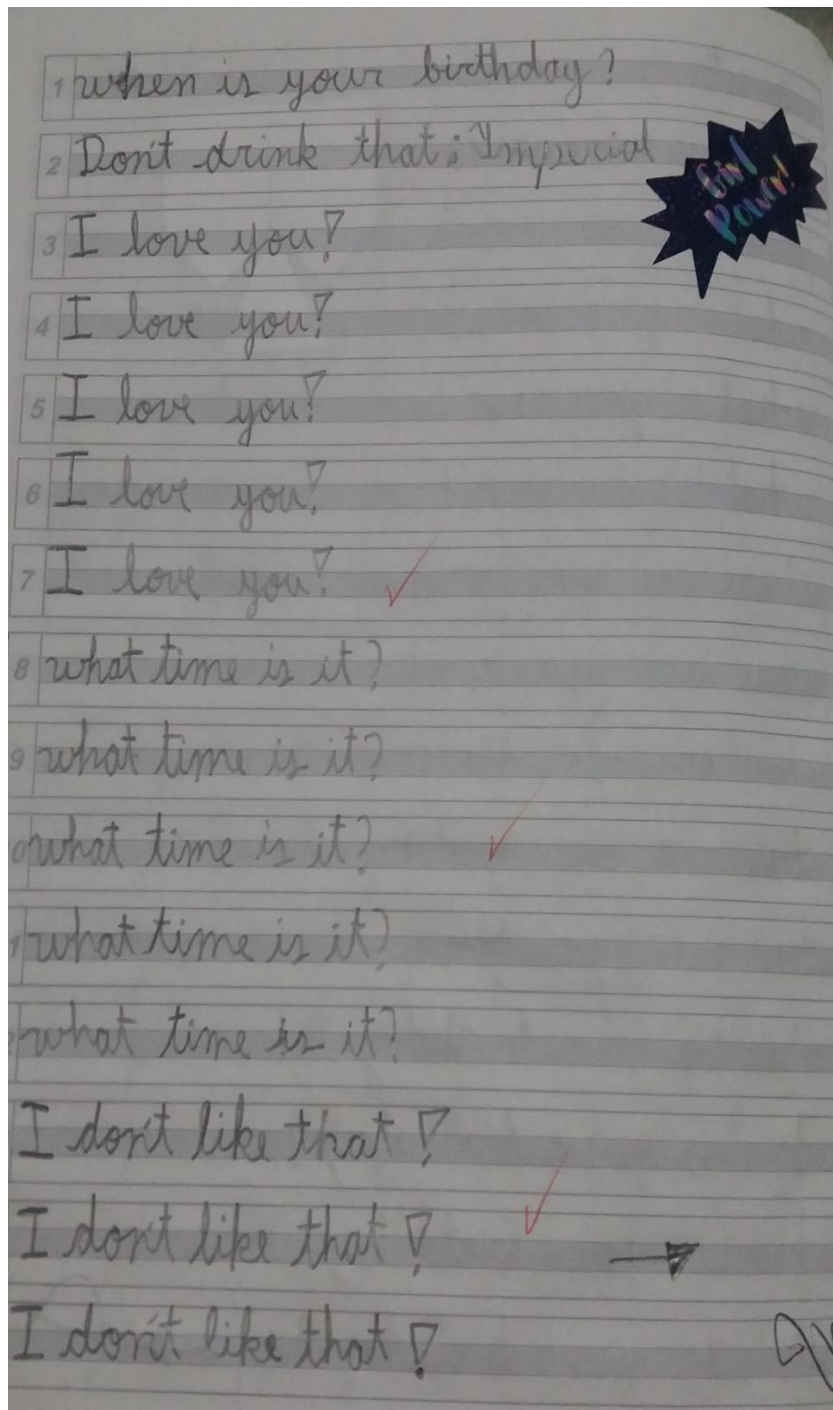
Appendix G. Grammar Sequence and Grammar Approach

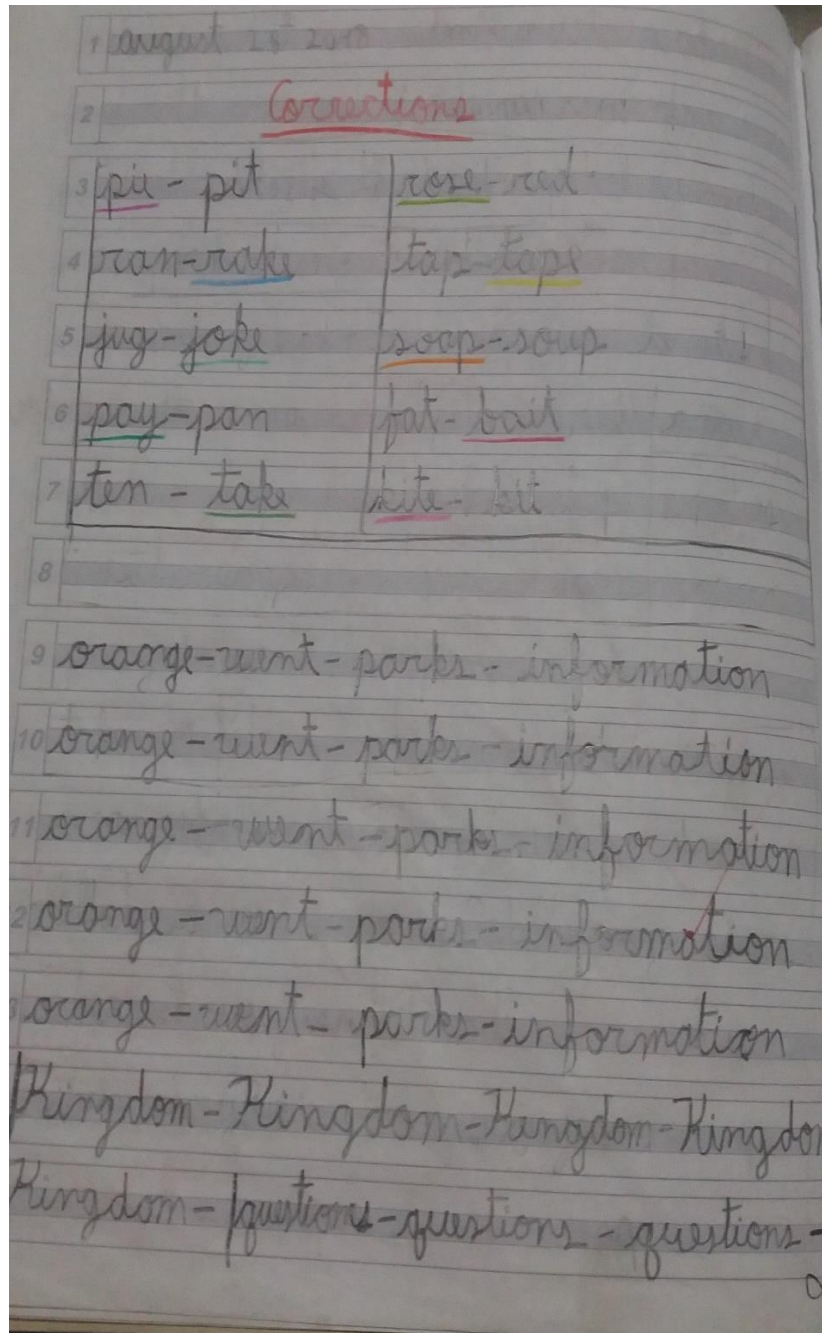




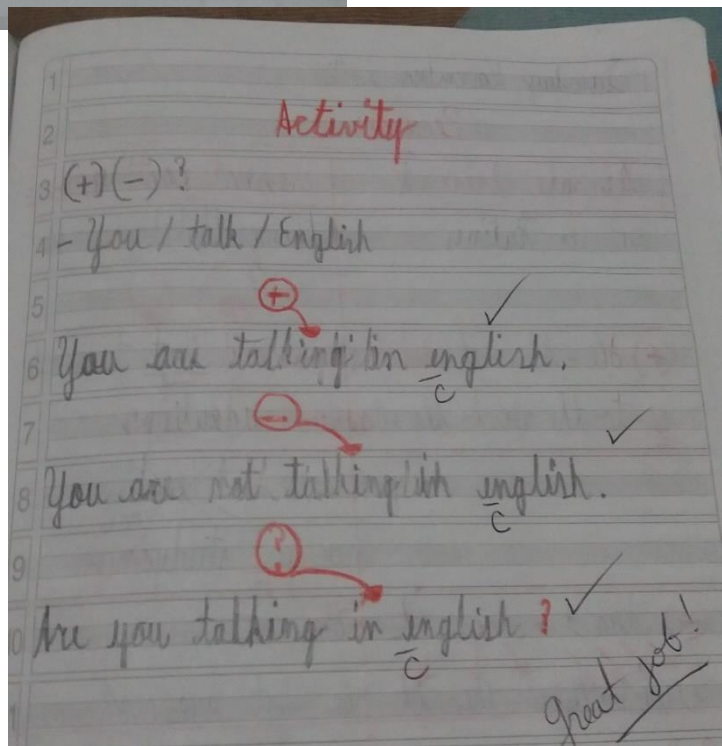
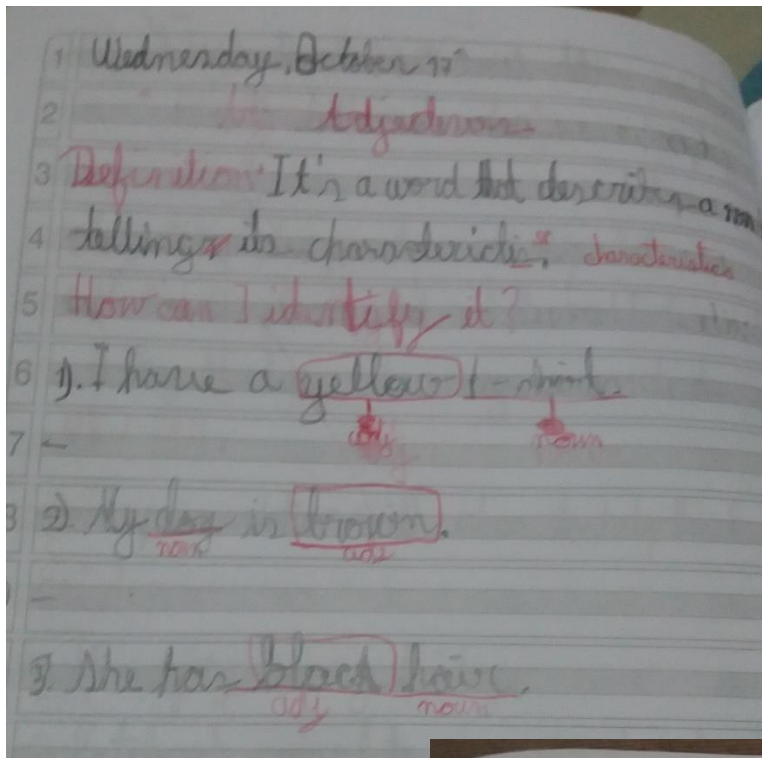


Appendix H. Repetition Exercise

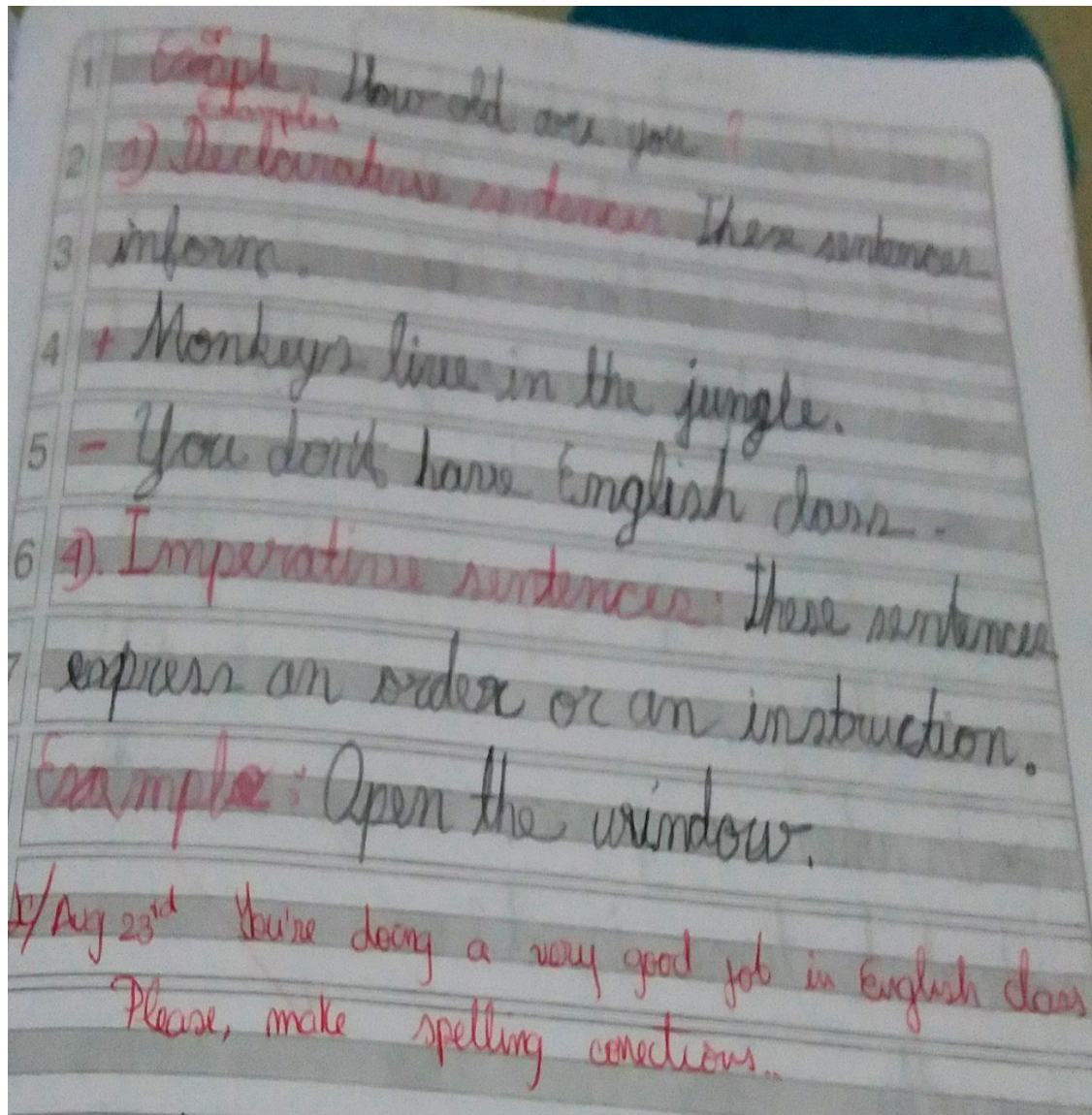




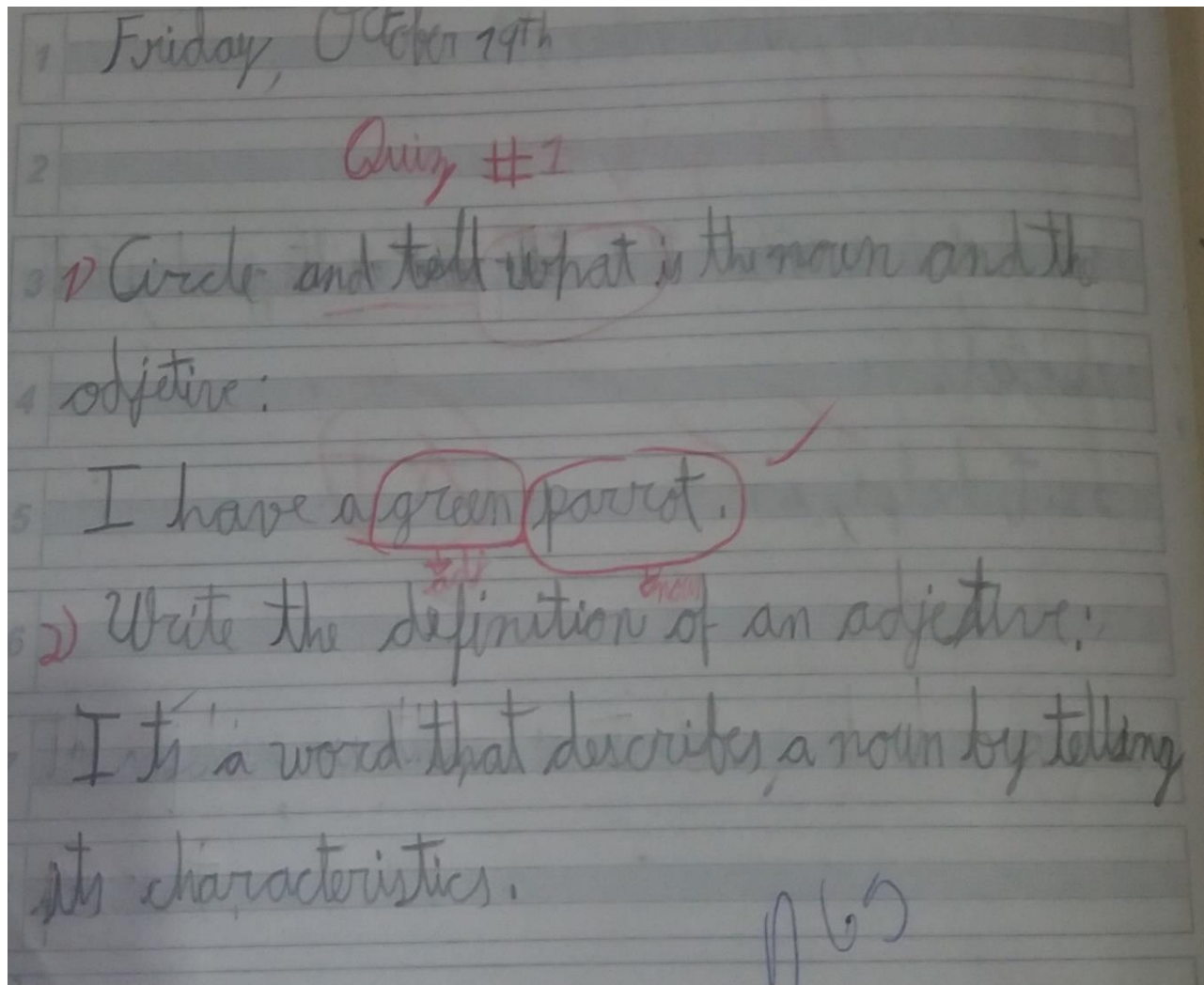
Appendix I. Lack of Free Writing

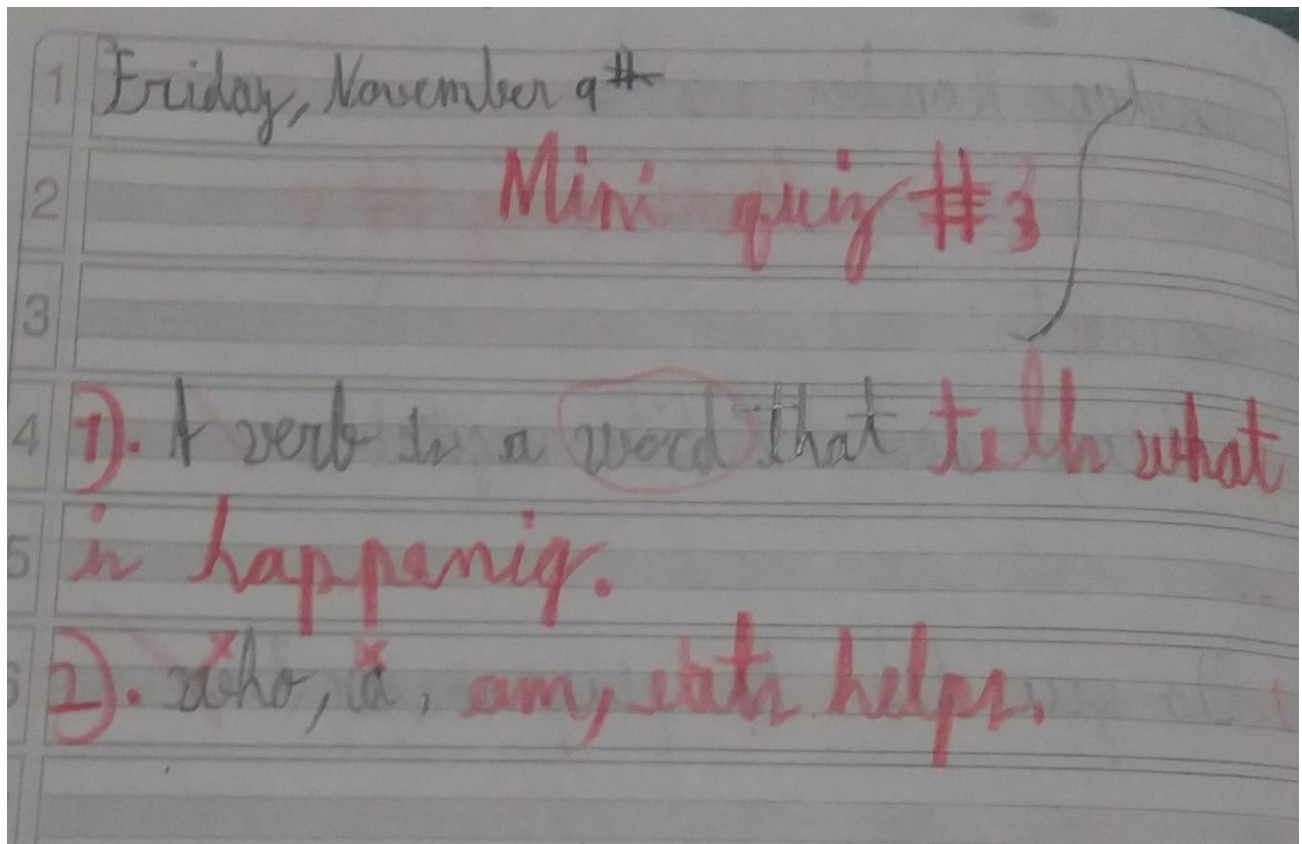


Appendix J. Modelled exercises

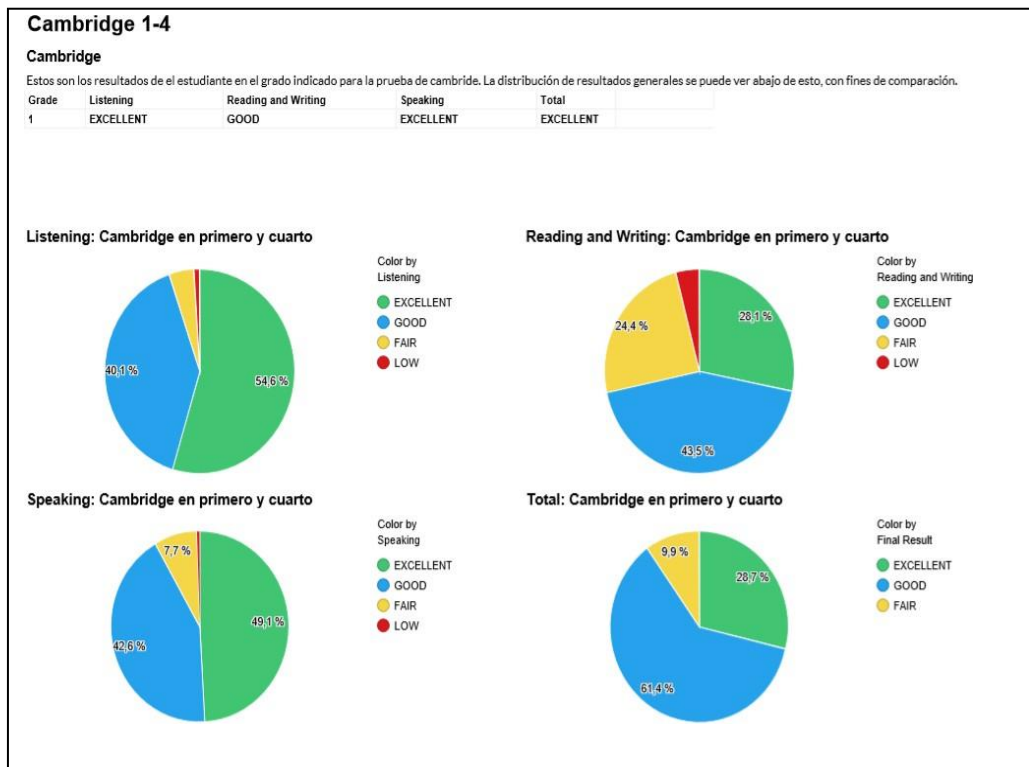
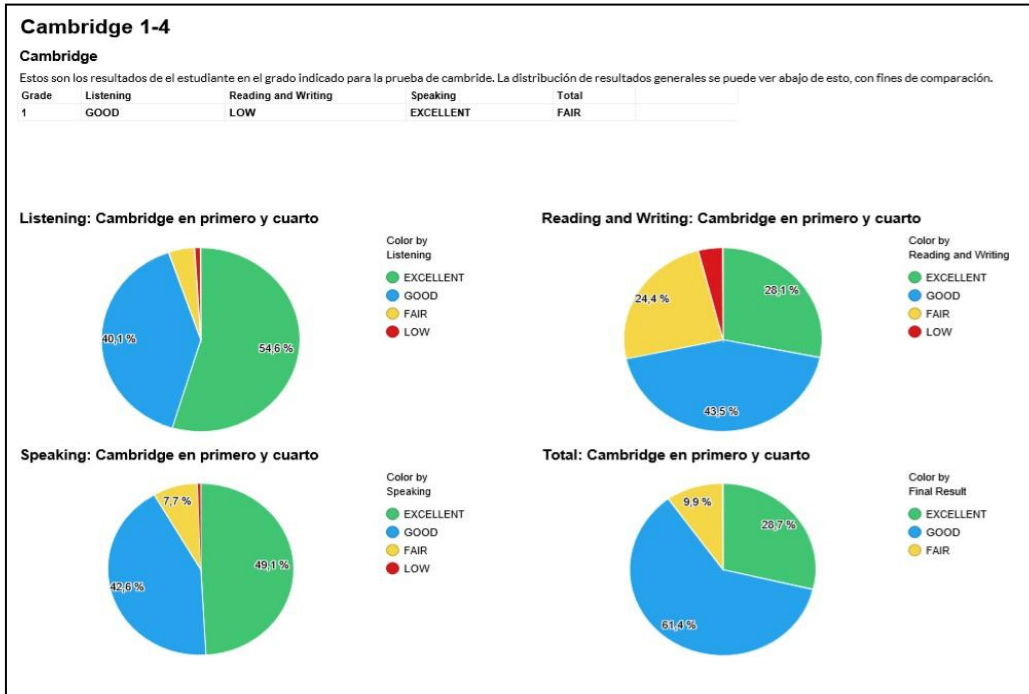


Appendix K. Tests about Knowledge of Grammar Elements






### Appendix L. Cambridge Standardized Tests for Young Learners (movers)





Appendix M. Informed Consent

 UNIVERSIDAD PEDAGÓGICA NACIONAL <small>Universidad de Colombia</small>	<b>FORMATO</b>	
	<b>CONSENTIMIENTO INFORMADO PARA LA PARTICIPACIÓN EN INVESTIGACIONES ADULTO RESPONSABLE DE NIÑOS Y ADOLESCENTES</b>	
Código: FOR025INV	Versión: 01	
Fecha de Aprobación: 02-06-2016	Página 188 de <del>191</del> <sup>89</sup>	

**Vicerrectoría de Gestión Universitaria  
Subdirección de Gestión de Proyectos –  
Centro de Investigaciones CIUP Comité de  
Ética en la Investigación**

En el marco de la Constitución Política Nacional de Colombia, la Ley 1098 de 2006 – Código de la Infancia y la Adolescencia, la Resolución 0546 de 2015 de la Universidad Pedagógica Nacional y demás normatividad aplicable vigente, considerando las características de la investigación, se requiere que usted lea detenidamente y si está de acuerdo con su contenido, exprese su consentimiento firmando el siguiente documento:


**PARTE UNO: INFORMACIÓN GENERAL DEL PROYECTO**

<b>Facultad, Departamento o Unidad Académica</b>	Facultad de Humanidades, Departamento de Lenguas. Universidad Pedagógica Nacional.
<b>Título del proyecto de investigación</b>	<b>MATHEMATICAL-BASED ACTIVITIES TO FOSTER EFL WRITING SKILLS</b>
<b>Descripción breve y clara de la investigación</b>	Este estudio tiene la intención de explorar los efectos de la utilización estructurada del método de enseñanza de Matemáticas “Bansho” en las habilidades de escritura de lengua extranjera en los estudiantes de segundo grado, esto en el contexto de la resolución de problemas en las clases de AICLE (CLIL)
<b>Descripción de los posibles riesgos de participar en la investigación</b>	Esta Investigación <u>no supone algún tipo de riesgo a sus participantes.</u>

Bansho Mathematics strategy as a means for enhancing writing skills in second graders

<p>Descripción de los posibles beneficios de participar en la investigación.</p>	<p><i>Esta participación redundará en favorecer el proceso de producción escrita en Lengua Inglesa mediante el uso de actividades propias de la clase de Matemáticas en el enfoque AICLE. A su vez, esta participación permitirá generar información para indicar el uso potencial de las actividades realizadas en términos de beneficios en la formación de los estudiantes y el enriquecimiento de las prácticas pedagógicas en el modelo de Bilingüismo de la institución.</i></p>
	<p>Nombre(s) y Apellido(s): Martin Alfonso Arias Rivera</p>

<p>Datos generales del investigador principal</p>	<p>N° de Identificación: C.C 80.243.383</p>	<p>Teléfono :</p>	<p>3057671855</p>
	<p>Correo electrónico: <a href="mailto:martinarias@glm.edu.co">martinarias@glm.edu.co</a></p>		
	<p>Dirección: Cra 7A # 3- 25 Chía (Cundinamarca)</p>		

 UNIVERSIDAD PEDAGÓGICA NACIONAL <small>Universidad de la Calidad</small>	<b>FORMATO</b>	
	<b>CONSENTIMIENTO INFORMADO PARA LA PARTICIPACIÓN EN INVESTIGACIONES ADULTO RESPONSABLE DE NIÑOS Y ADOLESCENTES</b>	
Código: FOR025INV	Versión: 01	
Fecha de Aprobación: 02-06-2016	Página 189 de <u>191</u>	

**PARTE DOS: CONSENTIMIENTO INFORMADO**

Yo \_\_\_\_\_ mayor de edad, identificado con  
 Cédula de Ciudadanía N.º \_\_\_\_\_ de \_\_\_\_\_,  
 con domicilio en la ciudad de \_\_\_\_\_ Dirección: \_\_\_\_\_  
 \_\_\_\_\_ Teléfono y N° de celular: \_\_\_\_\_  
 \_\_\_\_\_ Correo electrónico: \_\_\_\_\_

Como adulto responsable del niño(s) y/o adolescente (s) con:  
 Nombre(s) y Apellidos: \_\_\_\_\_ Tipo de Identificación \_\_\_\_\_ N° \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_

Autorizo expresamente su participación en este proyecto y


**Declaro que:**

1. He sido invitado(a) a participar en el estudio o investigación de manera voluntaria.
2. He leído y entendido este formato de consentimiento informado o el mismo se me ha leído y explicado.
3. Todas mis preguntas han sido contestadas claramente y he tenido el tiempo suficiente para pensar acerca de mi decisión de participar.
4. He sido informado y conozco de forma detallada los posibles riesgos y beneficios derivados de mi participación en el proyecto.
5. No tengo ninguna duda sobre mi participación, por lo que estoy de acuerdo en hacer parte de esta investigación.
6. Puedo dejar de participar en cualquier momento sin que esto tenga consecuencias. Conozco el mecanismo mediante el cual los investigadores garantizan la custodia y confidencialidad de mis datos, los cuales no serán publicados ni revelados.
7. Autorizo expresamente a los investigadores para que utilicen la

## **Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

información derivada de los grabaciones de audio de los grupos focales, e imágenes que se generen de la producción académica en el marco del proyecto.

8. Sobre esta investigación me asisten los derechos de acceso, rectificación y oposición que podré ejercer mediante solicitud ante el investigador responsable, en la dirección de contacto que figura en este documento.

 UNIVERSIDAD PEDAGÓGICA NACIONAL <i>Universidad al servicio</i>	<b>FORMATO</b>	
	<b>CONSENTIMIENTO INFORMADO PARA LA PARTICIPACIÓN EN INVESTIGACIONES ADULTO RESPONSABLE DE NIÑOS Y ADOLESCENTES</b>	
Código: FOR025INV	Versión: 01	
Fecha de Aprobación: 02-06-2016	Página 190 de <u>191</u>	

Como adulto responsable del menor o adolescente autorizo expresamente a la Universidad Pedagógica Nacional utilizar sus datos y las grabaciones de audio, o imágenes que se generen, que reconozco haber conocido previamente a su publicación en: \_\_\_\_\_

En constancia, el presente documento ha sido leído y entendido por mí, en su integridad de manera libre y espontánea. Firma el adulto responsable del niño o adolescente,

\_\_\_\_\_  
Nombre del adulto responsable del niño o adolescente: .

Nº Identificación: \_\_\_\_\_ Fecha: \_\_\_\_\_

Firma del Testigo:

\_\_\_\_\_  
Nombre del testigo: \_\_\_\_\_  
Nº de identificación: \_\_\_\_\_ Teléfono: \_\_\_\_\_

**Declaración del Investigador:** Yo certifico que le he explicado al adulto responsable del niño o adolescente la naturaleza y el objeto de la presente investigación y los posibles riesgos y beneficios que puedan surgir de la misma. Adicionalmente, le he absuelto ampliamente las dudas que ha planteado y le he explicado con precisión el contenido del presente formato de consentimiento informado. Dejo constancia que en todo momento el respeto de los derechos el menor o el adolescente será prioridad y se acogerá con celo lo establecido en el Código de la Infancia y la Adolescencia, especialmente en relación con las responsabilidades de los medios de comunicación, indicadas en el Artículo 47.

En constancia firma el investigador responsable del proyecto,

\_\_\_\_\_

**Bansho Mathematics strategy as a means for enhancing writing skills in second graders**

Nombre del Investigador responsable: \_\_\_\_\_

N.º Identificación: \_\_\_\_\_

Fecha: \_\_\_\_\_

*La Universidad Pedagógica Nacional agradece sus aportes y su decidida  
participación*