A Study Using Thematic Maps for Vocabulary Acquisition in Japanese and Colombian University English Classes

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Abstract

This paper examines the effectiveness of using thematic maps as a tool for teaching in CLIL and EFL contexts by focusing on how they improve vocabulary acquisition and retention among undergraduate university students in Japan and Colombia. The data collected from pretest and posttest vocabulary test scores indicate that using thematic maps can progress students' vocabulary acquisition and retention. The study shows that thematic maps can assist in teaching new vocabulary and improving student's knowledge of English speaking countries, as they provide a visual representation of words in context and encourage students to analyze, interpret and explain real-world information. This paper also provides insights for educators in CLIL/EFL classrooms via classroom procedure descriptions of map usage and thus its utility can be replicated.

Keywords : Content and Language Integrated Learning (CLIL), EFL, thematic maps, vocabulary

1   INTRODUCTION

Teaching Content Language Integrated Learning (CLIL) and English as a Foreign Language (EFL) has many challenging aspects. One of the key challenges for educators is ensuring students adequately learn and retain enough vocabulary to communicate fluently and effectively in the target language. Crucially, language learners must not only comprehend and memorize the meaning of many distinct words, but also how they fit into larger frameworks. This juncture is where thematic maps can be a useful tool in the CLIL/EFL classroom. This is because they allow for visual representations and relationships between words connected to real-world/geographical settings and processes. In this paper we aim to demonstrate that using maps as a tool can help students understand and remember new vocabulary effectively by examining data collected through pretest and posttest vocabulary test scores after a five-lesson study module.

The paper is based on research conducted in English classes with both Japanese and Colombian undergraduate university students and thus has an international component based on locations as well as different first languages (L1s). The Colombian students were primarily studying in the areas of International Relations, Business Administration, and Economics at Universidad Externado de Colombia. The Japanese students were studying in the sphere of Engineering and science at Muroran Institute of Technology (MuroranIT). Both of the preceding institutions require English proficiency from their students. Having laid out the preceding basic information let us be clear about how thematic maps are fit into CLIL/EFL contexts as we delve into the study.

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2   THEMATIC MAPS IN CLIL/EFL CONTEXTS

2. 1   Thematic map usage

One of the key benefits of using maps as a learning tool in CLIL/EFL classrooms is that they root the learning in real-world settings and contexts (Perrem, 2021)[1]. In this way 'geographical imagination' may be used as a tool to inspire a sense of connectedness (Perrem, 2021, p.96)[1] to places which CLIL/EFL students may not otherwise encounter. This also affords the learner what Marsh notes as the 'dual learning' (Habte-Gabr, 2017, p.77)[2] benefit of gaining knowledge about the world via gaining familiarity in understanding maps as well as aspects of the English language, such as relevant vocabulary. As Beddis (1983, p.5)[3] states: 'maps and plans are extremely useful ways of storing and communicating information about places and the people who live and work in them. There is a "language" of maps and pupils can be helped to understand and use it just as they can be helped with any other language development'.

Thus, two forms of language learning are occurring when thematic maps are used: the language of maps and the language of English. Research has shown (Weeden, 1997)[4] that maps are considered to be an important form of communication on par with numeracy, oracy and literacy. Furthermore, it has been noted (Bryan & Habte-Gabr, 2008)[5] that students often lack geographical knowledge which hinders comprehension of English language texts and thus an imperative exists to counter this issue within CLIL/EFL contexts and classrooms.
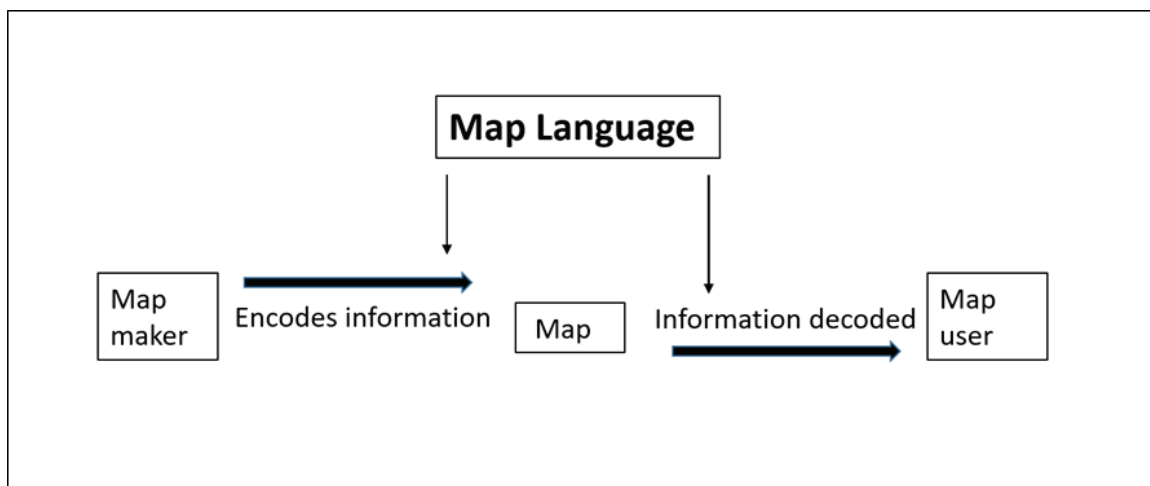

Figure 1. Simplified map language communication system. Adapted by the author from Weeden 1997.

During the Covid-19 pandemic, students appear to have become less aware of the importance of physical locations and the spatial context of social processes. The rapid advancements in digitization and globalization have contributed to a perception of the world as being more aspatial, where the significance of understanding specific places may be diminished. Marginson (2011)[6] highlights the role of globalization in compressing time and space. Interestingly, despite students' increased engagement with online media, their interest in geographic and spatial concepts vocabulary has been more at risk. By using maps in CLIL/EFL contexts this risk can be reduced.

2. 2   What are thematic maps?

Thematic maps, as the name implies, are a form of map that display a particular theme or focus upon an issue. Typical examples of such maps include themes like business density spread across a particular region, housing prices in a city or crime levels across a country. One key point to note is that thematic maps significantly differ from physical maps. Physical maps show geographic features such as rivers or mountains and other natural

phenomena. Thematic maps differ in that they focus on a specific attribute or characteristic of an area, region or country as a result of some form of thematic analysis which can be read.

A variety of techniques are utilized to portray information in thematic maps. These often include using different shading, integrating symbols, or color-coding schemes as in the case of choropleth maps. For example, shading techniques are useful for map readers to understand the depiction of continuous statistics about an area through tones of colors, in a cardinal or ordinal scale. An example of this can easily be conceived of if we imagine a map showing the density of crime across a country. Areas with higher crime might be shaded in dark red while shades of grey to might be used indicate areas with a low crime density. Schiewe (2019)[7] and Yang et al. (2020)[8] suggest that choropleth maps are the best way to show area-linked data compared to other thematic maps as the information is two dimensional, making it easier for interpreting the significance of data within a geographical area. Students who are normally not exposed to maps are also able to learn about the location of countries, societal aspects and divisions in a meaningful way.

2. 3   Vocabulary, skills and maps

One of the advantages of using thematic maps in the CLIL/EFL classroom is that they provide a visual representation of vocabulary in context. This can help students understand how words are related to each other and how they are used in real-world situations to examine issues such as unemployment for example.

Havelková and Hanus (2018)[9] have demonstrated that reading/using maps can sometimes be "cognitively demanding," particularly when previous map experience has been limited. Consequently, placing emphasis on a specific learning task, such as language competency, coupled with a content area like thematic maps, allows students to learn aspects about both subjects concurrently. This approach facilitates the simultaneous acquisition of vocabulary and understanding of useful geographical concepts which can be used by the student in myriad situations.

Thematic maps can be a beneficial tool for developing students' Higher Order Thinking Skills (HOTS), as they encourage students to analyze, interpret and explain information (Cambridge University, 2012)[10]. Both EFL and Geography are subjects that lend themselves to a clear delineation of learning objectives that can be schematized, and further, which can be organized according to a hierarchy of thinking skills. This hierarchy encompasses Lower Order Thinking Skills, including memorization and understanding, as well as intermediate thinking skills such as application and analysis. Finally, higher-order thinking skills (HOTs) such as evaluation and creation are also integral to these subjects.

An advantage of choropleth mapping it that it has been designed to not be "overly complex" to the reader (Dent, 1985, p.198)[11]. This allows it to be a visual tool in EFL and CLIL courses as information is conveyed clearly with limited language. In turn, this allows the student to employ HOTs skills without being impeded by language, which can be a motivating factor to use English for more complex purposes.

HOTS are based on Blooms Taxonomy, which ranges from Lower Order Thinking Skills, which include remembering and understanding, followed by intermediate skills, application and analysis and finally, evaluation and creation. (Armstrong, 2010)[12] When integrating content and language, as in the case of this study, calibrating HOTS levels in both language and content is important for the simultaneous learning process to occur. In our study the HOTS involve vocabulary, use of choropleth maps and place location knowledge. This can be summarized in the following table.

Table 1. HOTs level and skills summary table

HOTs Level	Vocabulary Skills	Geographic Skills
Remembering and understanding	Looking up definitions of words, identifying cognates.	Locating the countries in the study and learning about thematic maps, particularly choropleth maps.
Application	Brainstorming the meaning of vocabulary while using maps after the pretest.	Relating the vocabulary to the information on the maps after posttest.
Evaluation and Creation	Using the maps after the pretest to broaden vocabulary of students. Using broader language for making inferences. For example, what are possible reasons for unemployment variations in different regions of New Zealand?	Identifying and speculating on spatial variations of data within the countries studied. Discussions about similarities and spatial variations within countries.

3   METHODOLOGY

3. 1   Study location and setting

The data for this study was collected during the second semester of 2022 at two institutions: MuroranIT in Japan and Universidad Externado de Colombia in Colombia, South America. The data gathering was preceded by a correspondence, preparation and study refinement phase which lasted several months between the authors. During that preparatory phase the exact thematic maps, vocabulary and lesson timing were agreed upon. Ultimately a series of thematic maps for Australia, New Zealand, the USA, the UK and Ireland were selected to be used.

The reason for selecting these specific countries was based on the fact that both Japanese and Colombian students were studying English as a foreign language. It was considered that choosing English-speaking countries would be advantageous for their English language skills. Additionally, these countries were already familiar to the students due to their areas of study. By delving into topics related to these countries, it was expected that the students' international knowledge would be further developed, complementing the knowledge they had acquired in other courses.

The participants in both Japan and Colombia were informed about the study, the Thematic Maps Project (TMP), and how their data would be used. It was made clear that it was not compulsory for them to participate if they did not wish to and that their data would be anonymous if they did choose to participate.

3. 2   Study limitations

There are two potential limitations to be highlighted in this study. The first being the lack of control groups. Control groups can allow for a clearer vantage point regarding data differences between pretest and posttest scores as well help to verify the effectiveness of teaching that has taken place (Sustenance, 2022) [13]. However, in this study constraints outside of the researchers' control made this unfeasible. The scheduling of classes within the term when the study occurred did not allow for control groups to be incorporated into the study on the Japanese side. Therefore, control groups were not utilized and as such this caveat should be kept in mind. However, to the best of

both authors' knowledge, this study represents the inaugural attempt of its kind to combine thematic maps with vocabulary assessment in an intercontinental setting and therefore still holds value in informing the design of future research within this field.

The second limitation relates to the impact of pacing. As this is an international study involving two universities, natural differences in pacing emerged. Japanese students attended class once a week, whereas Colombian students attended twice a week. Consequently, the completion time for the TMP varied. The study did not include a comparative analysis of the effects arising from these differing durations, as it was deemed beyond the scope of the study's objectives. Our primary focus was on evaluating the effectiveness of the TMP within the specific timeframes allocated for each group. While we acknowledge that variations in duration could potentially influence outcomes, conducting such a comparative analysis was not part of the study's original design.

3. 3   Country and lesson themes

Three thematic maps for each country were utilized as the focal point across five lessons both in Japan and Colombia. Three themes correlated to each of the three maps per country, those being crime, work and business. For clarity, this themed approach is presented in Table 2. The themes were initially arrived at by being cognizant of Weeden's (1997) [4] geographic rationale of scale in tandem with practical content considerations. These chosen themes hold intrinsic relevance to thematic maps, equipping learners with vocabulary that finds immediate practical application. This ensures that the language proficiency gained in these areas remains applicable on a broad scale and directly relevant to interpreting thematic maps. By focusing on themes of crime, business, and work within an EFL/CLIL context, we adopt a comprehensive approach to language learning, as these themes are intimately linked to real-world contexts vividly depicted in thematic maps. The integration of these themes with the maps was intended to foster a more thorough and enriched understanding of the participants' broader global context.

Table 2. Thematic Maps Project (TMP) countries and themes

TMP Lesson	Country	Map 1	Map 2	Map 3
1	Australia	Crime	Work	Business
2	New Zealand	Crime	Work	Business
3	USA	Crime	Work	Business
4	UK	Crime	Work	Business
5	Ireland	Crime	Work	Business

The criteria for selecting the vocabulary included considerations of the preceding thematic relevance, cultural and geographical context of the five TMP English speaking countries, and alignment with Weeden's concept of 'map language words' (Weeden, 1997, 2) [4]. 'Map language words' allow for a spatial understanding of the concepts they represent. They help learners to visualize and analyze data, patterns, and relationships in a geographic context. Thus, specific vocabulary related to each of the themes of crime, work and business were selected to support students in being able to discuss and describe issues in those areas. The vocabulary also matched to the visuals being shown on thematic maps. The vocabulary list comprised of a total of 25 useful words (see Appendix A).

The distribution of vocabulary items across the themes of 'crime,' 'work,' and 'business' was determined based on their thematic relevance and importance within the context of interpreting thematic maps. In the theme of 'crime', 11 terms were selected to encompass a range of activities and processes useful for interpreting data. 'Work' and 'business', with 7 terms each, were chosen to provide learners with vocabulary pertinent to scale, culture and economic activities, useful for understanding employment and business-related information depicted on thematic

maps. This weighting aimed to ensure that overall TMP participants acquired a balanced set of vocabulary tailored to interpreting thematic maps within the context of EFL/CLIL instruction.

3. 4　　Pretest and posttest

A pretest was conducted independently by both teachers during the start of the first of the five TMP lessons. This was to establish prior knowledge prior to the commencement of teaching using the thematic maps as a tool. The pretest consisted of the 25 English TMP words. In this test format, the Colombian students needed to provide a Spanish translation, while similarly, Japanese students were instructed to provide a Japanese translation. Both teachers used the same test format created, agreed upon and shared in the preparatory phase of the research. Other recent English vocabulary acquisition research conducted at MuroranIT (Sustenance, 2022) [13] had shown that Japanese students were well accustomed with this style of testing and so this approach was deemed appropriate. Similarly, Colombian students were also familiar with such translation testing. The pretests were administered in a paper-based format, conducted in-person by the teachers during the first TMP lesson. In the pretest, if a student provided a correct answer for a word with multiple meanings, it was considered accurate. Following the completion of the pretest, instruction on the meanings of the words was integrated with thematic maps over the 5 TMP lessons.

In educational research and CLIL/EFL evaluation scenarios, the administration of pretests and posttests is a valuable practice in the assessment of vocabulary acquisition. The pretest measures the initial level of vocabulary knowledge that students possess, while the posttest measures the level of vocabulary knowledge after pedagogic interventions have occurred (Yang & Sun, 2013)[14]. By comparing the results of a pretest and a posttest, the usefulness of interventions to support vocabulary acquisition can be evaluated (Dang et al., 2022)[15].

A further additional benefit is that individual differences in vocabulary acquisition can be identified through pretests and posttests. This can be helpful for teachers to identify factors that promote or hinder vocabulary acquisition. Pretest and posttest results can also be used to modify instruction to students' needs, such as focusing on building a vocabulary foundation before introducing more advanced vocabulary. Being cognizant of the preceding elements the authors decided to utilize a pretest and posttest methodology in the Thematic Maps Project to measure vocabulary growth.

Once the five project lessons were completed a posttest was then conducted to compare the vocabulary acquisition of the students. This posttest followed the same translation format as the pretest for both Colombian and Japanese participants. The results of the posttest evaluated the efficacy of the previously outlined 'dual approach' in teaching EFL. The results of both the pretest and posttest were shared after the completion of both elements. In each of the five TMP lessons the centerpiece of the pedagogy in those classes were the thematic maps. In that way the data gathered pertains to student's exposure to the maps as a learning tool.

One distinctive feature of this study lies in the diverse student samples from Japan and Colombia. The group from MuroranIT consisted of second-year undergraduate students with a range of abilities spanning CEFR levels A2 to B1. These students engaged in a weekly 90-minute lesson with their teacher, falling within the age range of 19 to 21 years old. Conversely, at Universidad Externado de Colombia, the class was a blend of second to third year students, along with some first-year participants, operating at around a B1 proficiency level. The Colombian students' ages varied from late teens to 22 years old. This class convened twice a week, with each session lasting 105 minutes. The study's results, presented in section 4, are drawn from the pretest and posttest scores of the 20 Japanese participants and 19 Colombian participants.

3. 5　　Class procedure

As shown previously in Table 1, the TMP was comprised of five lessons in total. In Lesson 1, following the completion of the pretest, an introduction to thematic maps and their usefulness was presented to the students. A set of choropleth thematic maps covering crime, work and business were then shown and the students were placed in pairs/small groups to speculate in English about what themes might be shown. This initial speculative map

interpretation activity was to engage students' interest and to allow space for a form of geographical imagination (Harvey, 1990)[16] to be present. Once the pair/group discussions had concluded the actual theme of the maps was revealed and the TMP vocabulary list was issued to each student.

The vocabulary for the first English speaking country covered in the project, Australia, was then practiced through a listen and repeat procedure to ensure students were comfortable with pronunciation and to allow for the teacher to assess their pronunciation. The thematic maps were then shown again, and students had an opportunity to work in pairs/groups for a second time, now equipped with the word list to try and connect the words to the maps. Once the second round of discussions had concluded the teacher showed which words linked to which thematic map. Emphasis was placed on receptive learning of vocabulary.

Following this, vocabulary usage was demonstrated through example sentences. This informed students about how the words could be used usefully to describe processes. Next, a paraphrasing activity was used where students would work in pairs. One student would receive one of the selected lesson vocabulary and have to describe that word through paraphrasing. They were not allowed to state the selected word itself. Their partner would then have to say which vocabulary they thought it was. One point of difference in the lesson procedure was that in the Colombian classes 'Kahoot', a game-based learning platform, was also periodically used to gauge the knowledge of vocabulary during lessons.
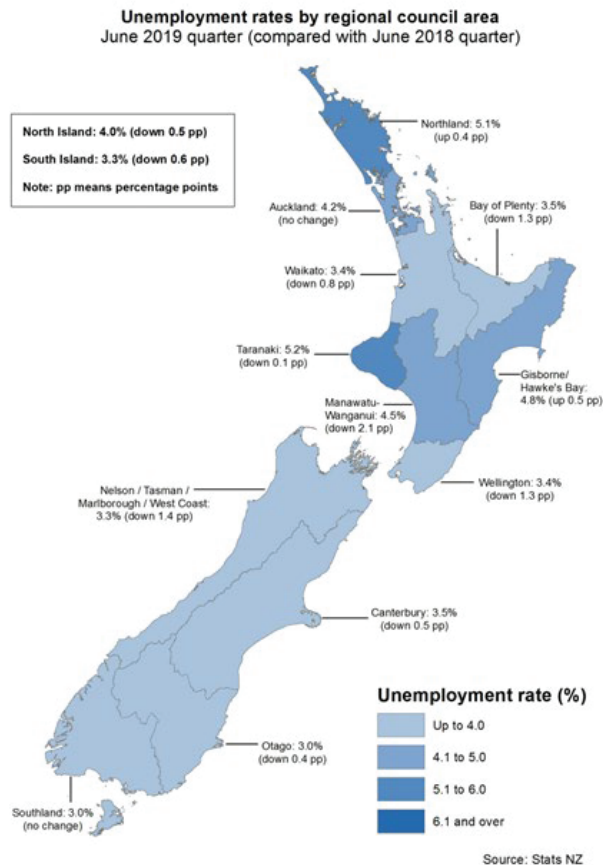

Figure 2. Example of thematic map used in the TMP. New Zealand Unemployment. Source: Stats NZ. Creative Commons License.

Following the vocabulary and map theme activities, cultural, social and political information about the particular TMP lesson's country was presented. This integrated an intercultural strand into the lessons and allowed a richer understanding of the TMP country beyond the targeted crime, business, and work aspects.

At the start of each of the four subsequent lessons the set of maps from the preceding lesson were shown and students had to recall what specific vocabulary they had learned connected to those maps. In this way, the map and map information, such as choropleth shading, were utilized as a memory trigger for students to access the vocabulary they had learned. During this revision phase of the lesson students were not permitted to look at their TMP vocabulary sheet. Once the revision phase was complete students were requested to look at their vocabulary list and a listen and repeat activity was undertaken while the teacher highlighted points on the map connected to the vocabulary. In this way a deepening of the map/vocabulary link was sought.

Other activities in the lessons included English communication activities related to the culture and geography of Australia, New Zealand, USA, UK and Ireland, and map-based quizzes to boost student's international knowledge. The questions in quizzes pertained to information such as locating capital cities and utilized blank maps of the countries so students could mark information themselves. HOTS, ranging from lower to higher activities were also integrated into the lessons, within which students were asked to discuss the basic patterns they observed and explain the information presented in the new maps for each lesson.

4   RESULTS

4. 1   Pretest and posttest scores

The results of this study show a positive correlation between the use of thematic maps as the primary focal point in the EFL classroom and increased vocabulary retention and understanding. The pretest and posttest results for both the Japanese and Colombian students demonstrated an increase in vocabulary knowledge after the TMP had occurred. Figure 3 and Figure 4 below show the pretest and posttest scores out of a total of 25 for students in the Japanese and Colombian case respectively. There were 20 participants in the Japanese university class and 19 in the Colombian university class. It is worth noting that the lowest scoring participant in the pretest was one of the Japanese students. That student scored zero on their pretest. They subsequently scored seven out of 25 on the post test. The lowest Colombian pretest score was five. Two Colombian students shared that pretest score. Those students saw posttest scores of 11 out of 25 and, notably, 21 out of 25.
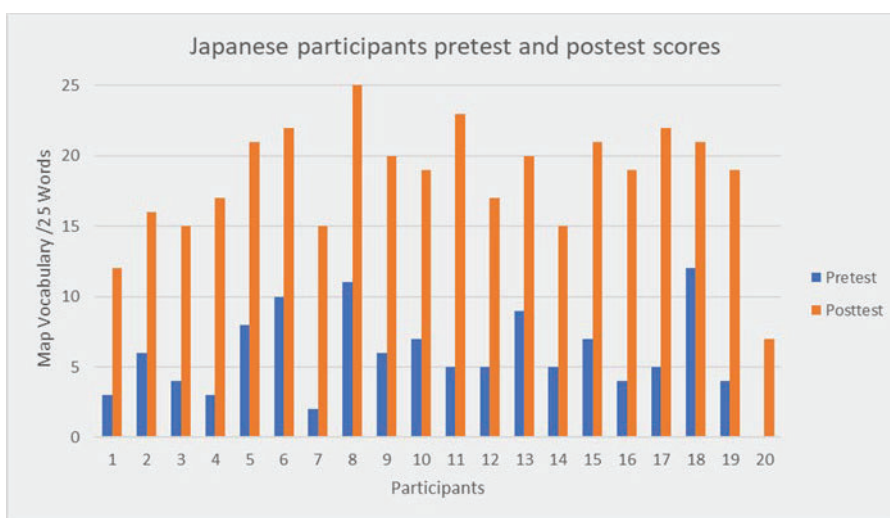

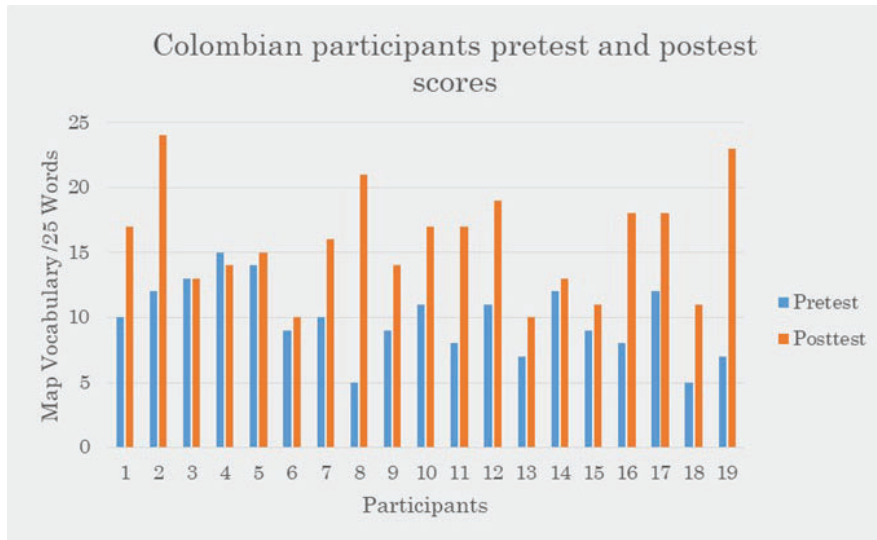**Figure 3. Japanese participants TMP pretest and posttest scores.**

Figure 2. **Colombian participants TMP pretest and posttest scores.**

For the Japanese university students, the average pretest score was 5.8 (23.2%) out of 25, while the average posttest score had a significant change at 18.3 (73.2%) out of 25 (refer to Table 3). For the Colombian participants a higher average pretest score was observed at 9.8 (39.3%) out of 25 and a posttest average of 15.8 (63.3%) out of 25 (see Table 4).

Table 3. Japanese participants pretest and posttest scores with % scores and averages

Japanese Participant	Pretest/25	Pretest % Score	Posttest/25	Posttest % Score
1. Participant	3	12	12	48
2. Participant	6	24	16	64
3. Participant	4	16	15	60
4. Participant	3	12	17	68
5. Participant	8	32	21	84
6. Participant	10	40	22	88
7. Participant	2	8	15	60
8. Participant	11	44	25	100
9. Participant	6	24	20	80
10. Participant	7	28	19	76
11. Participant	5	20	23	92
12. Participant	5	20	17	68
13. Participant	9	36	20	80
14. Participant	5	20	15	60
15. Participant	7	28	21	84
16. Participant	4	16	19	76
17. Participant	5	20	22	88
18. Participant	12	48	21	84
19. Participant	4	16	19	76
20. Participant	0	0	7	28
Average Scores	**5.8**	**23.2**	**18.3**	**73.2**

Table 4. Colombian participants pretest and posttest scores with % scores and averages

Colombian Participant	Pretest/25	Pretest % Score	Posttest/25	Posttest % Score
1. Participant	10	40	17	68
2. Participant	12	48	24	96
3. Participant	13	52	13	52
4. Participant	15	60	14	56
5. Participant	14	56	15	60
6. Participant	9	36	10	40
7. Participant	10	40	16	64
8. Participant	5	20	21	84
9. Participant	9	36	14	56
10. Participant	11	44	17	68
11. Participant	8	32	17	68
12. Participant	11	44	19	76
13. Participant	7	28	10	40
14. Participant	12	48	13	52
15. Participant	9	36	11	44
16. Participant	8	32	18	72
17. Participant	12	48	18	72
18. Participant	5	20	11	44
19. Participant	7	28	23	92
Average Scores	**9.8**	**39.3**	**15.8**	**63.3**

The results of the TMP study indicate that the use of thematic maps can be an effective tool for vocabulary acquisition amongst students in CLIL/EFL university classrooms. The significant increase in vocabulary knowledge demonstrated by both the Japanese and Colombian participants suggests that students can learn and retain new vocabulary effectively through the use of thematic maps as a major instructional platform within English lessons. It is also possible that the use of thematic maps to explore the real world topics of crime, business and work served to motivate students to be more active in learning related vocabulary.

Slightly higher results in the Colombian case could be attributed to the linguistic proximity between L1 and L2, in terms of words such as aboriginal, state, property, homicide, to mention a few. However, the activities also drew attention to occasional word confusion in the Colombian case brought about by false cognates and the importance of adopting a spatial approach in vocabulary acquisition. This speculation, however, warrants further study.

5   CONCLUSION

The TMP study indicates that the use of thematic maps in CLIL/EFL classes is an effective tool for vocabulary acquisition and is worthy of some consideration by language educators. This aligns with the findings of previous studies by Kalay (2021)[17] and, Agustín-Llach and Canga (2016)[18], which demonstrated that the use of a dual learning CLIL approach enhances both academic and non-academic receptive vocabulary. Additionally, these results support the conclusions drawn by Xanthou (2010)[19] regarding the efficiency of teaching vocabulary from a geographic perspective. Such an approach expands students' comprehension of target words by presenting them within a context of engaging and meaningful real-world related content.

It should be noted that the sample size of this study was quite small, as there were participants from only one class of university students in Japan and Colombia respectively involved in the project. With this in mind, the results may not be fully expandable to all contexts or learner populations. Future studies with larger sample sizes and perhaps in more varied international educational settings would assist in the further confirmation of the effectiveness of using thematic maps in CLIL/EFL classes in global settings. In addition, future research could also examine the long-term effects of thematic map use on vocabulary retention. However, the results of the TMP study indicate that thematic maps can be a valuable tool for language educators seeking to enhance student vocabulary learning and retention.

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Appendix A – Thematic Maps Project Vocabulary List

Word 1	report	Australia, Crime
Word 2	jurisdiction	Australia, Crime
Word 3	manufacturing	Australia, Work
Word 4	pastoral	Australia, Business
Word 5	Aboriginal	Australia, Business
Word 6	rank	New Zealand, Crime
Word 7	territorial	New Zealand, Crime
Word 8	regional	New Zealand, Work
Word 9	council	New Zealand, Work
Word 10	property	New Zealand, Business
Word 11	state	USA, Crime
Word 12	per	USA, Crime
Word 13	sorted	USA, Crime
Word 14	common	USA, Work
Word 15	industrial	USA, Business
Word 16	homicide	UK, Crime
Word 17	rate	UK, Crime
Word 18	unemployment	UK, Work

Word 19	start-up	UK, Business
Word 20	authorities	UK, Business
Word 21	assault	Ireland, Crime
Word 22	district	Ireland, Crime
Word 23	distribution	Ireland, Work
Word 24	sector	Ireland, Work
Word 25	density	Ireland, Business