

CONCEPT MAPS AND LANGUAGE ACQUISITION: AN IMPLEMENTATION WITH ENGLISH LANGUAGE LEVEL 2 STUDENTS

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Abstract. Concept mapping is a powerful tool for teaching and learning. Since its creation, it has been transforming education as a way of 'learning to learn' and for assisting to convert information into knowledge. This paper presents the findings of a research project conducted using concept maps to teach and learn English as a foreign language in a large university in Curitiba, in southern Brazil. The research was developed with a group of 13, Level 2, High School English language students, during their academic term (lessons of 1h40m, once a week, for 16 weeks). Action Research was undertaken and 15 activities using concept maps were created during the term, of which 8 are described in this paper. Students provided feedback during the course and answered a questionnaire at the end of the term. Students' responses to the questionnaire were analysed qualitatively according to Bardin (2011) and with the use of Atlas Ti software for qualitative analysis. Concept maps were perceived as facilitators of language learning and comprehension and for promoting thinking in the foreign language (L2), with special gains in the learning of verbs, prepositions and new vocabulary as well as in the development of reading, writing and aural skills.

1 Introduction

Concept maps (CMs) came as an alternative to rote learning, promoting meaningful learning. Its practice encourages reflection, research, selection, analysis and knowledge construction, as well as fosters the development of responsibility, initiative and self-confidence. Considered by many as a powerful tool for teaching and learning, CMs are "a strategy to externalize the conceptual and propositional understanding one has about a certain topic" (Valadares, 2014, p. 62); they can express internalized concepts as well as those in the process of assimilation and comprehension (Cañas, Novak, & Reiska, 2012, p. 1).

CMs comprise both content and structure (Cañas, et al., 2012); the concepts presented can be linked to each other by a verb (or verb phrase), with or without a preposition; by a preposition; or by a connecting word that expresses the relationship between those concepts (such as "for instance"). Propositions or semantic units, formed by a [concept] + linking word + [concept], are the main units that compose meaning (Novak, 2010, p. 45); they are stored in our cognitive structure and the quality of their meaning is related to the clarity and precision of not only the concepts employed, but also of the verbs, prepositions or linking words used to connect them (p. 26).

2 Concept maps and foreign language (L2) learning and teaching

The use of CMs for L2 learning and teaching has had some attention. The study conducted by Lee (2013) focused on concept mapping as a pre-writing strategy to learn Korean language in a collaborative way. Research data indicated that the treatment group had considerably higher results than the control group in the five criteria assessed, with special gains for Content, Organization and Vocabulary, and the result for Language Use and Mechanics were higher in the collaborative group as compared to those of the students working individually. Lee confirmed his hypothesis that "concept mapping activities may have the potential to have significant impact on the quality of writing when used as a learning activity in a prewriting phase of compositions." (p. 257).

Tezci, Dermirli and Sapar's research (2007) was on the use of CMs for L2 vocabulary acquisition. For the authors, a CM is a heuristic device and as such it helps learning by allowing students to see, read, write, and alter concepts. As students see same theme concepts interrelated in the CM, this promotes assimilation, potentializing contextual comprehension which, for the authors, is one of the main goals in language teaching. The authors claim that CMs can be used in language teaching not only for "presenting information by teachers, and students' management and evaluation of their own learning", but also for promoting the learning of: a word and related vocabulary; how words are used; how to read and write them; their grammatical structure; and how they aid text comprehension and vocabulary expansion (pp. 4-5).

Chularut and DeBacker's investigation (2003) concentrated on the effectiveness of concept mapping on students' achievement when learning from English language texts. The study involved the creation of CMs and concentrated on their relationship with the use of self-regulation and self-efficacy strategies for language learning related to four variables: achievement, self-monitoring, knowledge acquisition, and self-efficacy. Research

findings revealed higher gains in the four variables for students who used CMs than for students who employed their own learning strategies.

In The Language Learning Lab – LAPLI (Marriott, 2004), a methodology for language learning that combines face-to-face and online learning, students built collaborative CMs, negotiated the selection of concepts and linking words and the inclusion of cross-links. Research data revealed an enhancement not only in their linguistic skills but also in their argumentative and persuasion skills when debating about how to build the CM and how to express their understanding in the Cmap (Marriott, 2010). Torres, Kucharski and Marriott (2014) assessed the use of CMs as a pre-writing activity with post-graduate Education students at a Catholic University in Brazil. Although the study's objective was the development of autonomy, interaction and critical thinking skills in Inquiry-based Learning, with respect to students' linguistic skills research data revealed better text comprehension, more confidence in the writing of scientific texts and in the production of knowledge as well as in the structuring and organization of ideas.

3 Pedagogical implementation

The pedagogical implementation reported in this paper (which is part of a 2-year doctoral research project involving 7 groups of English as a Foreign Language (EFL) students at 6 different proficiency levels) was developed in a state university in Curitiba/Brazil. The researcher, who was one of the members of a research group that focuses on Innovative Methodologies, Concept Mapping and Information, Communication and Technologies (ICT) in Education, set out to investigate the potential of using concept maps for foreign language learning and teaching. This implementation was carried out in a Level 2 class with 13 EFL students who met for 1h40m-lessons once a week for a period of 15 weeks. The 15 activities created using CMs are presented in Table 1.

E2 – List of Activities Developed	
Activity 01	Course content – interactive presentation of CM by teacher
Activity 02	Learning how to CM & Getting to know each other – Development of aural and writing skills (Creation of CM (V1 & V2); oral presentation in pairs; creation of 2 nd CM (V1 & V2); writing based on CMs.)
Activity 03	Unit 3 – What's the weather like? - Development of aural, reading and writing skills with Mini-maps (Research on the Internet; data collection, pair work; reading; creation of CM (V1 & V2); assessment using Formative and Summative Assessment Table (FSA Table).)
Activity 04	Unit 3 – Focus on Grammar – <i>Present Continuous</i> (Interactive presentation of CM by the teacher, eliciting examples from the students.)
Activity 05	Unit 3 – What are you doing? - Development of aural skills (Pair-work using Mini-map.)
Activity 06	Unit 3 – Focus on Grammar – <i>Present Continuous vs. Present simple</i> (Pair-work: students interview each other on daily habits and routines, based on CMs.)
Activity 07	Unit 3 – Storm chasers - Development of reading skills (Access to links and audios on the Internet; creation of CM (V1 & V2); selection of root concept.)
Activity 08	Unit 3 – Focus on Grammar - <i>Present continuous</i> with future meaning (Interactive presentation of CM by teacher; creation of mini-maps to interview classmates; research on the Internet on weather-related free-time activities; group work.)
Activity 09 ASSESSMENT 1	Topic: Why learn English? - Reading & exercise; creation of CM (V1 & V2); selection of root concept; addition of personal information to CM & writing, assessment using FSA Table.
Activity 10	Unit 4 – Top Sports in the World - Development of reading and aural skills (Research on the Internet, creation of collaborative CM; oral presentation - Carrousel activity.)
Activity 11	Unit 4 – Focus on Grammar – <i>Can</i> (Interactive presentation of CM by teacher)
Activity 12	Unit 4 – Shopping for clothes online - Development of aural skills and vocabulary acquisition (Visit to selected online clothes shops; imaginary shopping of complete outfits for winter and summer; interview each other using CM Dialogue Plan; description of what classmate is wearing using skeleton map; writing.)
Activity 13	Unit 4 – Focus on Grammar – <i>Possessive Pronouns</i> (Interactive presentation of CM by teacher; Family possessions: creation of CM (V1 & V2) from skeleton map; writing.)
Activity 14 ASSESSMENT 2	Topic: People's love of shoes – Reading & exercise; creation of CM (V1 & V2): How much do people love shoes? How much do I love shoes? , selection of root concept, addition of personal information & writing, assessment using FSA Table.
Activity 15 ORAL ASSESSMENT	Dialogue creation and presentation (Use of CM Dialogue Plan for preparing dialogue on course content, oral presentation to class.)

Table 1: English 2 (E2) – Activities Developed

From the 15 activities listed in Table 1, 8 were selected for presentation and discussion in this paper. The selected activities are presented as follows.

Activity 01/E2 – Course content – interactive presentation of CM by teacher

Presentation of course content via a CM provides a general overview of the subject matter. This overview enables going beyond the compartmentalization of knowledge to maximize comprehension of its totality in a networked and contextualized way (Behrens, 2008; Morin, 2007; Yus, 2002; Zabala, 2002). Figure 1 shows the content of Units 3 & 4 from students text-book (Seligson, Lethaby, Gontow, & Abraham, 2013).

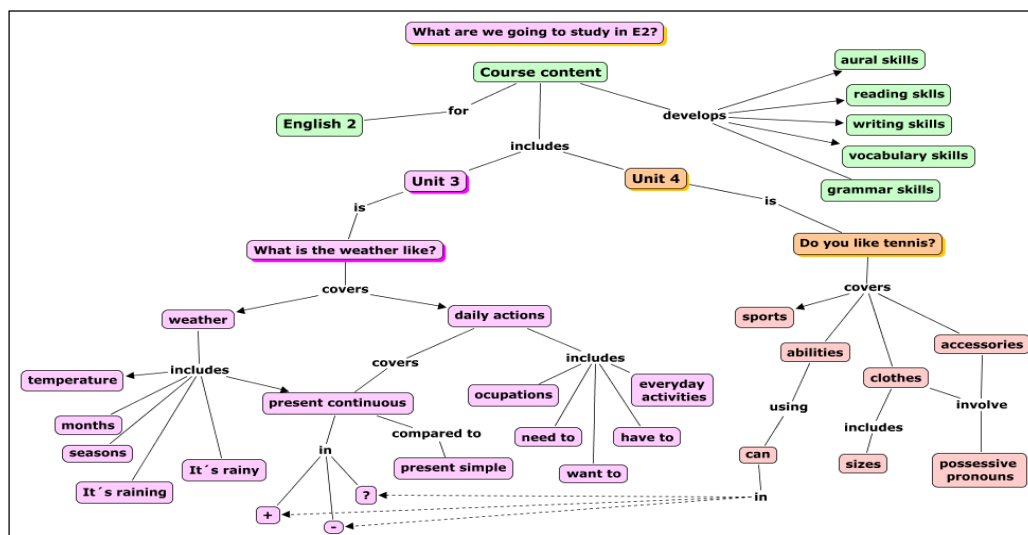


Figure 1. Presentation of course content

The goal of an interactive presentation of content (which includes eliciting examples from the students) is to promote access to acquired knowledge to foster meaningful learning (Novak, 2011). Besides introducing students to the concept mapping technique, this visual and oral presentation shows them how propositions are formed; how reading is done; how hierarchy is established; that it conveys a summary of the data, presenting general information but also focusing on more specific ones; it illustrates how concepts can be connected and also how cross-links (represented by the dotted lines) can be established.

Activity 02/E2 – Learning how to CM & Getting to know each other – development of aural and writing skills

To develop students' concept mapping building skills and for them to introduce themselves and get to know each other, they created a CM to answer the Focus question: What is unique about me? In this activity, the teacher was able to explain and explore how to form propositions by illustrating the importance of an appropriate selection of concepts and verbs (by covering the linking words in the slideware projection and eliciting new propositions from the students).

The steps of the activity were: (1) teacher introduced him/herself by means of a CM in the 1st person, answering the Focus question, using verbs/phrasal verbs/verb phrases such as: was born on, was born in, is, has, lived in, worked at, works at, enjoys, likes watching; (2) students built a CM to introduce themselves (V1-me); (3) students worked in pairs to introduce themselves by reading CM; (4) based on classmate's presentation of him/herself, students built a CM about him/her (V1-my) in the 3rd person; and (5) based on the information on the 2 maps, students wrote a paragraph about themselves (in the 1st person) and another about their classmate (in the 3rd person). While students were building their CMs, the teacher resolved all doubts that arose, taking the opportunity to revise verbs (in the different forms and tenses), the use of prepositions and vocabulary in L2.

V1-me and V1-my, created by student E2-10, were assessed using the Formative and Summative Assessment Table and V2-me is introduced in Figure 2 (the FSA Table, which was developed in this doctoral research, is presented and discussed in the CMC2016 Springer Volume). V2-me, produced by E2-10, could be defined as a spoke structure (Kinchin, Hay, & Adams, 2000), as most concepts relate to the root concept, and although there are still some ambiguities in his Cmap (pointed out by the letters and numbers in the boxes which represent the criteria in the FSA Table) it is a very clear and straightforward map, considering this is the first Cmap this students

builds. The stars highlight appropriate linking words or concepts used and the blanked out concepts ensure anonymity of the participants.

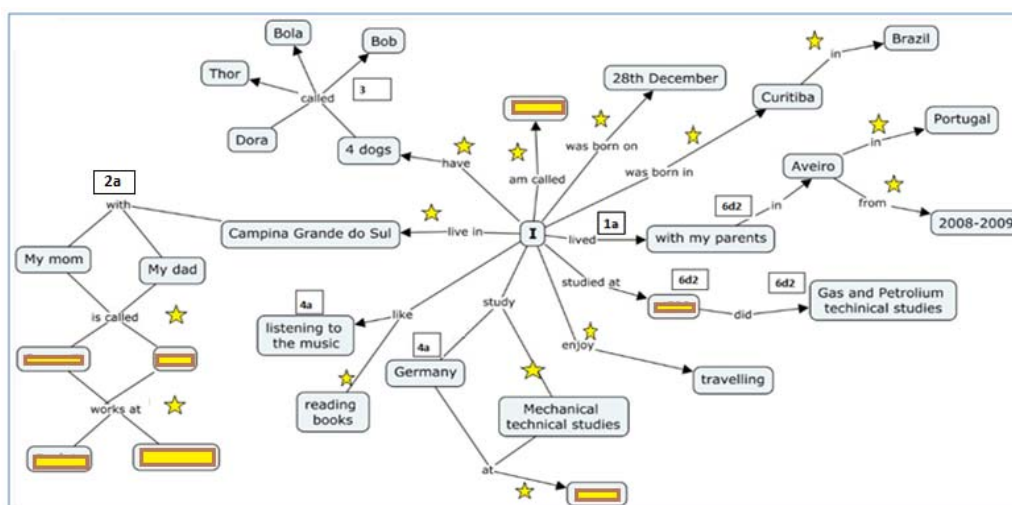


Figure 2. What is unique about me? E2-10, V2-me

Language acquisition is a complex, non-linear process and backslidings are part of this process (Larsen-Freeman, 1997) in the anchoring of new knowledge to the existing knowledge in the student's cognitive structure.

Activity 03/E2 – Unit 3 – What's the weather like? - Development of aural, reading and writing skills with Mini-maps

After eliciting students' existing knowledge about the weather with the question "What is the weather like now?", the teacher asked students to: (1) do some research on the Internet about the weather in their capital city and in other capital cities around the world; (2) fill-in a table in their course-books with new vocabulary; and (3) practice in pairs asking and answering questions about the weather at the moment (according to the website) and the usual weather in those locations (based on their previous knowledge about these capital cities). The pair-work activity was based on the Mini-maps (Figure 3) created and explored by the teacher.

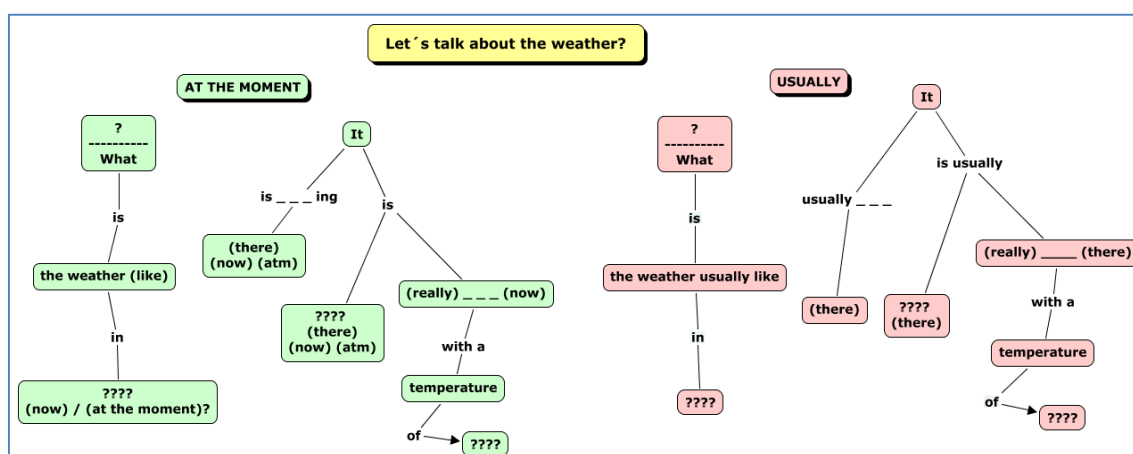


Figure 3. Let's talk about the weather? – Mini-maps

A Mini-map (MM) is a simplified version of a CM. It is one of the types of maps created in this study to promote "noticing" on the three dimensions of use, meaning or form (proposed by Larsen-Freeman (2001)) and to practice "grammaring" (which is not only the appropriate and dynamic use of grammar, but also its meaningful use (Larsen-Freeman, 2009, p. 526)). A MM is usually just a phrase and it is frequently practiced in pairs.

After practicing the MMs in pairs, students read the text on the weather in their text-book and, based on this information and the information found online, students built a CM individually to answer the following Focus

questions: “What are the seasons in the countries around the world? What is it like in Brazil?” Versions V1 and V2 of their CMs were assessed by the teacher using the FSA Table (not included in this paper).

To keep track of all of the various versions of the CMs produced, the pieces of text written and their formative and summative assessment in the construction of knowledge, and in order for students to be able to reflect on them and to solve the ambiguities detected by the teacher on their work, the teacher asked all the students to keep a Portfolio of all the material produced, always keeping the most updated version on top.

Activity 04/E2 - Focus on Grammar – Present Continuous

The goal of Focus on Grammar activities, as well as of the Mini-maps, is to promote a shift of attention from the general overview of a topic to a particular aspect in L2 acquisition. CMs created to this end sometimes display “functional concepts” (in grey, square boxes) that are not uttered but either give an explanation or help form a proposition with [concept] + linking word + [concept] in questions (which normally start with the verb) and when using intransitive verbs (such as “dreaming”). Various colours are also used to highlight the different forms, persons and verb conjugations (Figure 4).

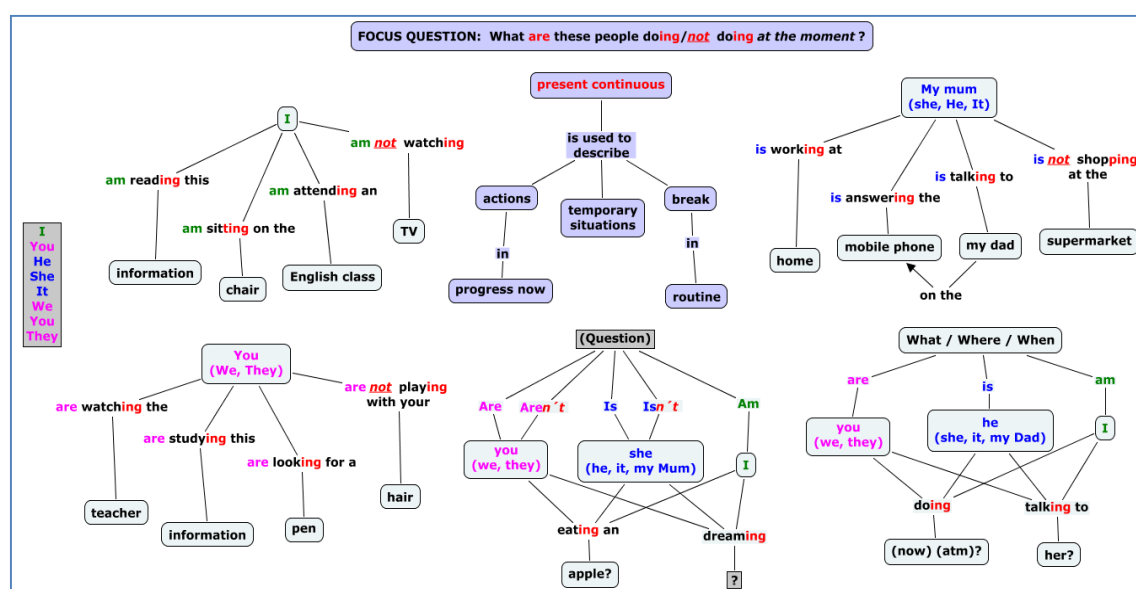


Figure 4. Focus on Grammar activity: presentation of the Present Continuous Tense via Mini-maps– E2

After an interactive presentation of MMs on the Present Continuous, to activate their existing knowledge and promote meaningful learning, students practiced this grammar point in Activity 05/E2.

Activity 10/E2 – Unit 4 – Top Sports in the World - Development of reading and aural skills

To activate students' knowledge, the teacher led a warm-up with questions on sports. The sports mentioned were listed on the board. Then students engaged in the following activity: (1) Researched on the Internet about the Top Sports in the World; (2) Read the information gathered; (3) Selected a superordinate root concept to start a CM; (4) Built a collaborative CM in pairs with at least 30 concepts covering the information read; (5) Presented the CM to classmates (Carrousel activity); and (6) Sent CM to teacher via email. The Carrousel activity (adapted from Lynch and Maclean (1994) apud Lynch and MacLean (2000)) consisted of pairs of two students, Students A and B, gathered in “stations” with their CM. While Student A would present the CM to each Student B visiting their “station”, Student B would go round the other “stations” to listen to their classmates' presentation and ask at least 2 questions on their research. When Student B arrived back to his pair, then it was Student A's turn to visit his/her classmates “stations” to learn about their research and CMs. This task-repetition activity gave them invaluable oral and interactive practice. The guided repetition challenged them to be fluent and clear and also made them reflect and revise their own CM for the next presentation. It encouraged them to pay attention to grammatical accuracy, pronunciation and rhythm as well as to follow the order of delivery in order to be understood. It provided them with contextualised and meaningful practice and promoted self-confidence.

The 4 CMs produced were compiled and their layout can be visualised in Figure 5. Applying Buhmann & Kingsbury's (2015) global morphology classification, CMs A and B (at the top) can be considered Broad whereas C and D can be classified as Interconnected. All CMs included the Focus question (What are the top sports in the world?).

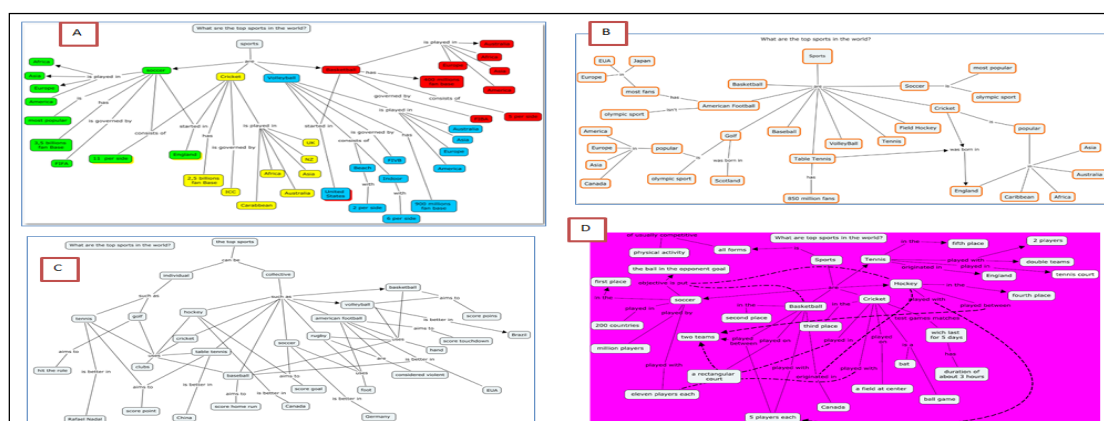


Figure 5. Layout of CMs A, B, C and D, produced by E2 students

To find out if at least 30 concepts were used (and which concepts were used), we activated the listing facility offered in CmapTools (Cañas et al, 2004) to list all concepts and linking words present in each CM and then compiled the lists into a table using Excel (Table 2).

	Mapa A	Mapa B	Mapa C	Mapa D
	Conceptos	Conceptos	Conceptos	Conceptos
1	x per side (*4)	850 million fans	american football	2 players
2	x million / billions	Africa	baseball	200 countries
3	fan Base (*4)	America	baseball	5 players each
4	Africa (*3)	American	Brazil	a field at centre
5	America (*3)	Football	Canada	a rectangular court
6	Asia (*4)	Asia (*2)	China	all forms
7	Australia (*3)	Australia	clubs	ball game
8	Basketball	Baseball	collective	basketball
9	Beach	Basketball	considered	bat
10	Caribbean	Canada	violent	Canada
11	Crick	Caribbean	cricket	cricket
12	England	cricket	EUA	double teams
13	Europe (*3)	England	foot	duration of about 3 hours
14	FIBA	EUA	Germany	eleven players each
15	FIFA	Europe (*2)	golf	England
16	FIVB	field Hockey	hand	fifth place
17	ICC	golf	hit the role	first place
18	Indoor	Japan	hockey	fourth place
19	most popular	most fans	individual	hockey
20	NZ	most popular	Rafael Nadal	million players
21	soccer	olympic sport	rugby	physical activity
22	sports	(*3)	score goal	second place
23	UK	popular (*2)	score home run	soccer
24	United States	Scotland	score point (*2)	sports
25	Volleyball	soccer	score touchdown	tennis
26		sports	soccer	tennis court
27		table tennis	table tennis	the ball in the opponent goal
28		tennis	tennis	third place
29		volleyball	the top sports	two teams
30			volleyball	which lasts for 5 days

Table 2: What are the top sports in the world? – Concepts and Linking words used – E2

Table 2 provides rich data for reflexion. As can be observed, all 4 CMs had about 30 concepts, despite some repeated ones (of countries and continents) in Map A. This repetition of concepts lowers the informative power of Map A if compared to the other 3 CMs. As regards the linking words used, in Map B, 50% of the verbs used stem from the verb To Be, which weakens the content of the CM, especially if we compare it to Map D where the verb To Be makes up only 12.5% of the verbs used. Disregarding the 3 invalid linking phrases in Map D (objective is put, of usually competitive, test games matches) out of the remaining 87.5%, 71% involve the verb To Play which, followed by 5 different prepositions (between, by, in, on, with), conveyed distinct and appropriate meanings. The use of other verbs/phrasal verbs in the other CMs (consists of, is governed by, started in, was born in, aims to) and also of the comparative form (is better in) in Map C, could reveal a deeper understanding of the content in the Interconnected CMs as opposed to the Broad CMs. Some L2 students find it difficult to grasp how

to use prepositions and phrasal verbs properly, so their voluntary selection and use in their Cmaps in this activity is significant in the promotion of meaningful learning.

Activity 13/E2 – Unit 4 – Focus on Grammar – Possessive Pronouns

Figure 6 presents the three types of pronouns: the subject pronouns, the object pronouns and the possessive pronouns, their explanation, use and examples. After its interactive presentation, students engaged in the following activities: (1) based on the skeleton map provided to them (not available in this paper), students had to tell us about themselves and about other 4 family members (using the concepts available in the Parking Lot or others); (2) they had to answer the following Focus questions: What are my family's (beloved) possessions? What are they like?; and finally, (3) based on the information in their CM, they were asked to write a narrative about their family's possessions.

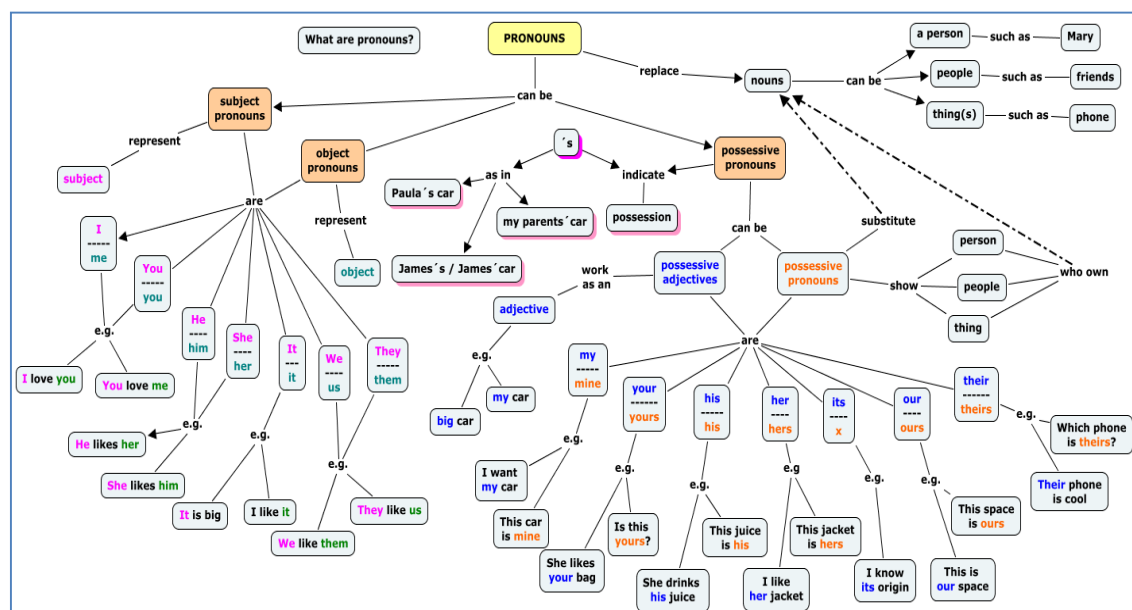


Figure 6. Pronouns: classification, explanation, use and examples – E2

The CM in Figure 7 was created by student E2-07. It reveals his family's possessions and qualifies them. Although the comparatives had not been studied yet, E2-07 felt the need to use them ([younger sister] and [older sister]) to talk about his family members. He was innovative in including the writing in the concept map, keeping everything together.

The inclusion of the comparatives (not usually covered in a Level 2 class) in a natural and contextualized way, expresses the non-linear and unpredictable potential of concept maps. The possibility to work with possessives and comparatives at the same time emerged in this activity with CMs. Practicing these two grammar items together could facilitate learning and promote meaningful learning. The non-linearity and unpredictability are attributes are used by Larsen-Freeman (1997) to explain the process of second language acquisition from a Chaos/Complexity perspective.

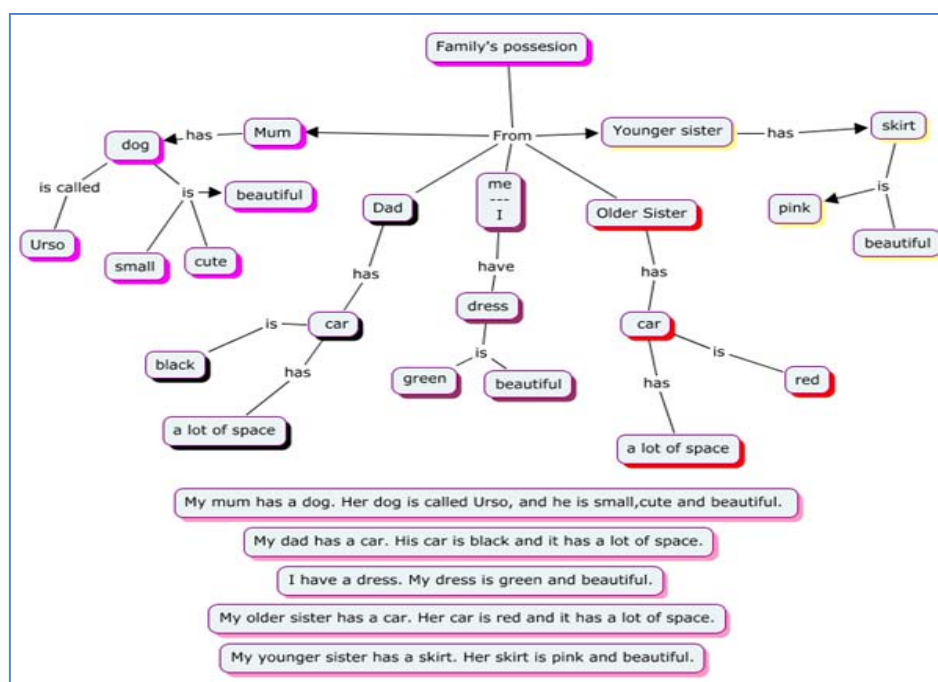


Figure 7. Family's possessions – E2-07

Activity 14/E2 – Assessment 2

For the final assessment, a piece of text with most possessive pronouns missing was used and students were asked to read the text and fill in the gaps appropriately. Then, students received the following instructions: (1) build a CM about the text read, choosing a superordinate concept to start the map; (2) answer these Focus questions: “How much do people love shoes? – How much do I love shoes?”; (3) include the information about the 4 people mentioned in the text; (4) include information about yourself and about your Mother to answer the Focus questions; and (5) after finishing the Cmap, write a narrative with the title “People’s Passion about Shoes!” based on and using all information in the Cmap.

On assessment day, students worked on the first version of the Cmap (V1) and narrative. On the following class they received formative and summative feedback (via the FSA Table) from the teacher and worked on the second version of the Cmap (V2) and narrative. V1 built by E2-05 is presented in Figure 8 whereas V2 can be seen in Figure 9.

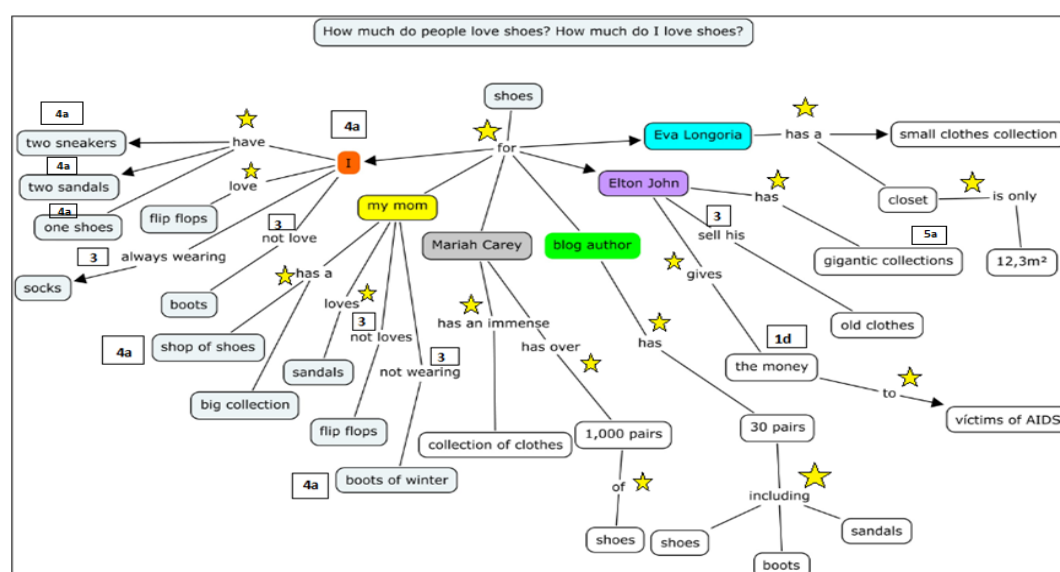


Figure 8. How much do people love shoes? –Final Assessment – E2-05, V1

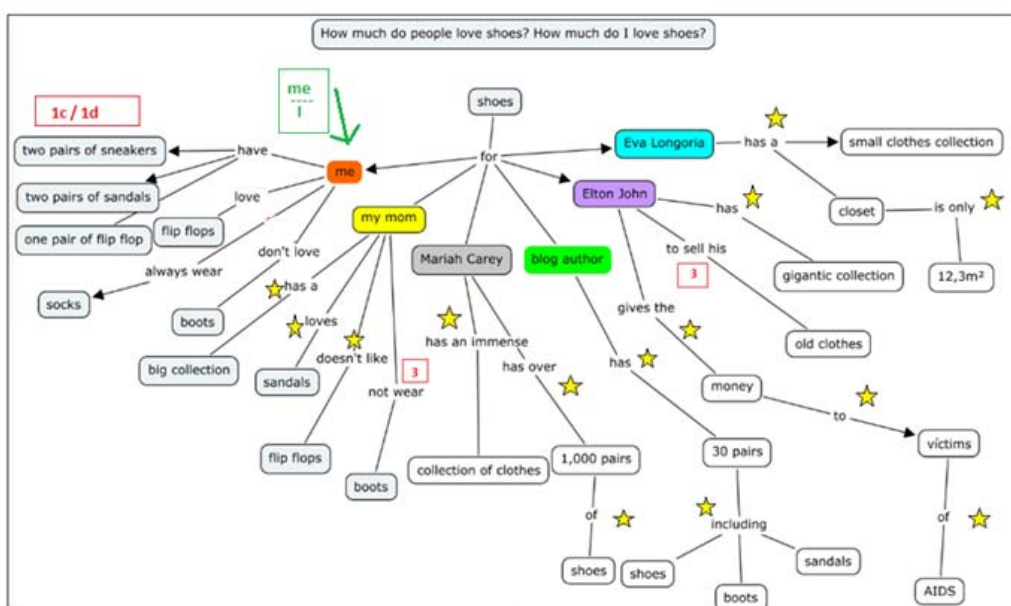


Figure 9. How much do people love shoes? –Final Assessment – E2-05, V2

Most ambiguities pointed out in V1 were worked on in V2, although some still occur (indicated in the boxes). As the student struggled with [I] and [me], the teacher offered the answer in V2. The act of reworking on the Cmaps and narratives encourage “noticing” (Larsen-Freeman, 2009) which can potentially contribute to promoting meaningful learning.

Activity 15/E2 –Oral Assessment

For the first time students were asked to plan an oral presentation using a CM. The Cmap could include any of the topics studied during the course, such as: sports; clothes; routine and temporary actions; the modal Can and the possessives. Students were provided with a Dialogue Plan (DP – not included in this paper) to serve as a basis to create their own dialogue.

Students E2-07 & E2-10 created their own DP (reproduced partially in Figure 9). A DP has 2 root concepts (which are the names of the 2 speakers) that are placed on the left and on the right-hand sides of the map. It does not necessarily answer a Focus question or provide the summary of a topic and it includes concepts that would normally be left out of a CM (such as “Hello” and “Good trip for you”), however, it plans speech in a hierarchical sequence and it is formed by propositions whenever the basic semantic unit is present ([concept] + linking word + [concept]). Looking at E2-07 & E2-10’s DP in more detail, it is possible to observe that: (1) E2-07’s utterances follow the usual written flow, from the left to the right, but E10’s utterances are dragged from the right to start in the middle to then they flow back to the right; (2) students used a dash [-] as an initial concept to indicate a question; (3) students placed the verbs “says” and “asks” at the centre and at the top and bottom corners to be closer and more in line with the propositions they initiate; and (4) they took much care and attention to form appropriate propositions ([concept] + linking word + [concept]).

To assess the usefulness of a Dialogue Plan in the development of the aural skills and L2 acquisition, feedback was collected from the students right after the activity. Although one of the students did not see much difference between this type of planning to other types (E2-10), 3 of them stated that after finding it a bit confusing at first, it became easy to do and visualize and it was very good (E2-06, E2-05 and E2-04). The Dialogue Plan was found to be a form of CM that: “it is interesting ... it is better to visualize and locate where you are” (E2-07); “it helps to develop the dialogue, as all the dialogue structure is there, and also where you are going to add your personal information, which defines the difference between the dialogues, so I think it helps a lot and it is very useful” (E2-09); “it is easy” (E2-08); and “it is a very simple framework to understand how to speak” (E2-02).

Using a Dialogue Plan to plan and assist oral production can help ease the cognitive load on attention and working memory, as found by Lee (2013) regarding the use of a CM as a pre-writing activity. The dialogue structure and the spaces to add their personal information (E2-09) as well as the visual aspect (E2-05 and E2-07) may have helped and contributed to consider this a useful activity. As this activity was considered effective,

simple and of easy visualization, it may have the potential to tap into students existing knowledge and promote meaningful learning.

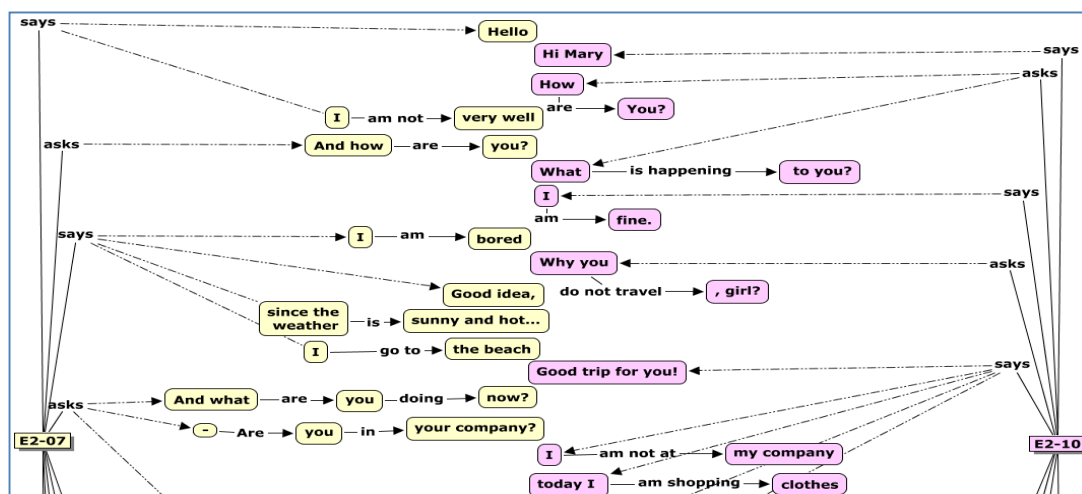


Figure 10. Oral Assessment - E2-07 & E2-10

4 Summary

With the support from all the research process which involved the review of literature, the creation and implementation of activities and the analysis of the feedback received in the questionnaire at the end of the course, the research findings revealed that Concept Maps can contribute to the development of L2 acquisition when: (1) CMs are used to assist with the learning and comprehension of the language; and (2) they are used to promote the learning of verbs, vocabulary and grammar. Our research data has also found that their visual aspect can contribute significantly with L2 acquisition and that students of all levels of proficiency in L2 can benefit from working with Concept Maps to develop their reading, writing and aural skills when learning a foreign language.

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