

# Graphic Organizers: Mind Maps as a tool to enhance Reading Comprehension skills

*Organizadores Gráficos: los Mapas Mentales como herramienta para potenciar las habilidades de comprensión lectora*

M. Ángeles Fernández-Fernández  
University of Huelva (Spain)

M. C. Fonseca-Mora  
University of Huelva (Spain)



VOL. 1 (2022)

ISSN 2952-2013 pp. 1-14

<https://doi.org/10.33776/linguodidactica.v1.7314>

## Graphic Organizers: Mind Maps as a tool to enhance Reading Comprehension skills

*Organizadores Gráficos: los Mapas Mentales como herramienta para potenciar las habilidades de comprensión lectora*

M. Ángeles Fernández-Fernández  
University of Huelva (Spain)

M. C. Fonseca-Mora  
University of Huelva (Spain)

Contacto:  
mcarmen.fonseca@dfing.uhu.es

### Abstract:

Reading comprehension in L2 is perhaps the skill whose requirements have changed most and most rapidly due to the demand of the information society. Readers not only need to interpret words and sentences in articles or books: sometimes they have to make a meaning out of disconnected pieces of information in pouring messages on websites, and social networks. The purpose of the present study is to explore the possibilities of mind-mapping techniques in order to foster the reading comprehension abilities in students of English as L2 by working under the assumption that the latter can be improved when apparently loose pieces of written information are connected by means of images and lines. The experiment in the project involved a total of 84 participants of two consecutive academic levels: first and second year of post-compulsory secondary education. Different sessions and two parallel procedures were scheduled in order to provide us with contrasting data that could be systematized numerically. Even though the sessions that could be scheduled were limited in number, the analysis of the data suggests some noticeable improvement in the reading comprehension abilities in most participants and some perception of progress in a majority of them. Their positive feedback, suggests that sustained work in this field could improve their reading comprehension skills in a significant way.

### Keywords:

Mind maps; graphic organizers; reading comprehension skills.

### Resumen:

La comprensión lectora en L2 es quizás la habilidad cuyos requisitos han cambiado más y más rápidamente debido a la demanda de la sociedad de la información. Los lectores no solo necesitan interpretar palabras y oraciones en artículos o libros. A veces tienen que encontrar un significado de piezas desconectadas de información en el vertido de mensajes en sitios web y redes sociales. El propósito de presente estudio es explorar las posibilidades de los mapas mentales como técnicas de aprendizaje para fomentar la comprensión lectora bajo la suposición de que mejoran. Se analizan las habilidades de comprensión en estudiantes de inglés como L2 cuando se enfrentan con fragmentos aparentemente sueltos de información escrita conectados por medio de imágenes y líneas. La experiencia en el proyecto involucró a un total de 84 participantes de dos niveles académicos consecutivos: primero y segundo año de la educación secundaria postobligatoria. Se programaron diferentes sesiones y dos procedimientos paralelos para proporcionar datos contrastantes que pudieran ser sistematizados numéricamente. Aunque las sesiones que podrían programarse eran limitados en número, el análisis de los datos sugiere alguna mejora notable en las habilidades de comprensión lectora en la mayoría de los participantes y cierta percepción de progreso en la mayoría de ellos. La retroalimentación positiva de este alumnado sugiere que el trabajo sostenido en este campo podría mejorar las habilidades de comprensión lectora de manera significativa.

### Palabras claves:

Mapas mentales; organizadores gráficos; habilidades de comprensión lectora.

---

Fecha de recepción: 07 de julio de 2022

Fecha de aceptación: 06 de septiembre de 2022

## Introduction

Developing strategies to understand written messages is a process that never stops, and more often than not turns out to be a challenging task. However, most traditional approaches to improving reading comprehension capacities are no longer as effective as they used to be, and may probably be useless in the near future, since the nature, density and occurrence of the texts is not the same as it was just very few years ago, and the rate of complexity is consistently increasing day after day on account of an avalanche of digital information in a global civilization. The OECD PISA Global Competence Framework (2018) incorporates the Global Integrated Scenario-Based Assessment of reading, which introduces the concept of “global reading literacy ability”, defined as “a multidimensional competence that requires students to not only use and process texts but also to employ other cognitive, language and social reasoning skills, as well as call upon their own knowledge, strategies and dispositions”, reflecting “the cognitive processes that students engage in when confronted with real learning activities” (OECD 2018, p.13). Any reader of English as L2 needs to scan, identify, choose, and interpret correctly the relevant parts of vast amounts of input in very dissimilar contexts at once. In order to keep the pace with both the times and the characteristics of the information, being able to disentangle the meaning behind utterly diverse written messages in English has become a matter of basic literacy for virtually anyone around the globe (Fernández-Corbacho, 2021; Foncujierta et al., 2018).

Everyday experience suggests that the mere input a reader receives from a text is not sufficient to determine its meaning. Rather, it requires a process of integration of prior knowledge, and situational and linguistic context. “Comprehension of words, sentences, and discourse could not be simply a matter of applying linguistic knowledge. Every act of comprehension involves one’s knowledge of the world as well.” (Anderson, 1976, p.4). Numerous theoretical approaches have been proposed concerning how the mind represents the content of a text and how meaningful discourse and correct interpretations are achieved (Rickheit et al., 1985).

Logan’s (1990, 1997) instance theory proposes a series of mechanisms attempting to explain how the process of reading is automatized and speeded up through repetition of similar patterns. Prior to mechanization, schema theories attempt to explain how previously acquired concepts intervene in the active process of comprehending a text and incorporating the information in it as new knowledge. In this sense, understanding a written message is the final product of a mutual interference between what is already known and what expects to be known: “The meanings of the individual words in a sentence clearly depend upon the interaction of world knowledge and context” (Anderson, 1976, p.3).

Schemata are not a new notion in psychology: Bartlett (1932) postulated their existence and defined them as “an active organization of past reactions, or past experiences, which must always be supposed to be operating in any well-adapted organic response” (Bartlett, 1932, p. 201). In his view, the reason for a particular response in any individual with regular behaviour is the product of its relation to previous similar responses acting as a unitary mass. Though the concept has been somehow redefined in the following decades (Anderson, 1978; Rumelhart, 1980), the central idea remains substantially the same, since these “interactive knowledge structures” (Rumelhart and Ortony, 1977) still represent all levels of experience and abstraction in cognitive theories: “our schemata are our knowledge: all of our generic knowledge is embedded in schemata” (Rumelhart, 1980).

Several other models have been developed in order to explain the processes through which previous knowledge in L1 affects the performance of reading comprehension in L2, inducing language transfer (Koda, 2008, p. 70; Grabe, 2009, p. 121). The comprehension of a written message in L2 is also conditioned by expectations derived from the prior experiences of the reader in L1. These expectations identify the starting point of the process of understanding a text. The subsequent steps involve different means of decoding pieces of information and connecting them in order to make a meaningful whole as wide and coherent as possible (Bernardt, 2011). The process has been defined as “explicit learning” and is usually associated with in an area of the brain where sensory input is transformed into meaning and comprehension (Hulstijn, 2007; Ellis, 2015).

Reading involves selection and connection: the reader first picks and chooses those bits of information that best conform to schemata and previous knowledge, then creates a link, and finally makes use of them to help decode the remaining bits. The process loops until it reaches the limit of the reader’s capacity or interest. Grabe (2009, p.14) points out that no definition or systematization has been capable of capturing the complexity of the activity of reading, and enumerates at least ten different processes that appear to be taking place more or less simultaneously. He also underlines the role of what he defines as “lower level processes”, which include word recognition, using grammatical information and building clause-level meaning from word meanings and grammatical information, and concludes that comprehension cannot occur without the smooth operation of all these processes (Grabe, 2009, p. 22).

From this perspective, and closely related to the notion of schemata and interactive linkages connecting, organizing and decoding written messages, the training program proposed in this study is focused on the concept of mind mapping as a technique to improve reading understanding of students of English as a foreign language. Mind mapping technique has been around for decades and numerous studies suggest that it is highly effective in most varied disciplines when it is necessary to visualize or remember a group of systematized elements, both at early and advanced stages of the learning process or regarding learning disabilities (Novoa 2018; Jain, 2015; Ralston & Cook, 2007; Brinkman, 2003). However, this tool has proved to be even more powerful at linking new information to pre-existing paradigms (Koda, 2008). It is precisely this property of creating connections easily that might make mind maps useful at enhancing the reading comprehension skills of foreign language students, since the process of reading basically consists of building a meaning that is consistent both with reality and with the representations in the mind of the reader (Rumelhart, 1977, 1980; Grabe, 2009). The process of decoding a written text in L2 involves adapting its content to the reader’s mental system, making predictions about its validity, and confirming them or not. Decades of studies support the idea that mapping enhances comprehension, since it requires some extra degree of concentration on text structure and the translation of words and concepts into diagrammatic expression (Armbruster & Anderson, 1980, p. 5). Mind maps might have the potential to help students unveil links between concepts which might appear unconnected at first reading.

The techniques of mind mapping are quick to learn and apply; they are also motivating and relaxing for students (Goodnough & Woods, 2002), probably because they do not require hard intellectual effort. Furthermore, visual clues are usually fun to use and reveal personal style. But above all, there

are no 'rights' or 'wrongs' in the process of elaboration, provided the information in a mind map is consistent with the data in the message it attempts to represent and the author's worldview.

Our concern of the study is based on the importance of getting students involved in the process of correct and systematic decoding of written texts in the target foreign language, since reading comprehension is essential to the acquisition of the majority of the curricular capacities, and much of the work on this skill in the early years of schooling has had an intuitive rather than methodical approach (González, 2010, p. 2). The 2015 PISA Assessment (OCDE, 2015), though suggesting some improvement in reading skills among Spanish students with respect of the results of previous editions, still reveals a lot of work to be done, and this task also implies reading comprehension in a foreign language. Studies and experiences aiming at improving reading comprehension in L2 involve the use of strategies of very diverse nature, focusing on aspects such as phonological discrimination, musicality, textual rhythms and structures, etc. This study deals mainly with the use of graphic organizers as a tool to make comprehension of written passages more precise and effective.

## 1. Purpose of the current study

The PISA 2018 Reading Literacy Framework resets the problem of understanding texts in the present world by acknowledging the necessity of redefining what ought to be understood by 'texts' and 'understanding':

As the medium through which we access textual information is moving from print to computer screens to smart phones, the structure and formats of texts have changed. This in turn requires readers to develop new cognitive strategies and clearer goals in purposeful reading. Therefore, success in reading literacy should no longer be defined by just being able to read and comprehend a single text. Although the ability to comprehend and interpret extended pieces of continuous texts - including literary texts - remains a valuable one, success will also come through deploying complex information-processing strategies, including analysing, synthesising, integrating and interpreting relevant information from multiple text (or information) sources. (OECD, 2018, p. 4).

Based on previous research concerning the importance of establishing links between new information to pre-existing paradigms in the mind of the reader so as to boost reading comprehension skills, the primary concern of this research was to explore the possibilities of mind maps as a means to motivate the students in the process of learning how to read more competently and enhance their ability to interpret diverse pieces of written information in any available format in L2.

The following questions were raised so as to study the factors that may appear relevant:

- Could mind maps be considered a useful tool and guidance to accurately understand and structure the ideas in a written text in L2?
- To what extent visualizing and organizing ideas in the brain and depicting them in the form of mind maps may help associate, relate and memorize main and secondary ideas in an easier and more efficient way?
- Which approaches concerning this technique will turn out to be more effective?
- What is the percentage of the students who will reflect a favourable evolution regarding reading comprehension?

As a result of these questions, the study was conducted under the following hypotheses:

**Hypothesis 1:** Mind mapping a text will improve the learners' capacity to understand it properly and organize main and secondary ideas in a better way.

**Hypothesis 2:** Those participants who are able to develop their own style of representing ideas in a mind map will obtain better results.

**Hypothesis 3:** By the end of the sessions, a significant number of students are expected to be aware of some degree of progress in their comprehension capacities.

## 2. Objectives

The objectives of the study could be stated as follows:

- To test in a group of students the appropriateness and possibilities of mind mapping techniques as tools to improve fluent and correct reading comprehension capacities in L2.
- To test to what extent mind maps can improve the association of terms and concepts with their referential ideas in the reading comprehension process of L2.
- To provide the students in the study with a set of techniques that might help them to handle the transfer between L1 and L2 and evaluate how effective these techniques are in CEFR levels B1 and B2.
- To help the students develop visual and conceptual techniques that might contribute to improving the understanding of general and specific information in written, real-life communicative texts.
- To enhance the students' capacity to extract, expose and discuss the relevant information in a text with well-organised structure, interpreting them in a critical way.
- To reinforce the students' ability to identify the key elements in a text, and how these elements relate to each other and build up a functional and conceptual structure of organized ideas.

## 3. Materials and methods

### 3.1 Participants in the study

A total of 84 students of first and second year of post-compulsory Secondary Education took part in the experience and were grouped in the way explained below:

- The first group included 46 students of second year of non-compulsory secondary level at a Secondary school in Huelva and was divided into two subgroups. The first one of these subgroups (2Ba) had 24 students, the second one (2Bb) had 22.
- The second group was formed by 38 students of first year of the first year of non-compulsory secondary level, and was also divided into two subgroups. There were 17 students in the first group (1Ba) and 21 in the second one (1Bb).

### 3.2 Data collection tools

a) A reading comprehension test. The Dialang Language Assessment test was used to establish the reading comprehension levels of the different groups. The Dialang tool was created with the support of the European Commission (SOCRATES Programme, LINGUA Action D). Its assessment system seeks to provide diagnostic information about students' language proficiency. This test was administered at the beginning of the intervention programme and its choice was determined by its

easy access, together with the reliability of the information about the students' proficiency that could be obtained.

b) Self-assessment questionnaires. Two self-assessment questionnaires were to be handed to the students at the beginning and at the end of the sessions. Both sheets included identical sets of questions in which the students were invited to evaluate sixteen items related to their reading comprehension capacities. These capacities were chosen according to the parameters settled in the CEFR for A2, B1, B2 and C1 speakers. The post-questionnaire also included two open questions in which students were invited to express their opinion about the intervention programme.

c) Reading comprehension tests, measuring different aspects of text understanding: identifying general ideas, scanning for specific details, making inferences and deductions, as well as elaborating an opinion. The questions were selected to provide the researchers with unambiguous data, which could be treated numerically, about the students' proficiency at clearly understanding the main ideas in the texts and making inferences from the context and included open, true-false and multiple choice questions, as well as some others requiring projections of future events based on evidence from the texts.

d) A rubric to establish the degree of accuracy in mind map elaboration. A grid was created, based on the study of Evrekli et al. (2010) and O'Connor's proposal (2011) in which the following factors were evaluated in a scale from 1 (poor performance) to 5 (excellent):

- Visual clarity.
- Consistent use of lines and/or colours.
- Presence of the main facts, characters or ideas.
- Absence of obvious comprehension errors.
- Consistent hierarchy of facts, events and characters.
- Consistent chronology of events.
- Accurate and concise use of words to define the nodes.
- Accurate and consistent use of images to support the concepts.

### 3.3 Intervention Program: Research design and procedures

A reading programme was designed where mind mapping was included as an essential technique. Two texts were selected from the book *Stories from the Mind and Soul*, by Mezo and Vallejo (1999) together with reading comprehension activities which could be easily adapted for the purpose of the study.

In order to choose a set of texts with similar degrees of difficulty, the online utility available at [http://www.online-utility.org/english/readability\\_test\\_and\\_improve.jsp](http://www.online-utility.org/english/readability_test_and_improve.jsp) was used, together with other specific sites which estimated and analyzed the results according to the Automated Readability (ARI) and the Coleman Liau indexes, as well as the Flesch Kincaid Grade Level. These readability calculators provide an evaluation of the text based on varied factors, such as its length, the number of different words, lexical density (complexity factor), average syllables per word and average sentence length, and translates the results into several scales. In addition to these, McLaughlin's SMOG (Simple Measure of Gobbledygook) Readability Formula was also applied, in order to estimate the years

of education required for an average individual to interpret a piece of writing. After the analysis of six preselected texts that could fit the expected level of the students (B1-B2 for the majority of them), it was concluded that the most suitable choices were the story called "Life Rhythms" for the first activity, and "Falling" for the second one. Both texts obtained average and similar scores in the aspects considered above and a very standard estimation of readability complexity, just slightly above in the case of the latter, a fact which suggested that it should be used for the second text.

Table 1: Comparative results of readability indexes among the pre-selected texts:

	Coleman-Liau Index	SMOG	Flesch Readability Index
Schol Blues: Kids Hate Them, Moms Too!!	6,51	8,26	76,05
An Angel in My Path	6,96	8,77	75,19
Life Rhythms	7,20	8,98	71,17
Falling	7,60	9,09	71,03
Virtuso	8,37	9,04	68,89
The Virtual World	8,44	10,17	64,51

The reading intervention programme consisted of five sessions of sixty minutes each, and followed these steps:

**First session:** The students were introduced to the subject, and asked to fill the first of the self-assessment sheets. Then, they completed the DIALANG test and showed the results to the teacher, who took the corresponding notes. The scores confirmed the predictions that the groups chosen were sufficiently homogeneous, so it was concluded that the same texts and activities could be used for all of them.

**Second session:** The technique of mind mapping was presented to the students and practiced for some time. They were also given written information about how to create mind maps and the tools available online.

**Third session:** The activities corresponding to the story called "Life Rhythms" were carried out. Two pre-reading questions were proposed as some sort of warm-up activity; then the students were given 50 minutes to read the text, complete the rest of the activities, and finally fill in the gaps in the mind map they were suggested as a model. The students were also requested to produce at home their own alternative version of the mind map that was proposed as a model.

**Fourth session:** Some of the students proposed their own mind maps of the story and the accuracy and efficiency of the different versions were discussed.

**Fifth session:** Groups 2Bb and 1Bb were handed a copy of "Falling" together with a set of comprehension questions and were given 60 minutes to perform the activities in the following order: first they should read the text, then answer the comprehension questions, and finally produce a mind map of the story. The groups 2Ba and 1Ba were told to read the text first, then map the story, and finally they were given a sheet with the same set of questions to be answered in the second half of

the session. If noticeable differences were observed, it might be deduced that mapping the story had somehow contributed to a better performance at the reading comprehension task.

At the end of the session, they were handed the second self-assessment sheet and were requested to fill it in at home and hand it in to the teacher the following day.

## 4. Data analysis and results

### 4.1 The results of the Dialang Assessment test

The level assignment of the Dialang Assessment Test are exposed in Table 1 below.

Table 2: Distribution of students according to their assignment in Dialang's reading comprehension test:

Level assigned	Total of students	2Ba	2Bb	1Ba	1Bb
A2	13	1	2	5	5
B1	52	16	12	11	13
B2	18	6	8	1	3
C1	1	1	0	0	0

### 4.2 The results of the Reading Comprehension tests

The average scores of the reading comprehension tests in each group appear in Table 3:

Table 3: Results of the reading comprehension activities.

	2Ba	2Bb	1Ba	1Bb
Average score "LifeRhythms"	6,5	6,4	5,9	5,7
Average score "Falling"	7,2	6,9	6,7	6,1
Difference	+0,7	+0,5	+0,8	+0,4

There were wide ranges of variation of the scores within each group, corresponding to the differences in competence among students, as it is expected to happen in most groups. The reasons for these variations may be due to all sorts of individual characteristics and circumstances, such as previous background, general intelligence, working memory, processing speed, etc. However, the average marks tend to suggest that all of the groups obtained better results in the second questionnaire, even though a minority of students actually did not improve their results. A revision of the results of the self-assessment questionnaires reveals the following tendencies among the students with little or no improvement which can be grouped in two blocks:

a) Those who obtained lower marks, who had already acknowledged their poor performance in their reading comprehension skills in the first self-assessment questionnaire and found the texts somehow above their level.

b) Those who obtained the highest marks in the first exam and scored an equivalent of B2 and C1 level in the Dialang Assessment Test, for whom the texts were too easy for their capacities and had little or no room for improvement.

As it was exposed before, groups 2Ba and 1Ba were requested to map the second story before they answered the reading comprehension questions. A modest improvement in these two groups can be appreciated with respect to the others, but the difference is not relevant enough to confirm or contradict the expectation that students might do better if they map the story first, a few more tests would be required in order to establish this tendency as a fact, but the projection seems likely, since a better understanding of the links between ideas in a text ought to have some effect on the clarification of unknown words or expressions and passages that may appear obscure at first reading.

### *4.3. The results of the mind maps*

Taking into account the two mind maps the students were handed, a significant improvement in accuracy and visual effectiveness could be appreciated in the majority of the students. The presence and arrangement of the different elements in the story suggested that reading comprehension had been effective and precise with many of them scoring 3.5 or higher in the scale exposed in the rubric created for the evaluation of mind maps, and only a small percentage of the students seemed to have misunderstood the method.

As it was explained, the first mind map was proposed by the researcher and the students just had to fill in the blank spaces with the right idea or name from the text. About 53% of the respondents filled the spaces correctly, 28% completed the mind map only partially and 19 of the participants seemed not to understand correctly how to organize ideas using this method. However, when they were free to produce their own mindmaps of the second text, they manifested a more precise understanding of the text and were able to organize the ideas more clearly: 82% of the students represented the key concepts and secondary ideas correctly, whereas 18% showed different degrees of comprehension; the graphic representations of these students did not follow the pattern of a proper mind map and perhaps could rather be considered concept maps or conceptual diagrams instead.

The reason for this significant increase may correspond to the fact that each person most probably visualizes and connects ideas in a different way. Therefore, when they have the opportunity to reflect their own perspective of a text, focusing on a particular starting point (characters, sequence of events, settings, etc.), the association of ideas is usually successful, with not many signs of misunderstanding. In contrast, when a pre-established pattern is presented, the attempt to adapt to an imposed arrangement of ideas leads to poorer results.

### *4.4. The results of the self-assessment questionnaires*

#### *4.4.1 Students' self-rating their reading comprehension capacities*

Comparing the figures of the pre- and post- assessments, the perception of improvement among the groups at High School ranges between 15 and 16%; such high percentages may appear more than a bit optimistic, but this impression of progress among the students is consistent with the data obtained by the teacher of the subject from other sources, such as class observation, classroom reading tests, participation in group reading activities, as well as extensive reading progress checks.

#### 4.4.2 The open questions

According to the information in this part of the questionnaire, the following general landscape can be drawn from the participants' perspective:

The majority of the students who took part in this study were not familiar with the techniques of mind mapping. Only 7 students had previously been introduced to them, and 6 more had used some other similar ways of representation, but 71 students had never heard about the existence of such technique. Of those who had worked with mind maps before, less than a half manifested in the sessions that they used them regularly. The proportion does not vary much from one group to another, indicating that the use of this tool is not particularly widespread in their educational environment yet.

The main positive aspects the students expressed freely in the second self-assessment sheet about mind mapping as a tool to improve their reading comprehension can be paraphrased and summarized as follows (some students subscribed to more than one of these points):

- *Mind maps help me identify the main ideas more clearly* (39 students).
- *At first I wasn't quite sure about it, but I've realized that using colours, lines and images helps me organize the ideas* (25 students).
- *Mind maps help me get a general view of the subject, but at the same time I also pay attention to more specific details* (18 students).
- *After I create the mind map, something that seemed complex at first appeared simple to me* (16 students).
- *When I have to draw a mind map, I make an extra effort to understand the text correctly, so my interpretation of it improves* (12 students).
- *I can understand and remember the main ideas with just one quick look* (10 students)

Seven students, however, manifested that they felt more comfortable with the traditional 'underlining and summary' method and preferred not to change it.

Of all the population in the study, 82% see positive aspects in mind mapping as a tool to improve the understanding of a text in L2; 31 % of the participants dare to manifest that they are convinced that mind mapping is definitely a useful method to improve their competence in L2 and associate the ideas in any text more easily. 24% of them consider the method particularly useful to memorize key concepts and to simplify main ideas from a given text and 23% claim that mind mapping helps visualize the main and secondary ideas, as well as organize them more effectively. Finally, 19% of the participants claim to have found this method useful to deduce the meaning of obscure passages in a given text.

## 5. Discussion

The questions in the self-assessment tests arranged for this research correspond to different abilities in reading comprehension: analysis, synthesis of relevant information, prediction, contextualization, and visualization, etc. In addition to that, the Dialang test provides the student with an assessment of their reading comprehension capacities of the students and assigns a level (ranging from A2 to

C1 in this study) in relation to the CEFR. The average correspondence between the initial self-evaluation sheet passed by the researcher and the results in this part of the Dialang test were consistent in 70%, of the cases, so it can be considered that the self-perception of the students' reading comprehension capacities was sufficiently accurate. In general, most of those students whose results did not match tended to self-evaluate their own proficiency below the appreciation of Dialang. The fact that both self-assessments confirm each other is significant to the investigation, since many of the implications of the study rely on the students' perception of their own progress, and this perception seems to be accurate.

After the analysis of the results, the main finding to be remarked is that a significant 92% of the participants in the study considered the technique to be a useful tool that could play the role of a guidance to understand a text in L2 more accurately: 56% of the respondents declared that being introduced to the techniques of mind mapping had been a positive experience, and 36% considered it to be very positive and helpful to improve their reading competence in L2. About 55% of the participants claimed to have already included the technique in their studying habits, a percentage of them that appears significant given the very limited number of sessions. Only 8% manifested that they would prefer to use other methods in order to increase their competence at this particular skill.

A noticeable progress regarding the proper understanding of the texts was perceived both by the students and by the researcher, and this improvement was manifested in the accuracy of the mind maps and the scores in the reading comprehension activities corresponding to the second text. Despite the short time available to practice the skill, the general perception among the students is that they had definitely noticed that their reading comprehension capacities were better.

The results of the experience reveal that the techniques involved in mind mapping are easily understandable by most students, since most of them were able to produce adequate output in the first session, and an even higher number of them proved to be able to create competent mind maps at the end of the process. This result agrees with López & López (2022) with respect to the fact that mind mapping contributes to reading comprehension. A crucial point results from the contrasts between the first and second mind maps: the results proved to be far better when the students feel free to organize the ideas according to their own perception, instead of having to adapt their ideas to an imposed, external pattern. The vast majority of the participants were able to associate all the main and secondary ideas in the second text correctly, even though they took different aspects of the story as the focus of their maps, perhaps seeking to maintain a perception of reality that conformed to a previous scheme.

The average score of the mind maps produced by the participants revealed that those who did better and neater mind maps tended to increase the positive difference between the marks in the reading comprehension parts corresponding to the second text in comparison with the first one. This fact, along with the positive feedback received from the vast majority of the participants, supports the idea that the strategy worked. Moreover, a few of them claimed to have started using software to create and print the mind map they had to bring to their third session, downloaded applications on their smartphones (such as *Simple Mind Free*, *Schematic Mind*,

## 6. Conclusion

*Mindly*, or *Mindjet Maps*) and experimented profusely with them in order to find out which one offered best results.

As it has been said, reading comprehension involves a set of highly complex cognitive processes. The results of the experiment point in the direction that the effectiveness of these processes can be fostered with the help of visual support that connects the concepts in the text with the schemata in the mind of the reader. After the data in the study have been analyzed and discussed, it can be concluded that the students might very well benefit from an improvement in their reading comprehension performance if they manage to master the technique and incorporate it to their studying habits. It is true that the need to produce a visual representation of the content required an extra effort on their side, but also stimulated their attention to detail and their creativity; it also increased the positive interaction among peers, who frequently discussed their output and results, proposing and accepting suggestions on how to express an idea in a better way.

With respect to the questions that were formulated in the introduction, all of them have been more or less answered in the previous sections: nine out of ten students manifested that creating a mind map had helped them understand the texts more efficiently and thoroughly, with not much extra investment of time and effort required in the process of acquiring the technique and putting it into practice.

A 10% average perception of improvement may not seem a big difference, but it is indeed significant after only two consecutive texts and five sessions. After all, the students were not only expected to provide data for the investigation, but also to benefit from it, incorporating an instrument that might improve their reading competence. The results of this project suggest that there are reasons to think that the positive evolution could be more solid with maintained work and longer time span. A larger scale study also ought to include groups of different levels, from basic to advanced, with diversity of interests, contents adapted to the requirements of each group, testing and comparing the results, and providing the participants with extra online material that would allow them to increase the pace of their progress by their own means.

## References

- Armbruster, B. & Anderson, T.H. (1980). The Effect of Mapping on the Free Recall of Expository Text. *Technical Report*, 160. Urbana, IL: University of Illinois, Center for the Study of Reading.
- Bernhardt, E.B. (2011). *Understanding Advanced Second Language Reading*. Routledge.
- Ellis, N. (2015) Implicit and Explicit Language Learning: Their Dynamic Interface and Complexity. Patrick Rebuschat (Ed.). *Implicit and explicit learning of languages*. Amsterdam: John Benjamins. 3-23.
- Fernández Corbacho, A. (2021). *Aprender a leer en una lengua extranjera en educación primaria*. Servicio de Publicaciones Universidad de Huelva
- Foncubierta, J.M., Machancoses, F.H., & Fonseca-Mora, M.C. (2018). La competencia lectora del alumnado universitario en contexto AICLE. *Porta Linguarum*, 3, 75-88. <https://tinyurl.com/ycb25bc4>
- Goodnough, K. & Woods, R. (2002, April 1), Student and Teacher Perceptions of Mind Mapping: A Middle School Case Study [Paper] *Annual Meeting of American Educational Research Association*, New Orleans, USA.
- Grabe, W. (2009). *Reading in a Second Language*. CUP.

- Grabe, W. & Stoller, F. (2002). *Teaching and researching reading*. Longman.
- Hulstijn, J.H. (2007). Psycholinguistic Perspectives on Language and its Acquisition. Cummins, J. and Davison, C. (Eds.) *International Handbook of English Language Teaching*. Springer.
- Jain, S. (2015) The Comprehensive Study of how Mind Mapping Technique Helps to Understand Concepts and Ideas in Science Teaching. *International Journal of Scientific and Research Publications*, 5 (12), 284-286. <https://www.ijsrp.org/research-paper-1215/ijsrp-p4843.pdf>
- Koda, K. (2008). Impacts of prior literacy experience on second language learning to read. In K. Koda, & A. M. Zehler, (Eds.) *Learning to Read Across Languages: Cross-Linguistic Relationships in First and Second-Language Literacy Development*. Routledge (pp.68-96).
- Link, S. (2008). Graphic Organizers. *Research Starters Academic Topic Overview*, 1-7.
- Logan, G. (1997). Automaticity and Reading: Perspectives from the Instance Theory of Automatization. *Reading and Writing Quarterly*, 13 (2), 123-146. <http://dx.doi.org/10.1080/1057356970130203>.
- Logan, G. (1990). Repetition priming and automaticity: Common underlying mechanisms? *Cognitive Psychology*, 22, 1-35.
- Mezo, T. & Vallejo, R. A. (1999) *Stories for the Mind and Soul*. International Thomson Publishing.
- López, J. L., & López, J. C. (2022). Reading comprehension through the use of graphic organizers. *Espirales revista multidisciplinaria de investigación científica*, 6 (41), 14-4.
- Novoa, P., Cancino, R., Flores, W., Nieto, J. & Venturo, C. (2018). The Harmonic Mind Map in the Comprehension of Narrative Texts in University Students. *Propósitos y Representaciones*, 6,(2), 541-606. <http://dx.doi.org/10.20511/pyr2018.v6n2.243>
- OECD (2015) PISA Assessment. <http://www.educacionyfp.gob.es/inee/evaluaciones-internacionales/pisa/pisa-2015.html>
- OECD (2018) PISA 2018 Reading Literacy Framework. <http://www.educacionyfp.gob.es/inee/dam/jcr:49ede102-244b-4acb-b28e-a7978d9883ed/ReadingFramework.pdf>
- OECD (2018) Preparing our Youth for an Inclusive and Sustainable World. The OECD PISA global competence framework. Available at <http://www.educacionyfp.gob.es/inee/dam/jcr:3c539272-6f4f-41f7-ac04-dd930d541bdf/Handbook-PISA-2018-Global-Competence.pdf>
- Ralston, J. and Cook, D. (2007). Collaboration, ICT and Mind Mapping. *Reflecting Education*, 3, (1), 61-73.
- Rickheit, G., Schnotz, W. & Strohner, H. (1985). The Concept of Inference in Discourse Comprehension. Inferences in Text Processing. In Rickheit, G. & Strohner (Eds.) *Inferences in Text Processing*. Elsevier Science Publishers.
- Rumelhart, D. E. (1980). Schemata: The building blocks of cognition. In R. J. Spiro, B. C. Bruce, & W. F. Brewer (Eds.), *Theoretical issues in reading comprehension*. Erlbaum.
- Rumelhart, D.E. & Ortoni, A. (1977). The Representation of Knowledge in Memory *Journal for the Study of Education and Development*, 5, 115-158, . <https://doi.org/10.1080/02103702.1982.10821949>