LANGUAGE LEARNING STRATEGIES MEDIATED BY TECHNOLOGIES TO ENHANCE READING COMPREHENSION SKILLS

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Abstract:

The purpose of this study is to determine the level of reading comprehension for English as Foreign Language (EFL) university students with a level of proficiency B1 according to the Common European Framework of Reference for Languages (CEFR) that can be achieved when instructed cognitive and metacognitive strategies in a multimodal learning environment. Accordingly, the research question was: Which factors facilitate or hinder metacognitive and cognitive learning in a technology enriched environment for EFL university students to achieve a B1 proficiency level according to CEFR in reading comprehension? This study took place in the Universidad Estatal de Sonora (UES), México. This sequential-explanatory mixed method research design was composed of two phases. In Phase 1, the pilot test, the researcher set about collecting mostly quantitative data through two instruments (EFL reading comprehension exam and self-reported questionnaire in the use of cognitive and metacognitive strategies). Qualitative data was also collected in a limited basis through an open-question questionnaire of two items. The objective of this initial phase was to validate the proposed instruments. The participants of the Phase 1 consisted of 13 students enrolled in curricular English courses. Once this Phase 1 was finished and based on its results, the researcher undertook Phase 2 of the research project where the sample increased to 150 students who received 30 hours of instruction in LLS by 6 instructors in an environment enriched with technologies to enhance reading comprehension abilities. In phase 2, four instruments were used to gather data: a pre-test and post-test reading comprehension test, a self-reported questionnaire in the use of cognitive and metacognitive strategies, a semi-structured interview and document analysis. For data analysis, t-test paired samples and ANOVA were used for quantitative analysis meanwhile a phenomenological approach was conducted to analyze quantitative data. To validate the results triangulation data was carried out to compare information from the instruments employed. This study shows main findings resulting only from its Phase 1 which bears significant improvement in the use of metacognitive strategies rather than cognitive, which meant better overall results in reading comprehension scores due to the following factors: (a) a revealed preference approach to reasoning through the meaning of the activities before answering them, and (b) to reviewing their own performance and progress as they complete their exam. Consequently, it can be inferred the development of critical thinking enhanced by the use of LLS in a technology enriched environment.

Keywords: Language learning strategies, technology, reading comprehension, cognitive strategies, metacognitive strategies

1   INTRODUCTION

Since the mid 70's, learning strategies have been a key aspect in learning a second language. Defined as "techniques for understanding, reminiscence and use of information that is intentionally used and consciously controlled by the learner" (Rahimi & Katal, 2011, p. 1) [1], learning strategies represent steps, actions, behaviors, or techniques used by students to enhance their own learning, that is, to make it easier, faster, enjoyable, self-directed, effective and transferable to new situations (Oxford, 2003) [2]. In other words, strategic learners have metacognitive knowledge about their own thinking and learning approaches, a good understanding of what the activity or task involves and the ability to come up with strategies that best meet the demands of the assignment and their own learning strengths.

Language Learning Strategies (LLS) also concern any set of operations, steps, plans or routines used by the learner to facilitate the obtaining, storage, retrieval and use of information (Brown, 2007) [3]. An important perspective is to visualize the LLS as those used with the explicit goal of helping learners to improve knowledge and understanding of the target language.

Other researchers visualize the Strategy Based Instruction (SBI) as a student-centered teaching approach that extends to the instruction of strategies in the classroom to demonstrate its implicit or explicit integration into the course content and has two key components: (1) the teacher's explicit teaching of how, when and why the strategies can be used to facilitate language learning and the specific tasks of their use, and (2) integration of strategies in daily classroom supplementary materials, and perhaps the explicit or implicit inclusion of them in language practice exercises (Li & Liu, 2008) [4].

At the same time, Abhakorn (2008) [5] says that the language learning strategies can be described in a cognitive learning model where the learning itself is defined as an active and dynamic process in which students select information out of their own environment, organize it, connect it with their previous knowledge, keep relevant information, use it in adequate contexts, and reflect about the progress of their learning efforts. The definition of language learning strategies provided by Carter & Nunan (2001) [6] emphasizes the importance of student's independence and autonomy, besides giving them a cognitive and affective sense through describing them as techniques that impact the students' learning, assisting them with the storage of information, the construction of language rules and the adoption of an appropriate attitude towards the learning situation.

Research studies about language learning strategies in the last 40 years have been oriented to identify what good students do in order to learn a second or foreign language. In other words, it means to determine those strategies which make the learning process a successful experience (Pannak & Chiramanee, 2011) [7]. In addition, Zare (2012) [8] argues that the learning strategies applied by students in their language acquisition process have been identified and described by researchers of education in order to determine a taxonomy of language learning strategies or a classification of those strategies that not only contribute to relate them with a variety of phases of the cognitive process during the language learning but also to assist them in making an instructional framework.

One of the classifications of the learning strategies presented in several studies proposes a Strategies Inventory to Learning Languages (SILL) which categorizes them in direct and indirect strategies. In the first category, direct strategies involve the target language and imply a language mental processing. These categories include the strategies of memory, cognitive, and compensation. On the other hand, indirect strategies provide an indirect assistance to learning a language through focusing, planning, evaluating, and searching opportunities, controlling anxiety and being empathic. These categories include meta-cognitive, affective, and social strategies (Chang, 2011) [9].

There is a classification which divides the learning strategies into three main categories: The metacognitive strategies, related to planning for learning, reflecting about the learning process as it occurs, observing the personal production and comprehension, correcting own mistakes, and evaluating the learning after completing an activity, imply the following strategies: classification, advanced organizers, directed and selective attention, functional planning, auto-monitoring, and auto-evaluation. The cognitive strategies, limited to specific learning tasks involve a more directed manipulation of the learning material through strategies of repetition, resources, translation, note taking, deduction, images, key words, contextualization, elaboration, transference and inference. Finally, the socio-affective strategies are related with a mediating social activity and interaction with others, and imply cooperation and asking questions for clarification (Gerami & Ghareh, 2011) [10].

On the other hand, the Web-based technologies, the powerful Internet connections and multimedia learning materials provide a wide range of possibilities to the development of educational technology that supports flexible, well-designed, efficient, interactive, affordable, and student´s centered e-learning environments (Sarica & Cavus, 2009) [11]. The result will be an English language learning that is more enjoyable and easier.

According to Tong & Trinidad (2005) [12], the education systems have strongly answered the technological revolution by providing the schools with computers and other resources. Nevertheless, these technologies have failed in the development of coherent strategies that allow a real integration of ICT in the teaching-learning process based on a wide and deep understanding of school system factors. Thus, the adoption of these strategies is the principal challenge for the XXI century education leadership. In sum, teachers must be convinced of adopting technologies as something necessary and

convenient to comprehensively educating students and their professional development in this new information and knowledge society.

Instructional content mediated by technologies can be designed with ease through the Microsoft PowerPoint application, which has an enormous potential to impact the learning process if used properly. A PowerPoint presentation facilitates class fluidity and provides a defined structure for better comprehension of themes (Lai, Tsai, & Yu, 2011) [13]. In addition to this, Gier & Kreiner (2009) [14] point out the existence of sound benefits in student's learning when the instructor makes the most of the PowerPoint slides such us providing images and visuals to those learners keen to visual materials, connecting to Websites for instructional purposes and giving the students more time to get involved with learning activities.

The production of Open Educational Resources (OER) allows the development of special competences related mostly to the use of technologies and its integration to learning or instructional contents. Ramirez (2013) [15] describes the OER as a set of materials, resources, elements or multimedia and textual applications that instructors have at their disposal for integration in traditional or digital learning environment, and has a free license to be accessed. Additionally, the competences developed by those involved actively in the production of OER are creativity, teamwork, search and retrieval of information and responsibility. The OER can help reduce class preparation time in a significant way, this is, the teacher requires finding a resource quickly and that its applicability, based on the teaching goals, can be deemed easily (Ramírez, 2012) [16]. This initiative taken by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) to demand universities the opening and re-use of their instructional contents for free through the Open Access format has been consolidating in a way that many universities with worldwide recognition are embracing this form of democratizing quality education such as Carnegie Mellon University with its Open Learning Initiative Program.

The reading comprehension abilities are necessary to acquire knowledge and learning of new information, especially for those students who want to study at the university. To better understand a text, Suwantharathip (2012) [17] argues that students use two main strategies: cognitive and meta-cognitive strategies. Cognitive strategies support the student to develop inner procedures in order to execute complex tasks. Thus, students explore the text and combine information as they ask questions understanding then what they have read. On the other hand, meta-cognitive strategies allow students to plan, monitor, and evaluate their learning in order to improve their academic performance. Recent research has provided evidence that human conscience or meta-cognition aspects related to learning a second language, particularly enhancing reading comprehension, is related with students' success (Zhang, 2008) [18].

The purpose of this mixed-method study is to determine the level of reading comprehension for EFL university students with a level of proficiency B1 according to the CEFR that can be achieved when instructed cognitive and metacognitive strategies in a multimodal learning environment. Thus, the research question in the present study is, which factors facilitate or hinder metacognitive and cognitive learning in a technology enriched environment for EFL university students to achieve a B1 proficiency level according to CEFR in reading comprehension?

2   METHODOLOGY

According to Valenzuela & Flores (2012) [19], the mixed methods research has the purpose of explaining and describing a phenomenon through the combination of the quantitative and qualitative approaches. Additionally, Johnson & Onwuegbuzie (2004) [20] define it as an inclusive, pluralist and complementary method in which the researcher adopts an eclectic approach to selecting the method and conducting the study. Consistent with the several types of mixed methods research designs which varies with respect to its theoretical orientation, implementation approach, the priority given to the type of data, the phase in which the data is analyzed and integrated, and the procedural codes (Hanson, Creswell, Plano-Clark, Petska & Creswell, 2005) [21], a sequential-explanatory mixed method research design was chosen to conduct the study. According to nomenclature commonly used in mixed methods research, this study used the following type: (QUAN ⟶ qual). This formula means that obtaining quantitative data (QUAN) has a preeminence and is executed in a sequential manner, this is, once this method is concluded, the qualitative one is undertaken to collect data, indicating that the use of this qualitative method is mostly executed to complement the analysis of the quantitative

data (Tashakkori & Teddlie, 2010) [22]. In sum, this mixed methods study comprises a sort of design with a preeminence of a quantitative approach over a qualitative.

2.1 Participants

A sample of 13 university students participated in the study. The sample technique used in this study was participative or intentional due to a participant selection dependent to an entirely availability of subjects with the background needed (Prado, Romero y Ramírez, 2009) [23]. The learners were enrolled in a curricular low intermediate English class of the third semester which focuses on developing reading comprehension, listening comprehension, writing and speaking skills according to B1 level of Common European Framework of References for Languages (CEFR). The learners participated voluntarily through signing an informed consent letter and were notified the implications and procedures of conducting the study. The learners' age ranges fluctuate between 19 and 23 years-old and the learners had been studying English in the Mexican educational system for seven years. The learners' English proficiency was mostly basic at best.

2.2 Instruments

Three instruments to collect data were used in this study: (1) an EFL reading comprehension test, (2) an auto-report questionnaire of cognitive and metacognitive strategies use, (3) an open-question questionnaire which explores students' perceptions on reading strategies mediated by technologies in a multimodal learning environment.

The EFL reading comprehension test was divided in two main parts: (1) fill in the blanks, and (2) text comprehension. In addition, the test was composed of 100 items which 70 relates to section 1 and 30 to section 2. Section 1 of the comprehension test evaluates reader's ability to understand texts through the use of lexical and grammatical structures. In this section, the student will choose the option from a set of words gathered in a box that best fits the answer to fill the blanks. Section 2 of the test evaluates reader's ability to understand texts in terms of identifying main and supporting ideas, and to make inferences. This section is composed of two parts: (1) skimming and scanning and (2) careful comprehension of text. In general, the reading comprehension test was formed out of three texts between 200 and 450 words length. The text and words are adapted or related to students' proficiency language knowledge as it is taught in class. The topics or themes are linked to family, folk tales of native Anglo-Saxons, attire, fantasy, etc. It takes around 90 minutes to get the test done.

The auto-report questionnaire of cognitive and metacognitive strategy use in this study was adapted from Phakiti's (2003) [24]. The questionnaire was translated to Spanish to avoid language problems when evaluating the use of cognitive and metacognitive strategies. The questionnaire let students cross out the strategy use that best fits their learning style o experience in a Likert 5-point scale: 1 (never), 2 (sometimes), 3 (often), 4(almost always) y 5 (always).This out of 30 items that describe different kinds of strategies to evaluate on comprehension, memory, and retrieval for cognitive; and planning, monitoring and evaluation for meta-cognitive. It takes about 10 to 15 minutes to complete the paper.

Finally, the open-question questionnaire that explores the students' perceptions on reading comprehension strategies mediated by technologies was applied by the time the last class was over. All members of the group had to answer two questions related to a strategy based instruction (SBI) in a technology enriched environment. The first question, what benefits did you get out of the use of cognitive and metacognitive strategies mediated by technologies on your class performance? The second question, do you prefer to work on a multimodal learning environment or on a traditional classroom learning environment? The purpose of using open-question questionnaires was to allow students the opportunity to give answers to a teaching approach.

2.3 Procedure

The study took place in an EFL classroom where the research was an active participant as the English class teacher. The students had two and a half hours a week for six weeks of instruction in reading comprehension strategies (cognitive and metacognitive) mediated by technology such as PowerPoint and Open Educational Resources (OER). The students underwent several passages a week which highlighted the use of different reading strategies. Each student was explicitly taught about how the strategies work, in which context strategies should be applied, and how to use them. The teacher was prompt to make suggestions in how to use strategies effectively while the learners were working on

the text. At the end of each learning activity, the teacher gave sound feedback and sensibly corrected any mistake where needed.

An EFL reading comprehension pre-test and post-test was administered to the students before and after the SBI to evaluate the impact of the use of cognitive and metacognitive strategies meditated by technologies on enhancing reading comprehension competences. Additionally, an auto-report questionnaire in the use of cognitive and metacognitive strategies, and an open-question questionnaire were applied by the learner's right at the end of the course.

2.4 Data analysis

The data obtained through the exams and the auto-report questionnaire were analyzed quantitatively by descriptive statistics such as means, standard deviations, percentages, variances, and by inference statistics such as a paired sample t-test. Qualitative data were collected through a feedback questionnaire on perceptions about reading comprehension strategies mediated by technologies and analyzed by textural and structural descriptions of the phenomenon experiences under study.

3 RESULTS

The following Table 1 shows the results of data analysis in terms of the scores obtained in the Section 1 pre-test and post-test of the EFL Reading comprehension exam, that is, before and after cognitive and metacognitive strategies based instruction mediated by technologies.

TABLE 1. DEGREE OF READING COMPREHENSION COMPETENCE BEFORE AND AFTER SBI MEDIATED BY TECHNOLOGY OF SECTION 1 TEST

TOTAL SCORE	SCORE PRE-TEST (N=70)		SCORE POST-TEST (N=70)		DIFFERENCES OF PARITY		DF	T-VALUE	SIG. (2-TAILED)
	MEAN	SD	MEAN	SD	MEAN	ERROR STD.			
SECTION 1	40.85	28.25	56.69	18.91	-15.84	5.139	12	3.0836	0.0095*
*HIGHLY SIGNIFICANT AT THE LEVEL OF 0.05									

As it is shown in Table I, the scores from the pre- and post-test mean in Section 1 of the EFL Reading Comprehension exam were 40.85 and 56.69 respectively. The result of t-test shows that the score of the post-test was significantly higher than the score of the pre-test to a level of 0.05. This difference of significance shows that the instruction of strategies mediated by technologies contributed to an improvement of students reading comprehension skills.

On the other hand, the following Table II shows the results of the data analysis of the score obtained in the Section 2 pre-test and the post-test of the EFL reading comprehension exam, that is, before and after the instruction of cognitive and meta-cognitive strategies mediated by technologies

TABLE 2. DEGREE OF READING COMPREHENSION COMPETENCE BEFORE AND AFTER SBI MEDIATED BY TECHNOLOGY OF SECTION 2 TEST

TOTAL SCORE	SCORE PRE-TEST (N=30)		SCORE POST-TEST (N=30)		DIFFERENCES OF PARITY		DF	T-VALUE	SIG. (2-TAILED)
	MEAN	SD	MEAN	SD	MEDIA	ERROR STD.			
SECTION 2	20.00	8.40	25.00	5.52	-5.00	1.044	12	4.7897	0.0004*
* EXTREMELY SIGNIFICANT AT THE LEVEL OF 0.05									

Table 2 shows the scores from the pre-test and post-test means in Section 2 of the EFL Reading Comprehension exam which were 20.00 and 25.00 respectively. The result of the t-test shows that the score of the post-test was significantly higher than the score of the pre-test to a level of 0.05.This difference shows, as the previous analyzed section, that the instruction of cognitive and meta-cognitive strategies mediated by technologies contributed to improve the students' reading comprehension skills

In sum, the case has n-1, that is, 13-1=12 degrees of freedom (df). The two-tailed t-test has the purpose to know if SBI mediated by technologies contribute or hinder the development of EFL reading comprehension abilities. The critical value of the t-chart of the student for $t_{05, 12}$ is 2.179. Because both t-values from sections 1 and 2 are 3-0836 and 4-7897 respectively and higher than 2.179, the null hypothesis might be rejected. The test has shown that SBI supported by technologies contribute to the development of EFL reading comprehension abilities.

According to the degree of cognitive and metacognitive strategies use when resolving the EFL Reading comprehension test, it was found that students used an average or moderate number of metacognitive or cognitive strategies when answering the EFL reading comprehension test. According to Mokhtari and Reichard (2002) [25] score guide, the interpretation of a mean score in terms of the strategy used by students when doing an exercise or answering a reading comprehension test indicates that an elevated use of a strategy will have a mean of 3.5 or higher, a moderate use a media between 2.5 and 3.5, and low use a media of 2.5 or below. Table 3 below shows the results of analysis in terms of scores obtained when answering the auto-report questionnaire to the use of cognitive and meta-cognitive strategies after finishing the EFL reading comprehension test.

TABLE 3 DEGREE OF USING COGNITIVE AND META-COGNITIVE STRATEGIES WHEN ANSWERING THE EFL READING COMPREHENSION EXAM.

	Comprehension cognitive strategies	Mean	SD
3	I used the pictures or titles of the text in order to understand the reading activities.	3.462	1.050
6	I tried to understand the text and the questions no matter my previous vocabulary knowledge.	3.385	1.325
7	I tried to find the topics and the main ideas through skimming and scanning techniques.	3.385	1.121
14	He tried to identify main ideas from the text and Reading comprehension which were given to me.	2.846	0.899
2	I translated to Spanish the text and the Reading activities.	2.462	0.660
	Mean	3.108	
	Memorizing cognitive strategies	Mean	SD
22	I tried to understand the questions adequately before trying to get the answers.	3.769	1.166
5	I spent more time in difficult questions.	3.077	1.038
8	I repeatedly read the texts and the questions in order to understand them better.	2.846	1.214
1	I wrote small notes or underlined main ideas during the exam.	2.0	0.913
	Mean	2.923	
	Cognitive Recovery Strategies	Mean	SD.
9	I applied my previous knowledge in order to understand a Reading comprehension exam.	3.462	1.266
4	I applied my own structural English knowledge to understand the text.	3.308	1.437
26	I applied multiple-thinking strategies in order to answer the questions of the exam.	2.692	1.109
29	I selected relevant information to understand the Reading texts and answer the questions of the exam.	2.462	1.506

		Mean	
		2.981	
	Meta-cognitive Strategies of Evaluation	Mean	SD
15	I reflected through the meaning of the activities/questions of the exam before answering.	3.923	1.256
13	I looked at my own development and progress while answering the exam.	3.769	0.832
28	I looked at the accuracy of my answers as soon as I was advancing in the exam.	3.538	1.506
18	I wondered how the questions of the exam and the texts were related to what I knew.	3.462	1.266
30	I carefully checked the answers before presenting the exam.	2.462	1.506
	Mean	3.431	
	Meta-cognitive Strategies of Monitoring	Mean	SD
12	I was conscious of what and how I was answering the exam.	3.846	1.144
17	I corrected mistakes immediately after finding them.	3.769	1.641
16	I was conscious of what, strategies to use, how and when.	3.692	0.947
24	I was always conscious to keep on doing my readings and the exam.	3.462	1.561
21	I was always conscious of how long I needed to complete the exam.	3	1.581
25	I tracked my personal progress in order to complete the questions on time.	2.615	1.387
	Mean	3.397	
	Meta-cognitive Strategies of Planning	Mean	SD
23	I was sure of understanding what I had to do and how.	3.769	1.301
19	I determined what was necessary to do, according to the activities/questions.	3.462	1.330
27	I made sure of clarifying the objective and how to complete it.	3.231	1.166
1120	I was conscious of how necessary was to plan an action course.	3.154	1.519
11	When I started answering the exam, I planned how to complete it and I followed my plan.	3.077	1.256
10	I tried to identify the easier and more difficult activities of the exam.	2.462	1.127
	Mean	3.192	

According to Table 3, it is observed that metacognitive strategies are mostly used during the execution of the EFL reading comprehension test, and out of these, evaluation metacognitive strategies are the ones which reflect the highest mean with a score of 3.431, which represents the closest to the 3.5 mean guide mark previously described. Overall, two of the strategies most used by students were related to reasoning through the meaning of the activities/exam questions before answering them, and to reviewing their own performance and progress as they complete their exam, both cataloged as evaluation metacognitive strategies as well, with a mean of 3,923 and 3,769 respectively. This implies that students do critical thinking exercises that involve having a better understanding of what they are about to read and determining if the strategies employed are actually working out so far.

Moreover, the highest record in the use of cognitive strategies is the memory related to trying to understand the questions properly before finding the answers, with a mean of 3,769. This involves having the ability to make predictions and/or inferences when observing clues of what the reading storyline or plot is all about.

Regarding the lowest mean scores, the strategies least used were the memory cognitive related to writing little notes or underline main ideas during the test, with a mean of 2, and the recovery cognitive

related to selecting relevant information to help students understand the reading texts and answer exam questions, with a mean of 2.462. This denotes a students' weakness for synthesizing the information read and identifying the reading structure for a better text understanding.

In conclusion, it is important that teachers facilitate the learning process of cognitive and metacognitive strategies for text reading comprehension and encourage its constant practice in an autonomous and independent way, which is, giving them the freedom to choose the best strategies options that best suits their learning styles and comprehension.

Finally and according to the students' perception level towards the use of EFL reading comprehension strategies linked with the use of multimedia technologies, an open-question questionnaire in Spanish was applied to the group of students under study at the end of the course with the purpose of obtaining answers related to their purpose previously described. Summaries and relevant quotes from the two questions are presented below:

What benefits did you get out of the use of cognitive and metacognitive strategies mediated by technologies on your class performance? Most participants responded positively indicating benefits regarding didactic, motivational, entertainment and contribution aspects towards a more effective method of addressing and understanding the readings in less time. Besides, they expressed a very favorable response in terms of the benefits that cognitive and metacognitive SBI for enhancing reading comprehension skills have in their academic achievement as shown below:

> Being able to better analyze the texts I read. I learned strategies that maybe at some point I should have listened to but I had never put them into practice. And the fact that the video-projector was used, the Internet search and the online supplementary materials made learning easier.

> A faster pace when doing the class activities, learning more dynamically and out of the routine, new experiences on how to learn English in a more technology-related manner.

> I used to read just because I had to, and there were times I didn't understand anything and I had to start all over again. Nowadays, thank to these methods I plan the strategies that I will use and at the same time I monitor what I read and at the end, in my personal assessment I notice the difference: I understand faster and better.

> It has helped me to understand and identify better the types of texts, as well as reading more consciously, evaluating the way I understood and in case I didn't read properly I can use another strategy to understand better.

Do you prefer to work on a multimodal learning environment or on a traditional classroom learning environment? In general, there is a very acceptable preference for technology enriched teaching over the traditional method because it gives them greater autonomy. However, there is some skepticism when embracing a completely virtual teaching model or subjected to largely extent to the use of technology in the classroom due to a number of factors or negative experiences they have had in previous implementations of the same model. On the other hand, they observe a certain benefit in preserving the most important traditional teaching practices such as the physical presence of the teacher in the classroom. In other words, they advocate for a teaching model that gets the best of both methods:

> In an environment mediated by technologies because they make the class more didactic and entertaining for the student, besides it provides a great visual and auditory support, and leads class and activities to a better understanding.

> Of course, now that I know this combination I prefer the use of technologies in the classroom. I was very satisfied with the way you taught the course: there were talks, comments, examples; and technology is a key support. I think that classes are great, but what is online is not a 100 % feasible method. Instead, the course was very good because it has some traditional teaching enriched with the use of technologies.

In sum, those students who received this type of instruction based on cognitive and metacognitive strategies mediated by technologies to enhance EFL reading comprehension skills point out the convenience and flexibility of the methodology to assume greater self-direction on their learning and embrace it more effectively, entertainingly and motivationally. They also believe that this approach

facilitates their development and/or academic achievement as students and future professionals in their field.

4   CONCLUSIONS

The results of this study show that instruction based on cognitive and meta-cognitive strategies contribute to improve the students' reading comprehension abilities, earning a better understanding of the text content. In other words, a direct instruction of cognitive and metacognitive strategies helped students to be more conscious of the necessity to recognize and apply these strategies appropriately and effectively during the reading activities in the course and in the exams.

For this particular research group, the most meaningful improvement observed was in the use of meta-cognitive strategies, which is very encouraging because the development of a metacognitive critical thinking is strongly related to mature reading and practical knowledge. Also, the results of the evaluation, in general terms, showed a substantial improvement of their ability to apply the reading comprehension strategies independently during the class exercises and the same evaluation in a multimodal learning environment. The capacity shown by students to acquire the abilities in this context indicates the potential it has, with effort and an appropriate guide, to be replied in other contexts of university reading material or assignments.

In sum, teaching cognitive and meta-cognitive strategies must be a core of the teaching program of all second language teachers. When the students reflect about their learning strategies, they are more prepared to make conscious choices about what they can do in order to improve their own learning.

With respect to including technology when instructing cognitive and meta-cognitive strategies, the applied questionnaire to know the students' perceptions of this strategy allowed us to obtain useful and conclusive data. The data reflect the perception of a real learning environment mediated by technologies through the exercise of auditory and visual senses, which combined created a fun and entertaining experience in order to acquire the reading strategies. On the other hand, an effective integration of the competences or abilities of English was observed.

Technology was an important facilitator in the process of focusing the program primarily on instructional content, without sacrificing a secondary focus either on language forms or learning strategies. For example, while the main lesson was being developed, the students were able to access a variety of OER & Internet links that enabled them to quickly access grammatical explanations or exercises, pictures, vocabulary glosses, pronunciation information, etc.

Finally, the implications of the pilot test finding resulted in a series of changes for Phase 2 of the study: a proposed exchange of the EFL reading comprehension test for an existing format of the same proficiency level B1, according to CEFR, which has proven validity and reliability due to its extensive use in evaluation context of English competences in worldwide universities (TELC Exam). Besides, it was decided to extend not only the size of the sample (150 students and six teachers), but also the number of instruments for collecting data to four, that is, a semi-structured interview for teachers and document analysis through evaluating evidence in e-portfolios were integrated. Additionally, the instructional content based in LLS mediated by technologies was redesigned to include Learning Objects and e-Portfolios, along with a training program for teachers on the theme of LLS instruction.

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