

## THE EFFECT OF ENHANCED INPUT THROUGH MULTIMEDIA PRESENTATIONS ON PERFORMANCE IN THE RETENTION OF COLLOCATIONS

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**ABSTRACT:** This paper reports findings regarding the effect of Mayer's Redundancy Principle on the retention of collocations in a second language. According to the redundancy principle, students learn better from animation and narration than from animation, narration and on-screen text. It has only been applied in disciplines other than second language acquisition. Two groups of students were involved in the study. Whereas the experimental group received "enhanced input", which was characterised as the presentation of material through narration (i.e. the teacher's spoken input), animation (i.e. static images) and on-screen text, the control group was exposed to non-enhanced input, defined as a combination of narration and monomodal text. The results revealed that there was no statistically significant difference between the enhanced and non-enhanced input in the impact on the retention of the collocations. However, both groups showed gains in terms of retention of the collocations at the end of the experiment.

**KEYWORDS:** collocation; redundancy; multimedia; enhanced input.

### 1. INTRODUCTION

The importance of collocations (words that naturally occur together) in Second Language Acquisition (SLA) has grown considerably. Suffice it to say that native speakers recur to hundreds of these word combinations at any time. Accordingly, instead of emphasising the learning of individual words, students need to become aware of collocations, because, as some researchers argue, collocational knowledge is essential for mastering a second language (e.g., Cowie, 1998, Lewis, 1993, 1997, 2000, Sinclair, 1996, Wray, 2002). As Schmitt points out, "it seems intuitive that the most important role for collocation knowledge is in the production of language" (1998: 28).

On the other hand, multimedia learning is also becoming one of the major issues in learning a second language. Mayer (2001) suggested a cognitive theory of multimedia learning, which states a) that the human information processing system is composed of dual

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channels: visual and verbal, and b) that these channels are of limited capacity. In addition, one of the seven principles he tested to account for how to use or not to use multimedia to help students understand better deals with redundancy in the mode of presentation of the new material. This principle, called the Redundancy Principle, assumes that animation and narration, rather than animation, narration and on-screen text will lead to better learning. Furthermore, Mayer has been able to prove that redundancy does not seem to work effectively in disciplines such as engineering and science. The explanation for this ineffectiveness lies in the hypothesis which states that the human information processing system is of limited capacity, i.e. when learners are exposed to two visual modes at the same time (e.g. animation and on-screen text), their visual channel may become overloaded. However, it is not known how redundancy affects the acquisition of a second language.

## **2. REVIEW OF THE LITERATURE**

### **2.1 INPUT**

In the field of second language acquisition, there have been many theories on how a second language is acquired. Nativists such as Krashen (1981, 1985, 1987) assume that natural internal mechanisms operate upon comprehensible input which leads to language competence. One of the most influential hypotheses of his well-known second language acquisition theory, *the Input Hypothesis*, postulates that: “we progress along the natural order by understanding input that contains structures at our next “stage”-structures that are a bit beyond our current level of competence (Krashen, 1985: 29). In other words, SL learners acquire a target language if they are exposed to a kind of input that uses what they already know and a little bit beyond that and when their affective filter is thin.

### **2.2 INPUT ENHANCEMENT**

According to Sharwood-Smith (as cited in Urano, 2000), *input enhancement* refers to the deliberate manipulation of L2 input with the intention of making certain features more perceptually salient than others. It is usually defined as highlighting the L2 target form either typographically or intonationally. This is done with the hope of implicitly or explicitly making L2 learners notice targeted L2 forms and consequently increase the rate at which they acquire those forms.

There are several types of input enhancement. One of them, *textual enhancement* (TE), refers to underlining, bolding, italicisation, shading and the use of different fonts or uppercase letters to enhance particular features of the written input. In other words, input enhancement serves as a tool for focusing on form. Nevertheless, studies on input enhancement have yielded mixed results. For example, a study conducted by Jourdenais *et al.* and Shook (as cited in Leow, Egi, Nuevo, & Tsai, 2003) concluded that L2 learners benefited from TE. The other two studies carried out by Leow and Overstreet (as cited in Wong, 2003) revealed that there were no differences between the two types of input. Finally, Alanen and White (as cited in Wong, 2003) reported only partial effects for TE.

### **2.3 NOTICING**

Over the past two decades, researchers in the field of second language acquisition have become increasingly interested in the concept of *attention* and its relation to the acquisition of a second language. One of the most examined theories in this field is *the Noticing Hypothesis* proposed by Schmidt (Truscott, 1998), which posits -contrary to Krashen's stance- that noticing is a necessary condition for learning and that only what learners notice in the input becomes intake. He also contends that "whether a learner deliberately attends to a linguistic form in the input or it is noticed purely unintentionally, if it is noticed it becomes intake" (as cited in Cross, 2007: 2), which may be a rather controversial issue unless the meaning and restrictions of the concept "unintentional" are clarified. Furthermore, Schmidt (as cited in Cross, 2007) suggests that several factors influence noticing in the input: instruction, frequency, perceptual salience, skill level, task demand, and comparing.

The assumption that noticing is necessary for acquisition is not supported by exhaustive empirical evidence. Criticism comes from Truscott (1998), who claims that a weak version of the noticing hypothesis, that simple awareness of the existence of input is necessary for SLA, is uninteresting. Second, he argues that the strong version, that awareness of grammatical details is necessary for SLA, is not supported by empirical evidence from cognitive psychology and is not clear about what exactly is supposed to be noticed. Truscott's other criticism is that it is not clear exactly what details need to be noticed and that empirical investigations of the noticing hypothesis need to specify what learners are becoming aware of.

## 2.4 THE LEXICAL APPROACH AND COLLOCATIONS

Learning a foreign language used to be mainly associated with learning its grammatical structures, while the importance of vocabulary in this process was minimised. It was not until Lewis (1993), who developed the *Lexical Approach* theory that the pivotal role of lexis came into focus. The Lexical Approach is based on the idea that an important part of language acquisition is the ability to comprehend and produce lexical phrases as unanalysed wholes or “chunks”. This approach makes a distinction between a) vocabulary- traditionally referred to as a stock of individual words with fixed meanings and b) lexis, which includes not only single words but also multi-word items that are stored in the human mental lexicon. Lewis (2001) claims that language is not broken into traditional grammar and vocabulary, but is often made up of multi-word prefabricated chunks. These chunks consist of collocations, fixed and semi-fixed expressions and idioms, and according to him, occupy a crucial role in facilitating language production, being the key to fluency. Furthermore, their ubiquitous nature supports the view that much of language use is dominated by the “idiom principle” rather than by the “open choice principle” (Sinclair, 1991: 110). Sinclair claims that “...a language user has available to him or her a large number of semi-preconstructed phrases that constitute single choices, even though they might appear to be analysable into segments”.

An explanation for native speakers’ fluency is that vocabulary is not stored only as individual words, but also as parts of phrases and larger chunks, which can be retrieved from memory as whole units. Skehan (1998) suggests that non-native speakers construct a great amount of their language from rules rather than multi-word units. Regarding collocation, it means that learners acquire individual words without paying attention to their environment, i.e. their collocates. That is why they need a lot more time and effort to express themselves. As a result, it is essential to make students aware of chunks, giving them opportunities to identify, organise and record these. Therefore, the role of teachers is to draw learners’ attention to these chunks, since noticing features of the input has a facilitative role.

Within the lexical approach, special attention is paid to collocations and as Lewis (1997: 204) states: “instead of words, we consciously try to think of collocations, and to present these in expressions. Rather than trying to break things into even smaller pieces, there is a conscious effort to see things in larger, more holistic, ways”. There are as many different definitions of collocations as there are authors who have tackled this topic. The most commonly shared definition is the tendency of one or more words to co-occur frequently with other words (Firth, 1957, Carter, 1987, Lewis, 1993, McCarthy & O’Dell, 2005). Moreover,

collocation is not determined by logic or frequency, but is arbitrary, decided only by linguistic convention.

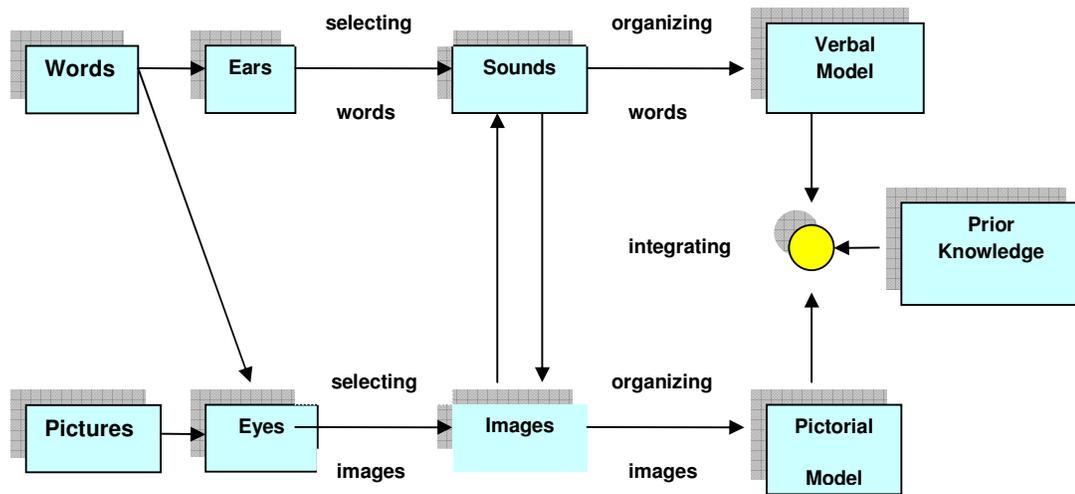
Collocations can be divided into lexical and grammatical collocations. Whereas lexical collocations are made up of two same lexical components, grammatical collocations combine a lexical word with a grammatical word. According to Hill & Lewis (1998), there are five categories of lexical collocations: *adjective/noun*, *verb/noun*, *noun/verb*, *adverb/adjective* and *verb/adverb*.

All this implies that vocabulary and grammar should not be separated, because most syntactic structures have a set of words that are normally used with them. Taking words out of their natural context leaves the sensation that something is incomplete and therefore grammar should not be separated from vocabulary. That is why the inappropriate use of collocations is the most perceptible marker of foreignness (1998: 28). In other words, in order to be a proficient speaker of English, it is imperative to gain collocational competence.

## **2.5 COGNITIVE THEORY OF MULTIMEDIA LEARNING**

There is a widespread belief in the power of multimedia learning environments. Mayer (2001: 2) defines multimedia as: “the presentation of material using both words and pictures”, suggesting that an explanation is better understood if presented in words and pictures than if it is presented in words only. He further argues that the rationale for multimedia presentations is the use of the full information processing capacity that humans possess. This means that when material is presented only through narration or spoken input, we are not taking advantage of the potential contribution of our capacity to process that material in the visual mode as well. Mayer claims that two channels are better than one and that pictures and words complement one another due to the fact that humans’ understanding occurs when learners are able to mentally and meaningfully connect visual and verbal representations. By doing this, learners develop a deeper understanding than from words or pictures in isolation.

One of the most important premises of cognitive psychology is to account for how multimedia can be used to foster learning. In an attempt to explain such a process, Mayer (2001) has proposed a Cognitive Theory of Multimedia Learning, which deals with the design of multimedia messages in such a way that they reflect the way the human mind works.



**Figure 1:** The Cognitive Theory of Multimedia Learning (Mayer, 2001: 44)

According to this theory, the learner's information processing system is composed of dual channels: a visual information processing channel in charge of visual/pictorial processing and a verbal information processing channel, responsible for auditory/verbal processing. When information is presented to the eyes, humans begin processing that information in the visual channel; when information is presented to the ears, it is processed in the auditory channel. Also, a Cognitive Theory of Multimedia Learning assumes that each channel has limited capacity for processing information, i.e. only a limited amount of information can be processed in each channel at one time.

Mayer (2001: 184) further proposes seven principles for designing a multimedia lesson. These are: the multimedia principle (students learn better from word and pictures than from words only), the spatial contiguity principle (students learn better if words and pictures presented are nearer each other on the screen), the temporal contiguity principle (students learn better when words and pictures are presented simultaneously rather than one after another), the coherence principle (students learn better when extraneous items are excluded from the presentation), the modality principle (students learn better from animation and narration than from animation and on-screen text), the redundancy principle (students learn better from animation and narration than from animation, narration and on-screen text), and the individual differences principle (design effects have more impact on low-knowledge than on high-knowledge students and for high-spatial rather than for low-spatial learners).

As previously explained, the redundancy principle suggests that students learn better from animation and narration than when presented with animation, narration and text. Mayer supports this argument by stating that our visual channel may be overloaded if it receives pictures and words both presented visually. The concept of cognitive overload on which Mayer bases his findings comes from Sweller (2005: 159), who claims that “coordinating redundant information with essential information increases working memory load, which interferes with the transfer of information to long-term memory. Eliminating redundant information eliminates the requirement to coordinate multiple sources of information”. Several studies on the redundancy effect have been conducted. All of them have indicated the negative outcomes of redundancy (e.g., Mayer (2001), Miller (as cited in Sweller, 2005), Kalyuga at al. (as cited in Sweller, 2005))

### **3. PURPOSE OF THE STUDY**

The present article deals with the effect of Mayer’s Redundancy Principle on the retention of some collocations in students of English as a foreign language. It is argued that input enhancement (operationalised as the presentation of information through animation, narration and on screen text) leads to a higher degree of noticing and consequently, to better retention.

Therefore, the hypothesis formulated in this study is that enhanced input should lead to more noticing and better retention of the collocations presented. In contrast, non-enhanced input should result in less noticing and in a lower degree of retention.

### **4. METHODOLOGY**

#### **4.1 PARTICIPANTS**

Participants in this research involved 23 first year students from the Department of Engineering at a state-funded university in Santiago de Chile during the academic year 2007/2008. They were attending Lectocomprensión en Inglés I (English I - Reading Comprehension).

## 4.2 PROCEDURE

As was mentioned before, this study intended to test how effective Mayer's Redundancy Principle was in the field of SLA, namely the retention of collocations.

The experimental and the control group were determined through a pre-test. The first group obtained a better score in the pre-test and as a result, was labelled as the control group. Group 2, whose scores were lower in the pre-test, was characterised as the experimental group, the group that was exposed to the enhanced input through the application of Mayer's redundancy principle. There were twelve students in the control group and eleven students in the experimental group. Once this was done, the training took place. It consisted of six sessions (over the course of two weeks, three classes per week) related to the learning of collocations through multimedia presentations.

The training of the experimental group was conducted by exposing the students to the "enhanced" input, i.e. simultaneous, three-mode presentation that contained on-screen texts with the underlined collocations written in bold and italics accompanied by on-screen static images and narration, i.e. the teacher's voice. The pictures represented the actions described by the selected collocations and were shown together with the collocations they referred to, i.e. the students were able to see the on-screen text and the picture at the same time as they listened to the teacher. The teacher's input (narration in Mayer's terminology) consisted of reading each collocation aloud and its corresponding examples from the screen and paraphrasing them in different ways.

As far as the control group is concerned, the students received the "non-enhanced input". In other words, they were exposed to a two-mode presentation which was composed of handouts containing the selected collocations (monomodal text) and narration, i.e. the teacher's input. The teacher's input in the control group referred to the reading aloud and paraphrasing of the collocations and their corresponding examples from the handout.

After this, the students in both groups had to do some exercises whose aim was to identify the correct collocations. Although the exercises were exactly the same, the students in the control group received them in the form of written worksheets, while the students in the experimental group were exposed to on-screen worksheets.

Once the instruction period was over, students took a post-test in order to determine if redundant input had led to better retention of collocations after the training.

### **4.3 MATERIALS**

- 1) Pre-test/post-test: a three-page 42-collocation checklist that included multiple-choice questions concerning forty-two collocations related to six different topics: daily routines, school, travel, health, work and sport.
- 2) The computer-based materials: power point presentations and on-screen worksheets for the experimental group.
- 3) Printed handouts and worksheets for the control group.

### **4.4 DATA ANALYSIS AND RESULTS**

As previously explained, our working hypothesis was that enhanced input would lead to more noticing on the part of the subjects and consequently, to better performance in their retention of collocations than non-enhanced input. In contrast, our null hypothesis stated that enhanced input via a three-mode presentation would not promote more noticing and consequently, would not lead to better performance in retention than non-enhanced input.

The t-test was applied to examine whether there was a significant difference between the two groups in their scores in the collocation post-test, i.e. after receiving the training.

### **4.5 THE PROGRESS OF THE EXPERIMENTAL AND THE CONTROL GROUP**

Although the working hypothesis was rejected, both groups made some progress. As the pre-test and the post-test were identical, when it came to scoring, one point was awarded for each correct answer, and no points for an incorrect answer. The knowledge gain scores between the pre-test and then post-test in both groups were categorized into: 1) highly substantial gain (40-42points) 2) substantial gain (30-39); 3) moderate gain (20-29 points); 4) little gain (10-19 points); and 5) negligible or no gain (0-9 points).

As for the scores obtained in the pre-test by the experimental group, it was concluded that their knowledge scores were low. However, this trend has changed in the case of the post-test. In other words, the number of low scores reduced and the students improved their overall performance. Of the 11 students, none of the students showed highly substantial gains (over 40 points) in knowledge scores from the pre-test to the post-test; three students showed substantial gain (30-39 points), two showed moderate gain (20-29 points); five showed little gain (10-19 points), and only one student showed negligible or no gain (0-9

points) in scores from the pre-test to the post-test. Findings from these results indicate that participants had very little previous knowledge of the subject matter topic. Based on the gain in knowledge scores between the pre-test and the post-test, however, it was possible to increase participant retention in the area of some collocations via enhanced input.

In the control group, the gain in knowledge scores in the pre-test was also low. In the post-test, this group improved its overall score as well. Of the 12 students, none of the students showed highly substantial gains (over 40 points) in knowledge scores from the pre-test to the post-test; seven students showed substantial gain (30-39 points), two showed moderate gain (20-29 points); three showed little gain (10-19 points), and none of the students showed negligible or no gain (0-9 points) in scores from the pre-test to the post-test. It can be concluded that these students also showed an increase in the retention of some collocations via non-enhanced input.

#### 4.6 THE DIFFERENCE BETWEEN THE CONTROL GROUP AND THE EXPERIMENTAL GROUP AFTER THE TRAINING

	English CG		English EG		T-test	p	Sig of t
	Mean	SD	Mean	SD	t value	0.05	
PostT	27.58	10.16	21.27	9.56	1.535	1.721	NS

**Table 1:** Between group comparison of the post-test scores

Table 1 shows the means and standard deviations of the two groups for the post-test. The T-test showed no statistically significant differences between the control group and the experimental group at the end of the training. The means suggest that the non-enhanced input unexpectedly had some positive influence on the learners' subsequent performance when compared to the enhanced input. However, given the statistically non-significant results ( $t=1.535$ ,  $p=.05$ ), we may argue that the overall effects of the non-enhanced input were minimal. This finding led the researcher to reject the working hypothesis since it postulated that there would be a significant difference in favour of the group exposed to the enhanced input due to its potential impact on noticing and subsequent retention of the collocations presented.

## 5. CONCLUSIONS AND IMPLICATIONS FOR FUTURE RESEARCH

Even though the studies on Mayer's redundancy principle, as applied in various disciplines, have shown its negative effects, we cannot simply assume that the same effects apply in the field of SLA. In other words, providing students with the same information more than once and through different modes may be quite beneficial for the retention of information. Before taking for granted the negative or positive effects of Mayer's redundancy principle we must certainly test it empirically. This was exactly what we intended to do through this quasi experimental research study.

The results of this study led to the rejection of the working hypothesis, which postulated that enhanced input via a three-mode presentation would promote more noticing of the collocations and consequently better performance in retention than non-enhanced input. Our hypothesis was based on the idea that the more redundant the information provided to the students was, the more retention there would be after the training. However, this was not the case.

What is concluded from this research is that perhaps the time span between the last session and the post-test may have influenced the overall performance of the students from the experimental group. There was a strike that took place at the university, which postponed the administration of the post-test for two months. We had originally planned to administer the post-test immediately after the final training session but this was something entirely beyond our control. As a consequence, we had to administer a delayed post-test which may have affected the results.

As the working hypothesis was rejected, that is to say, the two types of input did not make a statistically significant difference regarding the retention of collocations, it seems that the exercises the students were exposed to after the presentation stage led to overall improvement in both groups.

The results also seem to indicate that the students in both groups did notice the targeted collocations. According to Schmidt (as cited in Al-Hejin, 2004), only input that is noticed becomes intake. The reason why we came to such a conclusion is the fact that both groups showed gains in terms of their retention of the collocations chosen.

With regard to the research problem, it was concluded that enhanced input, that is, a redundant mode of presenting information was equally beneficial for the retention of collocation as non-enhanced input. This conclusion has been drawn on the basis of the students' results which indicated that both groups of students did make progress.

The results of the experiment suggest that the training (enhanced input versus non-enhanced input) did not make a difference. Therefore, further study is needed into the effect of Mayer's redundancy principle on the retention of collocations without exposure to exercises for systematic practice. In other words, what would the benefits of enhanced versus non-enhanced input be if the learners were exposed to these two modes only?

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## Appendix A. A sample of the “enhanced input”

### DO HOMEWORK

- I **do homework** every day after coming back from school.
- Sometimes my parents help me **do my homework** because it can be very difficult.
- If I don't **do my homework** regularly, I get bad marks in my tests.



1

### PASS AN EXAM

- At the end of the school year, all students have to **pass** the final **exam**.
- If we don't **pass** the final **exam**, we have one more opportunity.
- Some students study hard and **pass** the final **exam** without problems.



2

### TAKE AN EXAM

- In many countries, it is necessary to **take an exam** in the middle of the semestre and at the end.
- You have to **take** the same **exam** again if you don't pass it.
- When I have to **take an exam**, I study a lot.



3

### FAIL AN EXAM

- I think I am going to **fail** my **exam** because I didn't study enough.
- I wouldn't like to **fail an exam** because I would have to study again.
- If I **fail** my **exam**, my parents won't let me go out with my friends.



4

## **Appendix B. A sample of the “non-enhanced input”**

### **HANDOUT**

**May 7th 2008**

#### **1. DO HOMEWORK**

- I do homework every day after coming back from school.
- Sometimes my parents help me do my homework, because it can be very difficult.
- If I don't do my homework regularly, I get bad marks in my tests.

#### **2. PASS AN EXAM**

- At the end of the school year, all students have to pass the final exam.
- If we don't pass the final exam, we have one more opportunity.
- Some students study hard and pass the final exam without problems.

#### **3. TAKE AN EXAM**

- In many countries, it is necessary to take an exam in the middle of the semestre and at the end.
- You have to take the same exam again if you don't pass it.
- When I have to take an exam, I study a lot.

#### **4. FAIL AN EXAM**

- I think I am going to fail my exam because I didn't study enough.
- I wouldn't like to fail an exam because I would have to study again.
- If I fail my exam, my parents won't let me go out with my friends.

## Appendix C. A sample of exercises

### SCHOOL COLLOCATIONS

#### 1. Fill in the blanks with an appropriate word.

- a) She is going to \_\_\_\_\_ (reprove/fail) her exams because she didn't study anything.
- b) If I \_\_\_\_\_ (do/make) my homework every day, my English will get better.
- c) I have to \_\_\_\_\_ (make/take) an exam in biology at the end of term.
- f) I'm happy to say that you all \_\_\_\_\_ (passed/approved) your maths test.

#### 2. Correct each of the following sentences with one of the words given below.

*failed, do, take, pass*

- a) What homework do we have to make tonight?
- b) In which month do students usually do their final exams in Chile?
- c) I hope I will approve the exam in biology.
- d) I am sorry to say that 70% of the class reproved their exams.

#### 3. Fill in the blanks with one of the words given below.

- a) At what age do children \_\_\_\_\_ their final exams in secondary school?
- b) How often do you \_\_\_\_\_ your homework?
- c) When was the last time you \_\_\_\_\_ an exam? Did you feel disappointed?
- d) How many exams do you have to \_\_\_\_\_ in the first year of your career?

1) pass 2) take 3) fail) 4) do

#### 5. Complete the collocation about each picture.

do, take, pass, fail



\_\_\_\_\_ homework



\_\_\_\_\_ an exam

\_\_\_\_\_ an exam



\_\_\_\_\_ an exam

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**RESUMO:** Este trabalho apresenta descobertas referentes ao efeito do Princípio da Redundância de Mayer na retenção das ocorrências de associação de vocábulos em uma segunda língua. De acordo com o Princípio da Redundância, os estudantes aprendem melhor através de animação e narração combinadas do que através de animação, narração e texto apresentado em tela. O estudo foi aplicado em outras disciplinas além da aquisição de uma segunda língua. Dois grupos de estudantes foram engajados no estudo. Enquanto o grupo experimental recebeu “informação aprimorada”, que se caracterizou pela apresentação de material através de narração (i.e. material falado pelo professor), animação (i.e. imagens estáticas) e texto apresentado em tela, o grupo-controle foi exposto a informação não-aprimorada, definida como uma combinação de narração e texto monomodal. Os resultados revelaram que não houve diferença estatisticamente significativa entre a informação aprimorada e a não-aprimorada no impacto da retenção dos vocábulos naturalmente associados. Entretanto, ambos os grupos mostraram ganhos em termos de retenção dos vocábulos naturalmente concatenados ao final do experimento.

**PALAVRAS-CHAVE:** associação de vocábulos, redundância; multimídia: informação aprimorada.

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