



RESEARCH PAPER

Multimodal and Perceptual Learning Styles: Their Effect on Students' Motivation in a Digital Environment

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Abstract

The advent of various interactive multimedia networks in the English for Specific Purposes (ESP) classroom (Grabe & Grabe, 2007) has led to the emergence of new learning methodologies (Ming-Hung et al., 2017). Accordingly, new ways of learning are present in a multimodal environment, and have caused an effect on students' degree of motivation, as well as on their learning styles (e.g., 'multimodal' and 'perceptual' learning styles).

The present study aims to analyse the degree of motivation of ESP learners with a 'Multimodal' learning style in contrast to those with 'Multiple' learning styles. In particular, this study addresses three research questions: (1) Has 'Digital' learning created a recent 'perceptual' learning style (i.e., 'Multimodal' learning style)? (2) To what extent does 'digital' learning increase ESP students' motivation in comparison to 'traditional' learning? (3) Does the 'Multimodal' learning style heighten the degree of motivation in contrast to 'Multiple' learning style?

The study used a sample of 62 first-year ESP students taking the subject 'Professional English for Communicators' at a Spanish university. Data for this study were collected using 'Wix', as the main research tool, and two questionnaires which focused on students'

'Multimodal' learning style and motivation: (a) 'Multimodal Learning Styles Questionnaire', designed to help students identify their preferences towards their learning process, and (b) 'Motivation Questionnaire', in order to get information regarding students' perceptions for the enhancement of engagement.

Results suggest that the implementation of 'Wix' in the classroom increases students' engagement in their learning process and fosters a new perceptual learning style (i.e., 'multimodal' learning style). These findings may help to identify to what extent digital resources affect students' engagement and perceptual learning styles' preferences. The results obtained from this research may be used to derive conclusions on how to approach the 'Multimodal' learning style in further student performances with digital tools that promote the training of digital literacies (Girón-García, 2013).

Keywords

Multimodal learning style, motivation, digital learning, 'Wix', ESP.

1. Introduction

Higher-education EFL students are facing new learning environments due to the rapid development of Information and Communication Technologies (ICTs). Therefore, the presence of these new technological resources triggers students' need to learn how to use the digital medium (i.e. Internet) along with different types of resources (e.g. YouTube videos, web pages that contain text, etc.). For this reason, the integration of the new technologies into ESP classrooms should be considered in order to facilitate specialised vocabulary learning to digital native students (i.e., 'e-generation' students) (González-Vera, 2016; Grabe & Grabe, 2007). Recent evidence suggests that teachers have focused their attention on new methodologies that integrate technology (Moharrer, 2012) in the learning process in and outside the classroom setting. Accordingly, students feel encouraged to work with authentic materials in the classroom at any level of education. Additionally, there is a compelling need to adopt higher-education structures, as well as their resources in order to respond to current requirements evoked by new generations of students and foster their lifelong learning once they leave their university degree (Tynjälä, 2008; Naimie et al., 2010). However, there is increasing concern that some students are being disadvantaged because of their lack of technological management and, more importantly, their lack of awareness of their personal learning style. Although this issue has been approached in previous studies (Girón-García, 2013), effective learning requires both the knowledge of students' learning styles together with adequate instruction that meets students' needs by using technology in the ESP classroom (Moharrer, 2012).

Within this frame of technological advances, the aim of this study is to provide a conceptual theoretical framework based on learning styles, 'perceptual' learning styles (Gargallo-Camarillas & Girón-García, 2016; Girón-García, 2013; Villanueva & Navarro, 1997); and to analyse the degree of motivation and/or engagement of university ESP learners through the implementation and performance of a digital research tool known as 'Wix' in an ESP subject taught at the Universitat Jaume I (Spain). Accordingly, this study may help to prove to what extent a correlation between digital resources and students' engagement (Jurado-Navas, 2018) is feasible with the identification of students' learning styles. For this reason, this study aims at finding out the degree to which higher-education students with a 'Multimodal' learning style feel motivated compared to students with 'Multiple' learning styles. In particular, and in order to reach this aim, this study examines higher-education ESP students' learning styles for (1) the appearance of a 'Multimodal' learning style derived from 'Digital' learning, (2) the degree of students' motivation, comparing 'Digital' and 'Traditional' learning, and (3) the degree of students' motivation, comparing the 'multimodal' learning style and the 'multiple' learning style.

2. Learning digitally in an ESP setting: perceptual learning styles' effect on students' motivation

A number of researchers have reported that the World Wide Web (WWW), whose accessibility has developed multiple teaching possibilities, has played an important role in ESP because it offers a great number of resources in order to obtain information (Sharples, 2000; Pudichery, 2003). As a result, technology provides both teachers and students with unprecedented opportunities to learn foreign languages in real-life contexts (e.g., experiencing simulations, trying out instructed procedures, or even looking for additional information on the web) (Zhang, 2002).

The association of learning in digital environments with the students' learning styles is a key factor in order to approach different kinds of online activities so that students will develop different learning preferences according to task objectives (Franzoni & Assar, 2009). Along these lines, it is worth considering that with regard to students' specific learning preferences; each of them will accomplish a task in different ways. Although some research (Mulalic et al., 2009: 102) has demonstrated that "*Teaching and learning styles should become one of the greatest interests of the educators, particularly their relationship. However, one of the weaknesses of the research into learning styles is the lack of the investigation into the matching of teaching and learning styles.*" To date, much uncertainty still exists about the relation between students' learning styles and satisfactory teaching instruction that students may find suitable for their learning plan when using digital resources in the classroom.

Learners generally process different types of information in different ways according to their learning style. For this reason, Learning Styles (LSs) play a powerful role in students' learning processes. According to Dunn and Griggs (1988) "*learning styles are the biologically and developmentally imposed set of characteristics that make the same teaching method wonderful for some and terrible for others*" (Dunn & Griggs, 1988: 3). To be precise, LSs depend on the frequency to which cognitive and pragmatic strategies are employed; and as a result, a particular learning style should not be attributed to a specific student, since each student may experience different types of strategies (e.g. motivational, social, cognitive, metacognitive, affection, attitude, etc.) (Villanueva & Navarro, 1997). The choice of these 'learning strategies' might be affected by the type of task that learners are required to accomplish, therefore, learners will choose some strategies or others depending on the objectives that the task proposed addresses.

Additionally, LSs are usually connected with the concept of 'learner preferences', which are commonly referred to as the "*conditions, encompassing environmental, emotional, sociological and physical conditions*" (Pritchard, 2008: 43) in which learners are able to choose a particular set of learning strategies. Therefore, the choice of specific learning preferences and task requirements might determine students' task outcomes (Girón-García, 2013).

Regarding Dunn and Dunn's (1992) model of learning styles, these are defined as the way in which individuals begin to concentrate on, process, internalise and retain new and difficult academic information. Furthermore, this model examines four variables: environmental, emotional, sociological, and physiological. These variables refer, respectively, to (1) the individuals' preferences for the elements of sound or light; (2) the students' levels of motivation or responsibility; (3) the students' preference towards learning alone or in pairs; and (4) the perceptual strengths (Arbutnott & Krätzig, 2015). The present study addresses the physiological and/or perceptual learning style variable, which refers to visual, auditory, kinaesthetic, and tactile preferences. Likewise, this individual variable refers to the perceptual learning channels that students feel more comfortable with in their learning process (Gargallo-Camarillas & Girón-García, 2016).

In view of the fact that people may have different learning styles, it would not be surprising that they might be aware of other learning styles different from their own (Pashler et al, 2008). Therefore, students may have 'Multiple' perceptual learning styles, which means that they have strong preferences over two or three perceptual modes aforementioned. Moreover, as it has been mentioned in Section 2, there is a growing

emphasis on exploiting technological devices in education (Olson et al., 2010), which reinforces learners' various modes of perception in a multimodal learning environment.

Accordingly, this work aims to examine the 'Multimodal' learning style, which refers to the perceptual learning preference that includes all four perceptual learning modes at the same level (i.e. visual, auditory, tactile and kinaesthetic). More specifically, this study aims to examine the degree of motivation of ESP learners with a 'Multimodal' learning style compared with students with 'Multiple' learning styles'.

As regards motivation, this concept is defined as the driving force and the willingness of a person at a conscious and unconscious level to achieve a goal at a physical or mental level (Motivation, 2013). Within the field of education, this individual variable was primarily defined in terms of 'motivational intensity' (i.e., the effort learners make to learn a language and their determination in learning it) (Ellis, 2006). Thus, there is a current general belief that considers motivation as a precondition for successful learning (Mirhadizadeh, 2016).

In relation to ESP language instruction, teachers should consciously promote their teaching methodologies and include techniques and strategies that increase students' motivation (Dörnyei, 2001). Additionally, motivation increases when learners' perceptual learning styles are considered when implementing some sort of activities (Felder, et al., 2002). According to Vaishnav (2013), one of the benefits of increasing learners' awareness of their own learning styles is the degree of interest and motivation in the learning process, which implies students' increased responsibility for their own learning. Therefore, being aware of learning styles promotes effective learning because students can control their study habits, as well as the perception of receiving input.

In an attempt to expand this line of research, this study aims at exploring the connection between the 'Multimodal' Learning Style and its effect on students' motivation towards specialised learning in an ESP subject by using 'Wix'. This study addresses the following research questions:

- (RQ1): Has 'digital' learning created a recent 'perceptual' learning style (i.e., 'Multimodal' learning style)?
- (RQ2): To what extent does 'digital' learning increase ESP students' motivation in comparison to 'traditional' learning?
- (RQ3): Does the 'multimodal' learning style heighten the degree of motivation in contrast to the 'multiple' learning style?

3. Method

3.1. Context and participants

The present study was conducted with a group of university students taking the ESP subject 'Professional English for Communicators', a compulsory ESP subject taught in the first-year course of the bachelor's degree in Advertising and Public Relations at Universitat Jaume I (Spain). This subject deals with the fundamentals of New Media, Marketing and Advertising, which are necessary in the development of students' communicative and professional competences.

Students' participation in this study was voluntary; nevertheless, the whole group (62 students) gave their consent to participate. In order to safeguard students' privacy and to obtain their permission for data collection, an individual identification code was provided (e.g., Student 1, Student 2). The sample consisted of 52 females and 10 males, and their age ranged between 18 and 30 years old. Their mother tongue was Spanish or Valencian and all of them started learning ESP at the beginning of the 2018/2019 academic year. As for their English proficiency level, they had a pre-intermediate level (B1), according to the Common European Framework for Languages CEFR.

3.2. Instruments

3.2.1. 'Multimodal learning styles questionnaire'

This questionnaire (see Appendix 1) is used to measure students' perceptual learning styles. The questionnaire is divided into 20 statements dealing with information related to the educational environment. It has been designed in order to help students identify the way they prefer to learn EFL. The statements are divided into four main categories, namely visual, auditory, kinaesthetic, and tactile. Each category includes five statements that students are required to rate according to their perceptual learning style (see Appendix 2) using the following scale: 5 (strongly agree), 4 (agree), 3 (undecided), 2 (disagree), 1 (strongly disagree).

In order to consider a student as 'Multimodal', s/he is required to obtain 15 points out of 25 in each category, which represents a strong preference towards the four perceptual learning styles in the same degree.

3.2.2. 'Motivation questionnaire'

This questionnaire (see Appendix 3) is used to measure students' motivation and it is composed of 17 statements related to a pedagogical activity (conducted using Wix). All the participants completed this activity in the classroom. The purpose of its design is to analyse the multimodal students' motivation towards digital learning in comparison to learners with multiple learning styles. In order to attain this aim, students need to express their agreement (i.e., 'True' or 'False') to all the statements. Therefore, in order to affirm whether students are motivated or not concerning the completion of the activity proposed, students are required to obtain 10 affirmative responses (i.e., 'True' answers) out of the 17 statements.

3.3. Wix design and implementation

3.3.1. Wix design

In this study, 'Wix' is used as a technological tool in order to establish a relationship between teachers' instruction and students' perceptual learning styles. 'Wix' is a platform with millions of users worldwide that allows them to build fully personalised, high-quality free websites. In particular, users can display their art, set up an online shop or just test out new ideas from a wide range of designer-made templates that can be customised with graphics, image galleries, or fonts.

Wix provides students with the opportunity to foster their creativity and the possibility to take decisions in relation to content and design. For instance, students can attach videos, hyperlinks, or any piece of information they consider appropriate.

This activity is framed within the unit 'New Media'¹ in the subject curricula 'Professional English for Communicators'. More specifically, this activity helps students acquire specialised vocabulary in the New Media field (e.g., home pages, blogging, podcasting, and so on).

In order to complete this activity, students are required to design a home page about their university (i.e., 'Universitat Jaume I'). This home page must have the following elements: drop-down menu, search function, shopping cart/basket, hyperlink, sidebar, and domain name.

The following lines describe the Wix platform as presented to students:

Figure 1 shows the Wix home page, from which students can start their own designs. In this home page, students are able to create their proposals by using the different options displayed in the top left menu: menus and pages ('*menús y páginas*'), wallpaper ('*fondo*'), add ('*agregar*'), add apps ('*agregar apps*'), my files ('*mis archivos*'), start your blog ('*empieza tu blog*'), and reservations ('*reservas*').

¹ Extracted from: Ceramella, N. & Lee, E. (2013). *Cambridge English for the Media*. Cambridge: CUP.



Figure 1. Wix home page.

Regarding the first and the second sections (i.e., menus and pages, and wallpaper), Figure 2 shows how to edit the main menu, by changing the names of the different sections offered, the order in which these sections appear, as well as adding new sections. Moreover, Figure 3 shows how to edit the wallpaper. This design element allows learners to choose from a wide range of different colours, as well as images or videos.

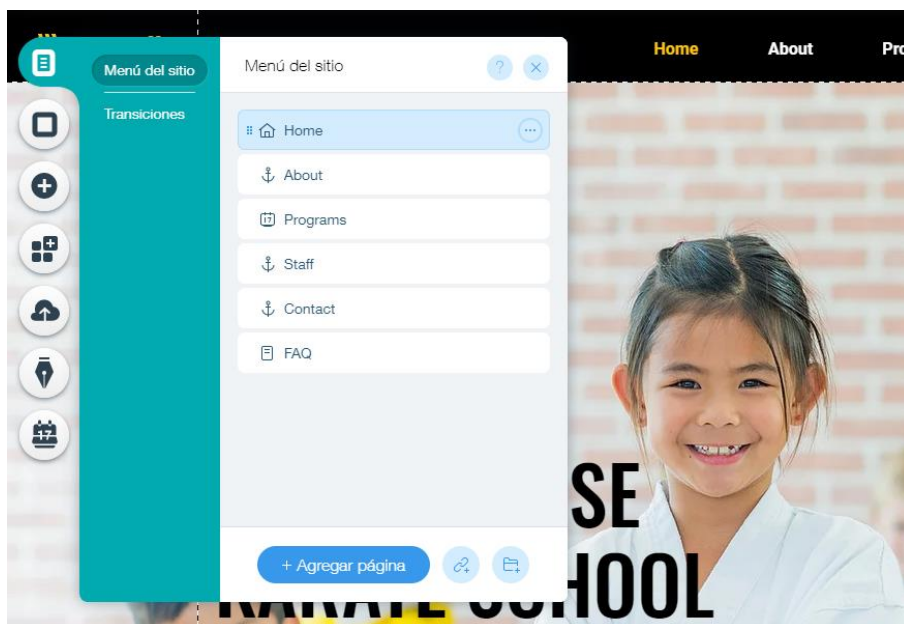


Figure 2. Wix editing menu.

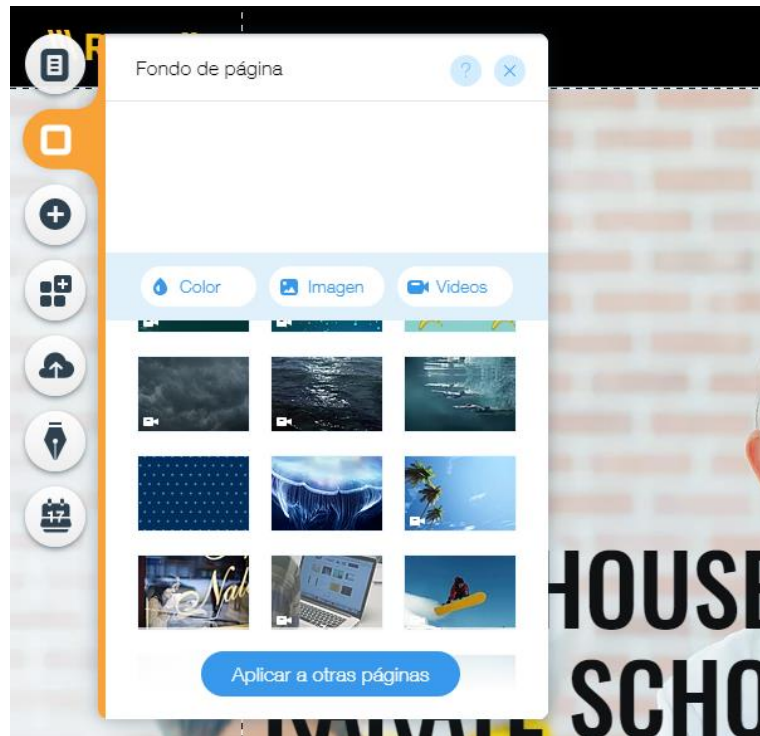


Figure 3. Wix wallpaper.

Finally, Figure 4 shows the text editor that students can find in Wix. With this option, students can include the information they wish. Moreover, they can modify the text colour, font or size.

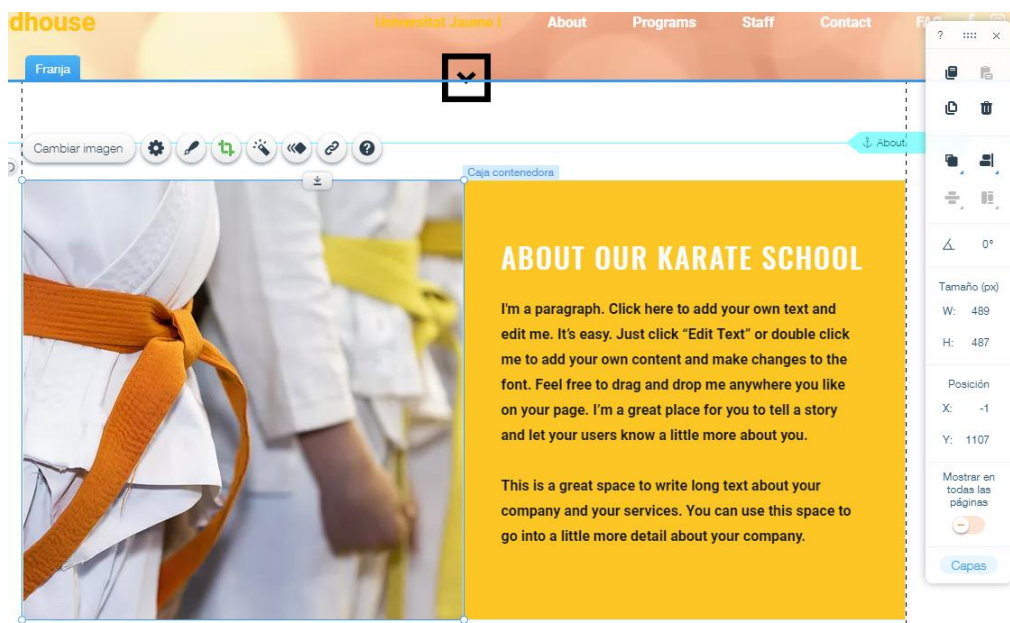


Figure 4. Wix text editor.

3.3.2. Wix implementation

This activity was developed in three weekly sessions of two hours during the second semester (January-June) for the 2018-2019 academic year. The activity consisted of creating and presenting a Wix home page in groups of 3-4 students. Students' participation in this activity was presented as voluntary work and their will to participate was considered as part of the subject class work. After completion of the home page, an

extra session was necessary in order to complete two questionnaires (i.e. 'Multimodal Learning Styles Questionnaire' and 'Motivation Questionnaire').

The study was developed as follows: Students used their course book to complete an activity (Figure 5) dealing with vocabulary about home pages. In this activity, students were required to label the home page of 'The Scottish Bookshop' using the vocabulary provided in the box.

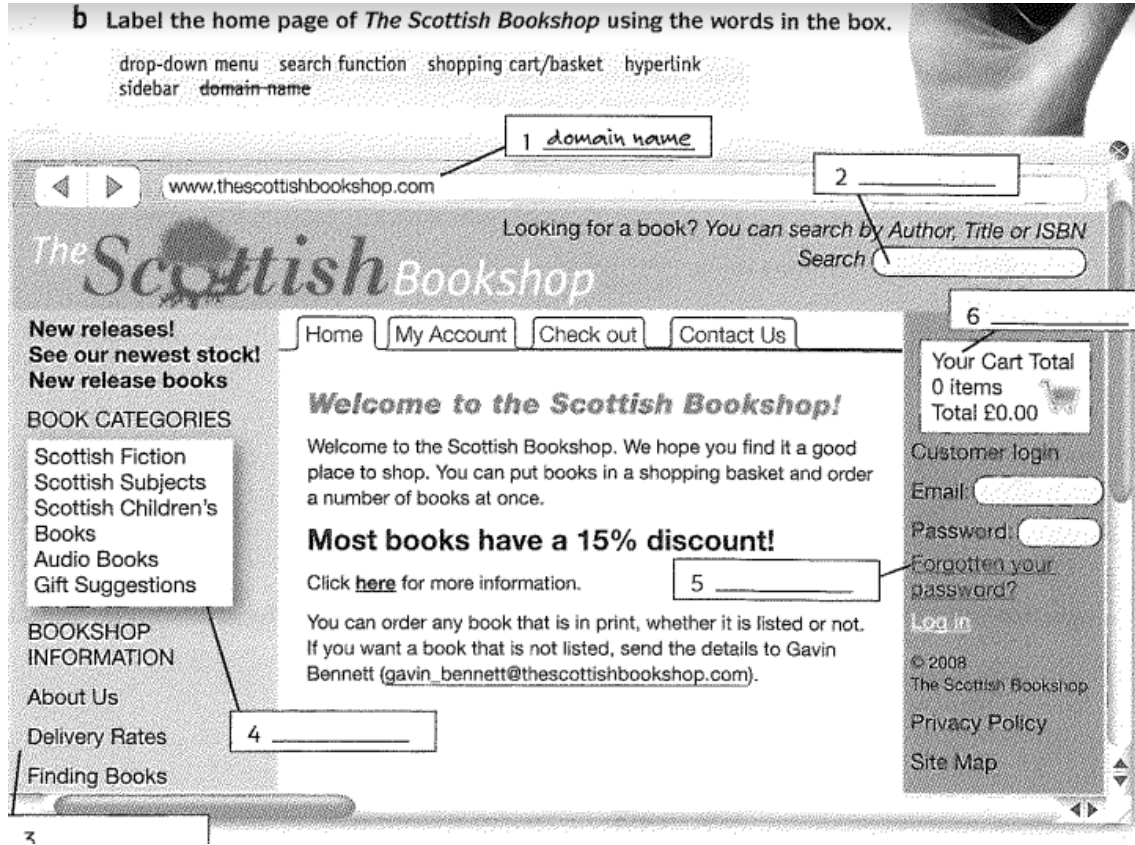


Figure 5. Book activity (Extracted from: Ceramella, N. & Lee, E., 2013).

After completing 'The Scottish Bookshop' activity, students had to watch a YouTube tutorial about Wix (Figure 6) in order to become familiar with this platform. After that, students were able to create a Wix account and start their designs.



Figure 6. Wix tutorial.

Once their Wix accounts had been created, students were arranged in groups of three or four participants. The task design consisted of creating a home page about the students' university (i.e., Universitat Jaume I). After the execution of their designs, they took their own home page screenshots, which were to be included in a PowerPoint presentation. Following that, they uploaded their presentations to the Virtual Classroom (i.e. Moodle

platform) to present the design in groups in front of their classmates for about 6-8 minutes. Subsequently, students were asked to complete both a 'Multimodal Learning Styles Questionnaire' and a 'Motivation Questionnaire'. Finally, only data gathered from the questionnaires were taken into consideration.

4. Results and discussion

The purpose of the present section is to show the results obtained from the process described above. Likewise, it attempts to examine these data quantitatively and qualitatively in order to discuss research findings. Results are displayed in Figures 7-9 according to each of the research questions posed in the study, namely (1) the appearance of a recent perceptual learning style (i.e., 'Multimodal' learning style), (2) the effects of digital learning on students' motivation and, (3) the degree of motivation of learners with 'Multiple' learning styles in comparison to those learners with a 'Multimodal' learning style.

Figure 7 shows the results obtained from the 'Multimodal Learning Styles Questionnaire' about **learners' perceptual preferences**.

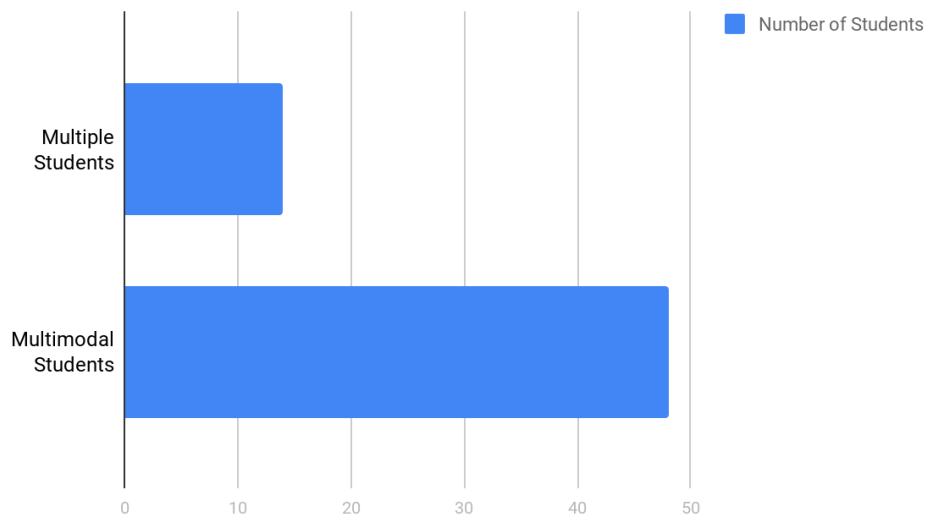


Figure 7. Multimodal learning styles questionnaire.

From the students' answers in the 'Multimodal Learning Styles Questionnaire', it can be inferred that a new perceptual learning style has appeared (i.e., 'Multimodal' learning style). Therefore, it seems that technological devices exert a great effect on students' senses by fostering them throughout multimodal input (i.e., multimodal resources and other types of materials).

Figure 8 shows the data obtained from the 'Motivation Questionnaire' regarding the degree of **students' motivation** fostered by a digital learning environment.

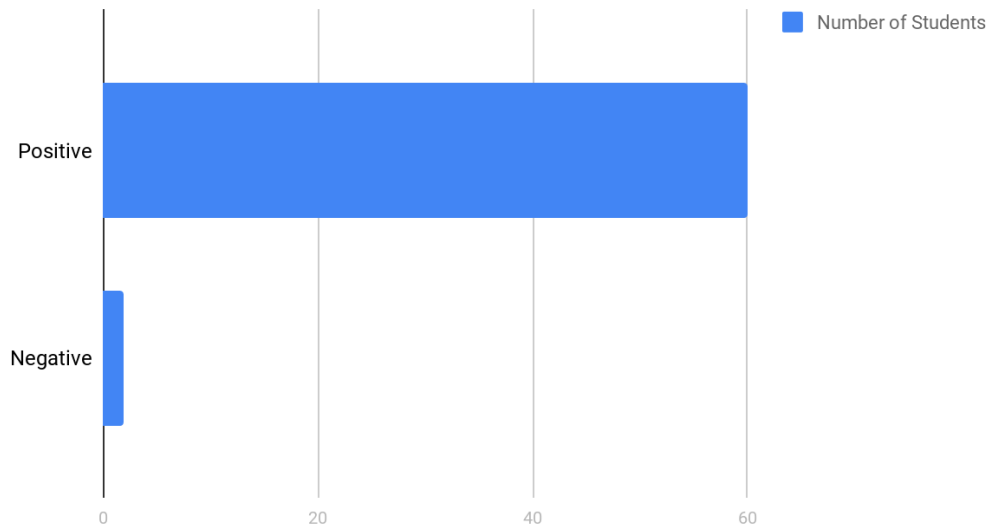


Figure 8. Motivation questionnaire.

According to the results obtained from the 'Motivation Questionnaire', it can be affirmed that there was a high degree of motivation of the students towards digital learning. It is apparent that almost the whole group of students showed a positive degree of motivation in contrast to only a few students, who reported negative results regarding the 'Wix' activity. Therefore, digital learning seems to stimulate students' sensory preferences, which leads to positive motivation and, results in more effective learning.

Finally, Figure 9 compares the degree of motivation displayed by students categorised as 'multiple' and 'multimodal'.

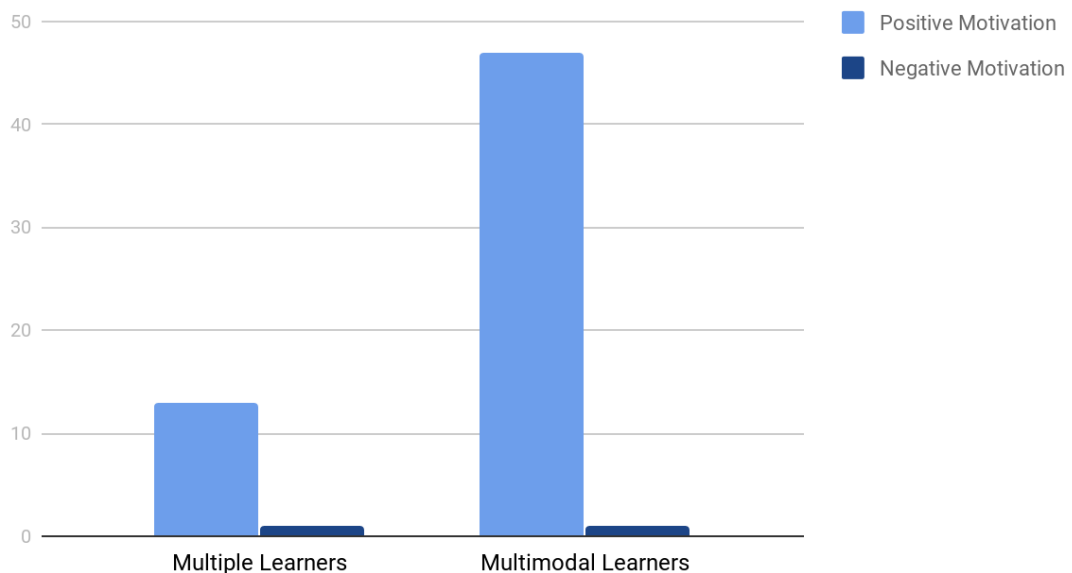


Figure 9. Comparison between 'multiple' and 'multimodal' students and their degree of motivation.

Results derived from Figure 9 show great differences between the number of students with 'Multiple' learning styles and students with a 'Multimodal' learning style. However, the degree of motivation towards the 'Wix' activity seems to be equivalent in both groups

of learners. This suggests that learning in a digital environment heightens students' degree of motivation regardless of their perceptual learning style.

The present study was designed to ascertain the appearance of a new perceptual learning style, the effects that digital learning may exert on students' degree of motivation, and the possible differences in terms of motivation arising from the comparison between 'Multiple' and 'Multimodal' learners. Taking into consideration the 'Multimodal' learning style, all the perceptual learning styles (i.e., visual, auditory, kinaesthetic, and tactile) seem to be fostered equitably probably due to the direct access to new multimodal resources and different technological tools, such as mobile phones, tablets or laptops. Furthermore, the use of these devices has been shown to encourage students' positive degree of motivation in the classroom, as inferred from students' involvement in a digital learning environment. Finally, disregarding students' perceptual learning categories (i.e., 'multiple' and 'multimodal'), results have proven that the students' degree of motivation by doing the 'Wix' activity is clearly positive as a consequence of their lack of exposure to digital resources in traditional learning environments.

Regarding the pedagogical implications of the results, teachers should bear in mind recent technological developments and its effects (1) on the new perceptual learning preferences that may appear in the classroom and (2) on learners' individual variables such as motivation. Therefore, these findings attempt to provide some evidence that proves the benefits of considering the 'Multimodal' learning style in digital learning environments, in comparison to traditional learning and 'Multiple' learning styles.

5. General conclusions

The present study was designed to determine the effect of multimodal and perceptual learning styles on students' motivation in a digital environment. Moreover, returning to the research questions posed at the beginning of this study, the results of this investigation show that a new perceptual learning style (i.e., 'multimodal' learning style) has been created (RQ1). Furthermore, ESP students' positive motivation is higher in digital environments in comparison to traditional teaching practices (RQ2). However, no significant differences have been found between multiple and multimodal students regarding their degree of motivation towards digital learning.

The results of this research support the idea that students' perceptual learning styles should be considered in order to create an effective and motivating learning context. More specifically, the digital learning environment addressed in this study has proven to foster students' sensory preferences (i.e., visual, auditory, kinaesthetic, and tactile), as well as their positive motivation.

The generalisability of these results is subject to certain limitations. Firstly, the current study was based on a relatively small sample of participants (N=62) taking only the 'Bachelor's Degree in Advertising and Public Relations'. Therefore, extending this sample to more university degrees with a higher number of participants could enrich the data obtained in the questionnaires. Secondly, both questionnaires used for the purpose of this study were not designed exclusively, for the study, rather they were adapted from previous valid examples (see Appendix 1 and Appendix 3). An increased number of statements could assess students' learning perceptions towards working in a digital environment in a more efficient way. All this data collection could provide (1) more specific information about students' profiles in terms of their preferences towards learning specialised vocabulary in a virtual setting, and (2) more valuable evidence obtained from students' answers in the questionnaires.

This work contributes to the existing knowledge of perceptual learning styles (Dunn & Dunn, 1992), which found that these should be considered in the classroom, since they could be decisive for a successful learning process. For this reason, the research presented here will serve as a base for future studies dealing with the multimodal learning style.

Finally, conclusions drawn from this study show that the general use of technology in learners' daily lives encourages their willingness to use different digital tools and applications in order to learn foreign languages in real-life contexts. With the arrival and

extensive use of all these devices, further research should therefore concentrate on the investigation of a possible relationship between the students' perceptual learning styles and multimodal resources in a digital learning environment.

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Appendix 1

'Multimodal Learning Styles Questionnaire'²

This questionnaire has been designed to help you identify the way(s) you prefer to learn. Decide whether you agree or disagree with each statement. Rate the following statements according to the following scale: 5 (STRONGLY AGREE), 4 (AGREE), 3 (UNDECIDED), 2 (DISAGREE), 1 (STRONGLY DISAGREE).

1. When the teacher tells me the instructions I understand better.	
2. I prefer to learn by moving around and doing something in class.	
3. I learn better by reading what the teacher writes on the whiteboard.	
4. When someone tells me how to do something in class, I learn better.	
5. When I make things in class, I learn better.	
6. I remember things I have heard in class better than things I have read.	
7. When I read the instructions, I remember them better.	
8. I learn more when I can make a model of something.	
9. I understand better when I read instructions myself.	
10. I learn more when I make something for a class project.	
11. I enjoy learning in class by doing experiments.	
12. I learn better when I make drawings as I study.	
13. I learn better in class when the teacher gives a lecture.	
14. I understand things better in class when I participate in role-playing.	
15. I learn better in class when I listen to someone.	
16. When I build something, I remember what I have learned better.	
17. I learn better by seeing the directions than by listening to someone.	
18. I enjoy making something for a class project.	
19. I learn best in class when I can participate in related activities.	
20. I learn more by reading textbooks than by listening to lectures.	

² Adapted from http://southgwinnetts.com/pdf/Teacher_Links/Learningstylepreference.pdf

Appendix 2

'Multimodal Learning Styles Questionnaire' (Answer Key)³

This questionnaire has been designed to help you identify the way(s) you prefer to learn. Decide whether you agree or disagree with each statement. Rate the following statements according to the following scale: 5 (STRONGLY AGREE), 4 (AGREE), 3 (UNDECIDED), 2 (DISAGREE), 1 (STRONGLY DISAGREE).

VISUAL

AUDITORY

KINAESTHETIC

TACTILE

1. When the teacher tells me the instructions I understand better.
2. I prefer to learn by moving around and doing something in class.
3. I learn better by reading what the teacher writes on the whiteboard.
4. When someone tells me how to do something in class, I learn better.
5. When I make things in class, I learn better.
6. I remember things I have heard in class better than things I have read.
7. When I read the instructions, I remember them better.
8. I learn more when I can make a model of something.
9. I understand better when I read instructions myself.
10. I learn more when I make something for a class project.
11. I enjoy learning in class by doing experiments.
12. I learn better when I make drawings as I study.
13. I learn better in class when the teacher gives a lecture.
14. I understand things better in class when I participate in role-playing.
15. I learn better in class when I listen to someone.
16. When I build something, I remember what I have learned better.
17. I learn better by seeing the directions than by listening to someone.
18. I enjoy making something for a class project.
19. I learn best in class when I can participate in related activities.
20. I learn more by reading textbooks than by listening to lectures.

³ Adapted from http://southgwinnetths.com/pdf/Teacher_Links/Learningstylepreference.pdf

Appendix 3

'Motivation Questionnaire'⁴

Regarding the WIX (home page) activity, answer TRUE (T) or FALSE (F):

1. The activity stimulates further inquiry.	
2. The activity is enjoyable and interesting.	
3. The activity meets my learning needs.	
4. The activity provides me with frequent and varied learning actions that increase my learning success.	
5. The activity provides me with opportunities to use new skills in authentic situations.	
6. The activity assists me to have positive feelings about my accomplishments.	
7. The activity is interesting so I spend extra time trying to obtain more information about it.	
8. This activity makes me synthesise and organise ideas, information, or experiences into new, more complicated interpretations or relationships.	
9. This activity makes me apply theoretical concepts to practical problems or new situations.	
10. This activity contributes to making learning effective on my own, so I can identify, research, and complete it.	
11. This activity helps me work with my classmates.	
12. This activity is challenging so I can learn new things.	
13. This activity is very useful to be used for future projects.	
14. This activity contains ideas that are important to me.	
15. This activity makes me practise the four language skills.	
16. This activity is more enjoyable than a printed activity.	
17. This activity fosters my creativity.	

⁴ Adapted from Kubischta (2014)