Educational Virtual Environment for Learning English

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Abstract. The use of traditional strategies within physical educational spaces poses an outdated way for the educational development of students. This places the teacher as the only source of information within the classroom. This currently breaks with the nickname that we have received today, 'the information society'. The importance of English as a linguistic competence within professional and academic environments is too high given that this is one of the competences that helps develop the others. This work proposes a virtual learning environment for learning English that helps the user develop the linguistic competence of English within professional and academic environments by applying topics from cognitive psychology.

Keywords. Virtual learning environment, English, language skills, software prototype, cognitive psychology.

1 Introduction

The integral development of a person implies that he/she can acquire and develop new competences. These competences should help the individual to be more fluent and more present in academic, professional and social environments.

Some research carried out within the Joint Research Centre of the European Commission indicates that key competences are developed throughout people's lives, not only within formal educational institutions or programs, but also in less formal educational settings such as playing sports.

The use of technological tools such as VLEs (Virtual Learning Environments) has proven effective in the student-teacher relationship. Technological tools allow students to test their cognitive abilities and promote collaborative and individual work [1].

On the other hand, we have the theories of Cognitive Psychology, which have been widely used in student learning processes. Cognitive Psychology has provided us with theories about how people learn about the environment and how the environment, in turn, affects how we learn. These theories can be applied to different areas of knowledge such as mathematics, chemistry, etc., or in the development of skills such as reading comprehension, learning to ride a bicycle, etc., [2, 3].

Linguistic competence is one of the most important competencies in professional and social educational environments [4]. Therefore, the main objective was to propose a virtual environment for learning English that would help develop English language competence in professional and academic settings by applying topics from cognitive psychology.

1.1 Virtual Learning Environments (VLEs)

Among the technological advances of recent years are virtual learning environments, called by their acronym VLE [5,6]. The trend in education proposes that traditional educational models become strategic models where technology plays an important role in the academic development of students.

Virtual Learning Environments (VLEs) are digital environments developed specifically for

people who want to acquire new knowledge and test their prior knowledge. The basis for the existence of virtual environments is the use of information and communication technologies (ICTs). The planning and development of these environments are based on technological tools whose main objective is to offer a stable and scalable software product throughout the life of the final product (the VLE).

VLEs offer a set of beneficial features for students. One of the main characteristics is the flexibility and accessibility of the resources offered in these virtual environments. In other words, students can access the resources with a few simple clicks from a mobile device such as a smartphone or laptop from anywhere in the world, thus eliminating geographical barriers.

Another important feature offered by these virtual learning environments is the ability to monitor students' academic progress step by step that is, a detailed history of each student can be obtained, and through this history, their academic progress can be parameterized with real and tangible data while using the technological tool [7].

This allows those immediately responsible to take immediate action (if necessary) to avoid biases in the student's academic development.

Today, the main difficulty in using EVAs in students' academic development is the technological infrastructure of the student environment. Not all educational environments can offer these students technological solutions and tools [8], [9]. Therefore, this article presents the idea of an application that can be used on smartphones and simultaneously make use of the features of this mobile device.

1.2 English Language Skills

Competence can be defined as a whole set of knowledge, procedures and attitudes, which, when combined, coordinated and integrated, result in a person with a sense of knowledge, know-how and know-be to face professional challenges. Mastery of the aforementioned knowledge makes a person capable of acting efficiently. [10,11].

Linguistic competence refers to the use of language as an instrument of interpretation and communication of reality, as an instrument of construction and communication of knowledge and as an instrument of organization and self-regulation of thought, emotions and behavior, and has as its final objective, the complete mastery of the oral and written language in diverse social contexts of the same geographic region [10].

Language is a set of symbols and sounds used by people within a social and geographic context. These symbols and sounds, when combined, organized and synchronized in a coherent way, provide the inhabitants of a region with a way to communicate with their peers and with themselves.

The ability to understand and use these sets of symbols and sounds is aimed at the complete transfer of ideas in different contexts of the same region, be it a political context, a social context, an academic context, a business context, or even an individual context.

The Council of Europe states that language proficiency is quite complex. It therefore suggests that language competence should be broken down into [12]:

- General linguistic range,
- Vocabulary range,
- Grammatical accuracy,
- Vocabulary control,
- Phonological control,
- Spelling control (Orthographic control),
- Language proficiency levels according to the Common European Framework of Reference.

The Common European Framework of Reference (CEFR) for Languages is an internationally recognized framework for describing language proficiency. According to the CEFR, it proposes six levels of difference that describe students' ability and curricular capabilities in terms of being able to communicate through speaking, reading, listening and writing. These six levels are listed as follows (see Table 1).

1.3 Cognitive Psychology

Cognitive Psychology is a theoretical perspective focused on trying to decipher and understand how human perception, memory and thinking work. A person could use mental strategies to be able to organize, process information and, in the same way as a computer, give an output to the information with an added value which is the

Table 1. Common reference levels according to CEFR

Level	Language proficiency
A1	Can interact easily as long as the other person speaks slowly and clearly and is willing to help.
A2	Can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters.
B1	Can describe experiences and events, dreams, hopes and ambitions and briefly give reasons and explanations for opinions and plans.
B2	Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party.
C1	Can understand a wide range of demanding, longer texts and recognize implicit meaning. Can express ideas fluently and spontaneously without much obvious searching for expressions.
C2	Can express him/herself spontaneously, very fluently and accurately, differentiating finer shades of meaning even in most complex situations.

"meaning", in other words, process the information and share it with other people [13].

Cognitive Psychology within education has provided powerful concepts that have helped educators and experts in the field of education to better understand how students learn and are able to generate or reaffirm skills and competencies from their new knowledge. The purpose of the activities should be to help the acquisition of new knowledge both individually and cooperatively with their classmates [14,15].

2 Tool Development Methodology

Type of Quantitative Study

This study can be classified as a quantitative study since its objective is to objectively measure the use of the VLE, called Floky, in students' academic development. Specifically, it focuses on language proficiency, seeking to measure progress in both academic and professional contexts.

This study is considered a quantitative study since it reflects and evaluates two sets of data. The first set of data shows the participants' previous state of English proficiency before using the Floky tool. The second set of data represents the state of language proficiency after using the Floky tool for a specific period. With these sets of data, we can reflect the positive or negative impact of using the Floky tool.

Furthermore, comparing these two sets of data will allow for a more accurate assessment of the effectiveness of the Cognitive Psychology theories that were applied throughout the life of this study. These evaluations could also verify the individual and collective effectiveness of these theories since the data collection instruments and interviews were designed for this purpose.

Experimental Design

This study uses an experimental design, as it seeks to evaluate the relationships between three main areas of knowledge and expertise: Virtual Learning Environments and theories of Cognitive Psychology, based on the objectives and goals presented by English Language Competence. The results will benefit students so that they can achieve optimal development in both academic, professional, and social contexts.

This experimental study seeks to satisfy the acquisition of key competences, as demonstrated by the Joint Research Centre of the European Commission [12]. This justifies the presence of three key variables throughout this study.

On the other hand, an experimental design is also considered, given that the theories of Cognitive Psychology are applied in the tool called Floky. Therefore, the correct application of these theories, a good UX/UI implementation, and a significant repertoire of resources can result in an important learning experience and, above all, significant in the academic development of students.

Population and Sample

For the group of people required as test subjects in this study, it was important to consider three factors: their academic levels, their geographical and sociocultural context, and their current level of English language use.

In our group, we sought to have diverse academic levels among the participants, including high school students and former university

Table 2. Usability question

Parameter	Possible Answers
Were the different segments of the app, posts, activities, and your profile easy to learn? Where 0 is difficult and 10 is easy.	Strongly disagree
Were there any element within the screen that you did not understand how it worked? If so, which ones?	Disagree
Did you successfully complete the tasks within the app? Where 0 is no tasks and 10 is all tasks completed successfully	Indifferent
Were the in-app help helpful? Where 0 is not helpful at all and 10 is very helpful.	Agree
Visually, how pleasant did you find the app? Where 0 is not pleasant at all and 10 is very pleasant.	Strongly agree

students currently developing their careers in the country's labor market. The main idea was to have people of different intellectual levels and ages, and above all, that they already had experience in using technology, which was useful since Floky is an interactive virtual environment.

Regarding the geographical and sociocultural context, priority was given to individuals from metropolitan areas such as state of Puebla, Monterrey, Mexico City, etc.

Meeting this characteristic allows us to understand and get an idea that the individuals are in an urban context, which facilitates their access to technology and communication in general.

The last factor considered for the population was to accept only individuals with an English level ranging from zero to one and A2, as indicated by the Common European Framework of Reference for Languages.

Despite the low levels of English, it allowed us to have a frame of reference to identify where we were in relation to expertise and where we wanted to go. Furthermore, this greatly facilitated our task of measuring the real impact of Floky on learning the English language.

Techniques and instruments for data collection

To measure the effectiveness of using the Floky virtual learning environment, it was necessary to specify important points and, based on them, establish metrics and identify the best way to collect data for these metrics. These points are:

− Level of knowledge and confidence in the English language before and after.
− Satisfaction regarding usability
− Satisfaction regarding communicative linguistic competence

To gather important information for the first point, it was necessary to administer a pre-test and a post-test to the participants. Both tests have the sole responsibility of measuring the English level concerning the first three levels proposed by the Common European Framework of Reference for Languages (CEFR), A0, A1, and A2. This is to determine whether the impact of Floky positively affected the development of English linguistic competence.

For the application behavior aspect, this information was collected through the activity history that the user records in the database each time they are interested in performing an action within the environment.

Additionally, within the human aspect, there are the last two: which address satisfaction with skills and language proficiency. To gather valuable information on these two aspects, a pair of surveys were administered to the participant at the end of using the EVA Floky. Each response to each question within this survey included Likert-type scales. (see tables 2 and 3).

3 Implementation

The main objective of the work presented was to propose a VLE that had solid foundations on which its idealization, development and testing could be justified and supported. These solid foundations are the well-known technological tools of ITCs; the definition of competence according to various authors and the objectives of linguistic competence; and finally, the theoretical foundations of Cognitive Psychology studied for years by various experts in the area

Table 3. Questions on communicative linguistic competence

Language competence parameter	Ask	Possible answers
General linguistic scope	The activities and publications made you test your knowledge in different contexts. Where 0 does not agree at all and 10 completely agrees.	Strongly disagree
Vocabulary range	The activities and publications made you learn new expressions and put them into practice. Where 0 does not agree at all and 10 completely agrees.	Disagree
Grammatical accuracy	The activities and posts made you learn English grammar structures and put them to the test. Where 0 does not agree at all and 10 completely agrees.	Indifferent
Vocabulary control	The activities made you take care of the expressions used in the different situations presented. Where 0 does not agree at all and 10 completely agrees.	Agree
Spelling control	The activities and publications made you reflect and take care of spelling. Where 0 does not agree at all and 10 completely agree.	Strongly agree

Fig. 1. Linguistic competence and cognitive psychology

Objective. The objective from the perspective of English language skills is for the student to be able to:

Acquire and use this vocabulary from his/her repertoire of expressions (vocabulary range and vocabulary control), to be able to express him/herself (linguistic scope) respecting grammar and having control of sounds (grammatical accuracy, spelling control and phonological control).

3.1 Resources to Achieve the Objective

In order to achieve this objective, it is necessary to specify the elements that the student will have to face. In other words, which are those elements that the student will have access to, in order to achieve the objective presented above:

− Discussion forums. Provide students and teachers with a space for interaction and the exchange of ideas.
− Current level status and constant motivation. Provide the student with a space to see him/her achievements and progress in learning English.
− Activities related to specific topics. Have a repertoire of activities related to a specific topic in English.
− Bug fixes. Provide constant feedback.

New features: Verbs and expressions. Offering catalogues of advanced expressions as well as verbs, both regular and irregular. Helping students to pronounce them at all times.

3.2 Linguistic Competence and Cognitive Psychology

According to the latest research conducted for this work, Cognitive Psychology strategies have a major role to play in developing specific strategies for language competence goals. Specifically, new features of verbs and expressions give a good example of the importance of the Cognitive Psychology Pillar (see Fig. 1).

3.3 Study Cycle

For the user experience, the dimensions of the screen (height and width) were taken into account, in order to get an idea of the possible actions and possible reactions that the students could obtain through the device in a visual way.

The Tab is the action to select and subsequently visualize those publications published by the teachers and activities that the

Table 4. Impact on STM (Short Term Memory) with the "Study Cycle" feature

Parameter	How does it impact?
Short-term memory is responsible for processing information.	Generate meanings to a finite number of expressions/verbs..
The effectiveness of short-term memory depends greatly on the context in which it is used.	Increase memory efficiency by providing information about the expression/verb.
The effectiveness of short-term memory can be developed over time.	Invite the user to constantly perform activities to increase efficiency

Table 5. Impact on LTM (Long Term Memory) with the "Study Cycle" feature

Parameter	How does it impact?
Declarative knowledge	To understand the meaning of the expression/verb presented.
Procedural knowledge	Understand how it works with examples, visually (images), written (sentences) and auditorily (the ability to reproduce the content).
Conditional knowledge	Be clear about what is it?/what does it mean? and how is it used?/in what cases is it used?

student wants or has to carry out (answer). The way in which the students (end user) held their mobile device in their hands was analyzed.

For this reason, it was proposed that the mobile application have a portrait format. Within the different activities that the FLOKY proposal exposes to the users (the students), listening competence is one of the four fundamental activities that the student can carry out.

For the User Interface, colors give contrasts and depths to the different elements on the screen, and the grouping of elements distributed within the screen was considered and how this group of elements draws the attention of users.

Taking into account the above, the concept of "Study Cycle" is created in which:

1. The student can select a maximum of 5 expressions/verbs to study.
2. The student can choose which skill he/she wishes to reinforce: writing, reading, listening, speaking.
3. Before starting the "Study Cycle", the student can see information about the expression/verb to be learnt.
4. The student will carry out activities according to the information previously presented.
5. If the student makes a mistake, this activity will be put in a queue to be attempted again later.
6. The student may leave if required.

This will impact the STM and LTM (see Table 4 and Table 5):

3.4 Scope of VLE

The objective of the VLE discussed in this present work is called FLOKY and aims to:

− Propose a virtual environment for learning English that helps develop English language skills within professional and academic environments by applying topics from cognitive psychology.
− For the reasons previously stated:
− FLOKY should provide students and teachers with a space for interaction and the exchange of ideas.
− FLOKY must provide the students with a space to see their achievements and progress in learning English.
− FLOKY must have a repertoire of activities related to a specific topic in English.
− FLOKY must provide constant feedback about errors in each activity.
− FLOKY should have a catalogue of activities for learning and reviewing advanced expressions as well as verbs, both regular and irregular, helping students to pronounce these at all times.

3.5 UX/UI

For the User eXperience, the dimensions of the screen (height and width) were taken into account, in order to have an idea of the possible actions and possible reactions that the students could obtain through the device in a visual way. The Tab is the action to select and subsequently view those publications published by the teachers and activities that the student wants or must carry out (answer). The way in which the students (end user)
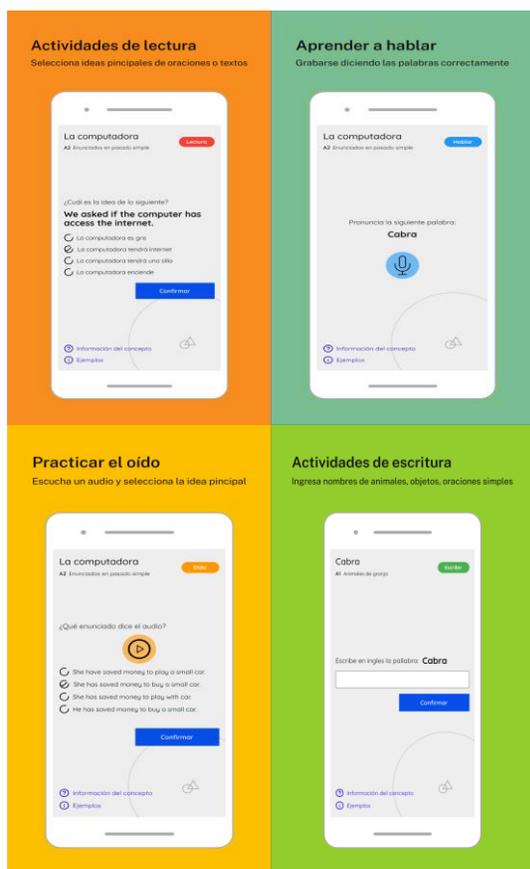
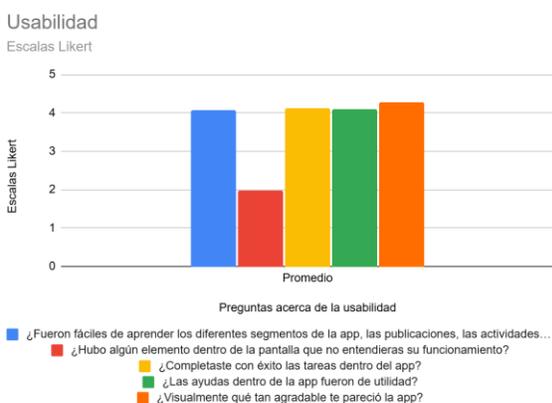**Fig. 2.** Mobile app interfaces for students

Fig. 3. Level of satisfaction with Floky's usability

held their mobile device in their hands was analyzed.

For this reason, it was proposed that the mobile application have a portrait format. Within the different activities that the FLOKY proposal exposes to the users (the students), listening competence is one of the four fundamental activities that the student can carry out.

For the User Interface, colors give contrasts and depths to the different elements on the screen. The grouping of elements distributed within the screen was considered and how this group of elements draws the attention of the users.

4 Tests and Results

The results obtained through tests applied to users who used the virtual learning environment called Floky allowed us to identify the strengths and weaknesses of the environment. In addition to providing data about effectiveness, we also have data about user experience from both a technical UX/UI perspective and a pedagogical approach using Cognitive Psychology theories.

For satisfaction regarding usability, it is important to measure the level of satisfaction with usability, as this allows us to identify those critical points where users could not intuit the objectives to be achieved when they were at a specific point in the application (see figure 3).

To show satisfaction regarding communicative linguistic competence and in accordance with the objectives set by communicative linguistic competence, it is important to detect that these objectives have been transmitted to end users. Therefore, it was important to gather information about students' perspectives regarding these objectives. And to know if the resources provided by Floky were sufficient for students to achieve these objectives (see figure 4).

To visualize the English language proficiency level before and after use; one of the most important aspects of this study is to determine the positive and negative impact of using Floky. To measure this impact, it was necessary to administer the same test twice: the first time before using Floky, and the second time after using Floky for a while (see figure 5).

On the other hand, according to the Cognitive Psychology perspective, confidence is an important factor in a person's development of new
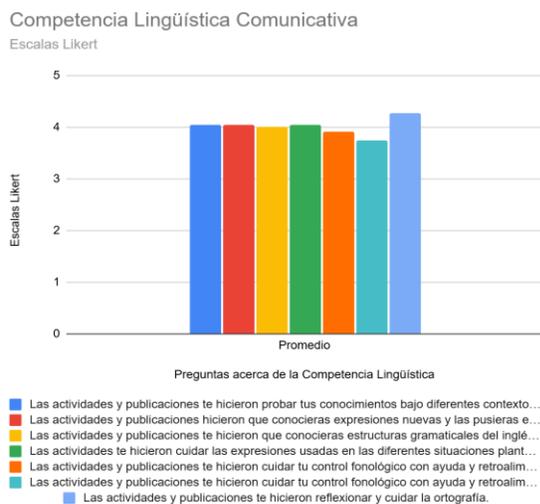
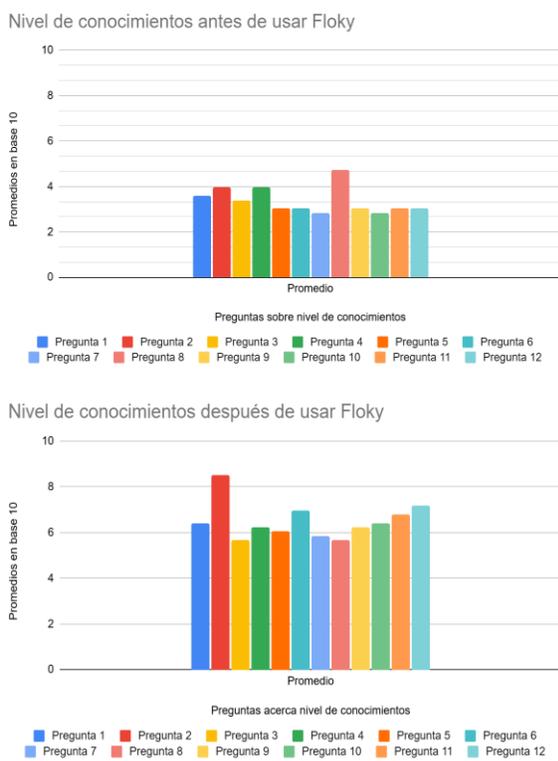**Fig. 4.** Level of satisfaction regarding communicative linguistic competence

Fig. 5. Knowledge level before and after using Floky

skills and knowledge. In line with this Cognitive Psychology perspective, this study also took into account the user's confidence level after using Floky (see figure 6).

5 Conclusions

This work has highlighted the characteristics of virtual learning environments. Floky is a tool that provides strong guidance and support for the development of English language proficiency, specifically in the first three levels, according to the CEFR.

Unlike other tools, Floky stands out because, from its inception, it incorporates theories from Cognitive Psychology. These theories have been studied and reviewed by experts for years. When combined with a technological approach and oriented toward a common goal: academic and skill development, specifically language proficiency, the result is a purposeful and objective educational tool.

Viewed from different perspectives as a software product, Floky delivers a fluid, intuitive, and acceptable experience, so we can conclude that it is a functional application. This is thanks to the UX/UI design principles applied during development.

It is important to emphasize that Floky is a functional English learning tool supported by this work. However, it is important to emphasize that Floky, when presented in an academic setting or context, its effectiveness will be compromised by the pedagogical plans that the institution or teacher wishes to follow. Floky itself represents a tool, so any tool should be used as what it is, not as a basis for unsupervised learning.

In short, the VLE Floky represents a value proposition for those who want to improve their English proficiency at the basic levels. Floky represents an accessible way to access resources since it does not require extensive hardware, but only a smartphone, giving the end user accessibility and flexibility in their academic development. Furthermore, this work also represents a basis for future research for those who wish to further develop the learning objectives by using theories such as cognition and goal
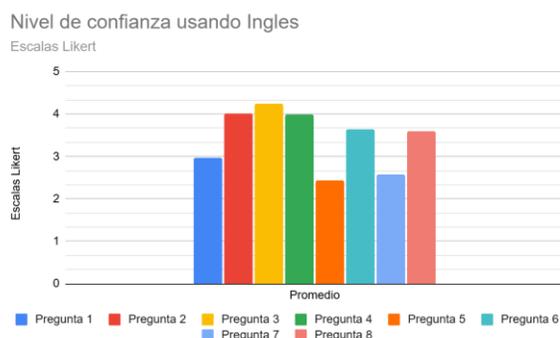
Fig. 6. Confidence level after using Floky

setting, as has already been done in English language proficiency.

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