Applying the Flipped Classroom Model Using a VLE for Foreign Languages Learning

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Abstract. Currently, there are different trends in terms of education. Some of these trends require the support of information technologies. For example, since some years ago, the flipped classroom educational model has been presented, which is a strategy that reverses the traditional learning model through instructional content developed by students. Flipped classroom is directly related to blended learning, which is a methodology that combines the traditional classroom learning environment with the use of online digital material. Moreover, blended learning requires both students and teachers, who communicate in presence and virtual manners. This paper presents a Virtual Learning Environment (VLE) as a technological tool for the development of learning activities and language teaching with the flipped classroom model in the blended learning education program. This VLE allows highlighting the importance of monitoring and feedback to the student from the collected data. Likewise, the VLE allows highlighting the importance of the teacher as the main actor behind the operation of the software. Finally, the VLE articulates the methodological proposal allowing the virtual work and the classroom class.

Keywords: Flipped classroom · Blended learning
Virtual Learning Environment (VLE)
Educational performance indicators

1 Introduction

The incorporation of Information and Communication Technologies (ICT) in classrooms highlights the need for a new definition of roles, especially for students and professors [14]. The inclusion of new instruments and technologies in the classroom suggests a new way to develop processes that foster students autonomy as well as propose a transformation of traditional classroom to diversification, extension, and integration of physical and virtual environments. In addition, it promotes the development and use of emerging teaching models such as flipped classroom [11].

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Several auto regulatory processes by students are focused on time management, physical environments, and activities planning to achieve the expected learning goals [5,9]. Then, these processes become the main problems to tackle in this study. It is important to mention that these processes differ from the ideal conditions for applying information technologies in learning and teaching processes.

Regardless of the educational model, learning is the result of student activities. Thus, the professor's role is focused on generating the conditions that increase the probabilities of obtaining a desired performance [8]. Then, the development of a Virtual Learning Environment (VLE) becomes very important because it focuses on generating the necessary conditions to facilitate the development of student activities, facilitating permanent monitoring and feedback of activities outside the physical classroom by professors.

Likewise, it is important to understand that ICTs constitute new conversations, aesthetics, narratives, and relational links between all participants in learning and teaching processes [13]. For this reason, in this paper, we present a VLE as the techno-pedagogical materialization in a process of learning-teaching for languages, based on ICT and supported by the flipped classroom model.

The paper is structured as follows. Section 2 presents the designed pedagogical model. Section 3 presents the proposed Virtual Learning Environment approach based on the designed pedagogical model. Section 4 illustrates the results of the work. Finally, Sect. 5 concludes the paper.

2 Pedagogical Model

The pedagogical model has been designed for a languages institute; nevertheless, it can be extended to be used in other learning domains. It is focused on the problem-based learning model [4]. The model proposes a work structure, for students interaction based on the flipped classroom model and blended learning education program. In addition, the model is supported by a Virtual Learning Environment (VLE) as technological tool for mediating the teaching-learning activities.

2.1 VLE Structure

The pedagogical model is based on academic courses that attend the following main characteristics [3]:

1. The academic program for learning languages is made up of four academic levels. Each academic level is divided by four academic modules. Each academic module is composed by three units.
2. The academic program has been designed to be completed in twelve months. Each academic level has been designed for three months. Each academic module has been designed for one month. Finally, each unit lasts one week. The distribution of time for the academic program is presented in Fig. 1.

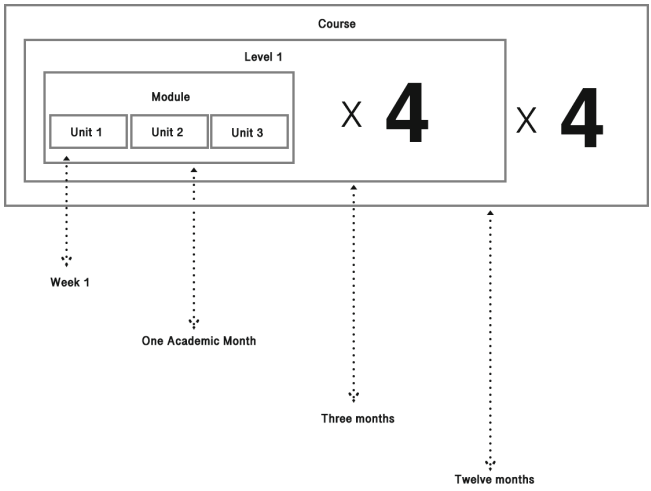

Fig. 1. Time distribution.

3. The workflow for modules and units regarding time defines the agenda structure, which indicates the students' activities that include the students' interactions with the VLE and the classes that the students must attend in physical classrooms. Figure 2 presents the course structure, which defines the workflow of students and teachers. It is important to highlight that the workflow is defined by standards of Flipped classroom model and Bloom Model [14].
4. Since it is a blended learning approach, in the first session students are informed about their role and their agenda for using the VLE and for attending the classes in the physical classroom.
5. The VLE defines the necessary components for articulating the virtual and classes in physical classrooms based on a method that allows doing monitoring, control, and feedback of the students' activities, as well as, the direct instructions presented through Virtual Learning Objects (VLO) such as classes video simulated. The activities are documented in rubrics, which are evaluated by the professors [1].

The method presented in the model of Fig. 3 relates the required components for running this study. This is a bottom up model ans has the following components.

- **Direct Instruction**. This component is used for the design of videos made by professors, since such videos are used by students as framework for each topic. With this in mind, students take these videos as guideline for learning desired topics.
- **Instructional Design**. This component presents a framework and template for developing the elements of the VLE. It also defines how content is distributed and how instructions are defined

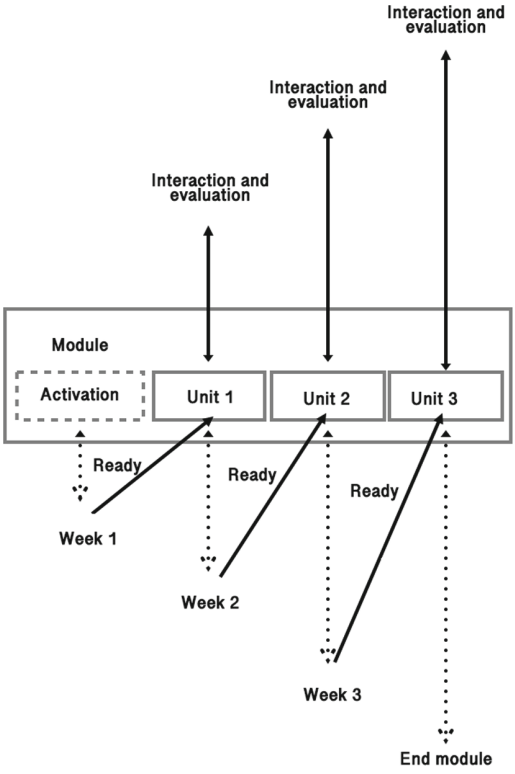

Fig. 2. Course structure.

- **Flipped Learning and Flipped Class**. These components seeks to engage previous components with the components related to the disciplinary area represented by the doted line box in the model. It suggests a framework that adopts other methodologies to develop an integral workflow.
- **Disciplinary Area**. It is the doted line box which proposes decouple the model to the disciplinary area (e.g., *Communicative approach*). It means that the disciplinary area and its corresponding model may be replaced in other projects.
- **Follow Up**. This component allows tracing the virtual and in site work made by students. The VLE includes registries regarding all activities such as: video watching, content reading, platform usage, etc. This trace is base on data such as dates, geographic location, frequency of use, navigation flow, etc.
- **Evaluation**. Based on this component, professors have a tracing binnacle of the in site class. In addition, this component allows planning classes for evaluations students individually and by groups in order to determine the autonomous progress fostering the evolution of the class activities.

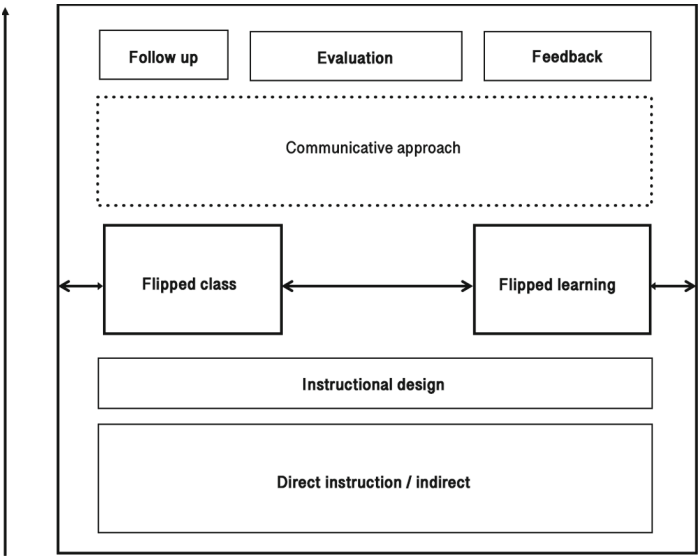

Fig. 3. Method for the VLE.

– **Feedback**. This component is used by professors and students. It is enriched using the VLE data. Based on this, the VLE offers students strategies to go on in the development of activities in order to achieve the academic goals.

3 Proposed VLE Approach

For the technological development, it was very important to inquire conceptually about existing techniques and applications that allow managing courses, modules and units accordingly to the proposed pedagogical design. In this way, Wang et al., [16] offer an holistic perspective regarding blended learning education program aligned to the flipped classroom model. Based on this, we were able to define the necessary technologies to be designed and developed in this work.

It is suitable to highlight that the development of technological tools for application purposes in teaching and learning require a defined contextualization, which implies the characterization of the goals in terms of the disciplinary area in the social context in which the teaching-learning activities are developed.

As a result, the VLE is a software application developed in Django[1], MySQL[2], MongoDB[3], and Angular[4], which is executed in the cloud computing [10]. It is important to mention that this is still in progress; then, all components are

[1] https://www.djangoproject.com/.
[2] https://www.mysql.com/.
[3] https://www.mongodb.com/.
[4] https://angular.io/.

in permanent evolution depending on the identified academic and technological needs. The VLE works based on three actors:

1. Administrator, who manages (a) students' registration, (b) tutors' assignments, (c) levels and modules enrollments.
2. Tutor, who can do monitoring, control, and feedback of the corresponding students for the assigned activities.
3. Student, who is main person in the academic and pedagogical processes developed using the VLE.

The use of the VLE is intuitive since it allows simplifying the users' interactions. Moreover, it is important to highlight that in the design, development, and deployment of the VLE, the targeted audience is very important because the contents, graphic user interfaces, browsing among other features define he success in terms of pedagogical intentions.

Thus, the VLE was developed taking into account the following items to define the population.

- Context. It refers to people who are intended to acquire a good level of a foreign language in short time with a moderated cost.
- Accessibility. It refers to audience that use to browse internet using mobiles, tablets, laptops, and desktops.
- Geographical location. Since the VLE works based on the flipped classroom and the blended learning education program, people must attend easily the venue of the languages institute.

3.1 Development Process

In the flipped classroom context, it is necessary that the student organizes its time to perform academic activities such as assignments, reviews, as well as, to watch pre-recorded classes, and to access online tutorials. This suggests the decentralization of academic activities allowing students creating their own personal learning environment, where they are able to discover the diversity of tools that technology offers in order to complement their knowledge acquisition processes [15].

For these activities, the VLE provides an agenda module, where proposed activities and contents are distributed over week showing daily progress. Figure 4 presents the VLE agenda highlighting the following items:

1. Assignments highlighted in red
2. Sessions with the tutor highlighted in blue

Once the student knows the content distribution regarding the time, the VLE provides the content organized by courses, where each course is organized by modules and classified by levels. Said contents are sequentially activated based on the progress of the student. Figure 5 presents the academic content organized by modules.

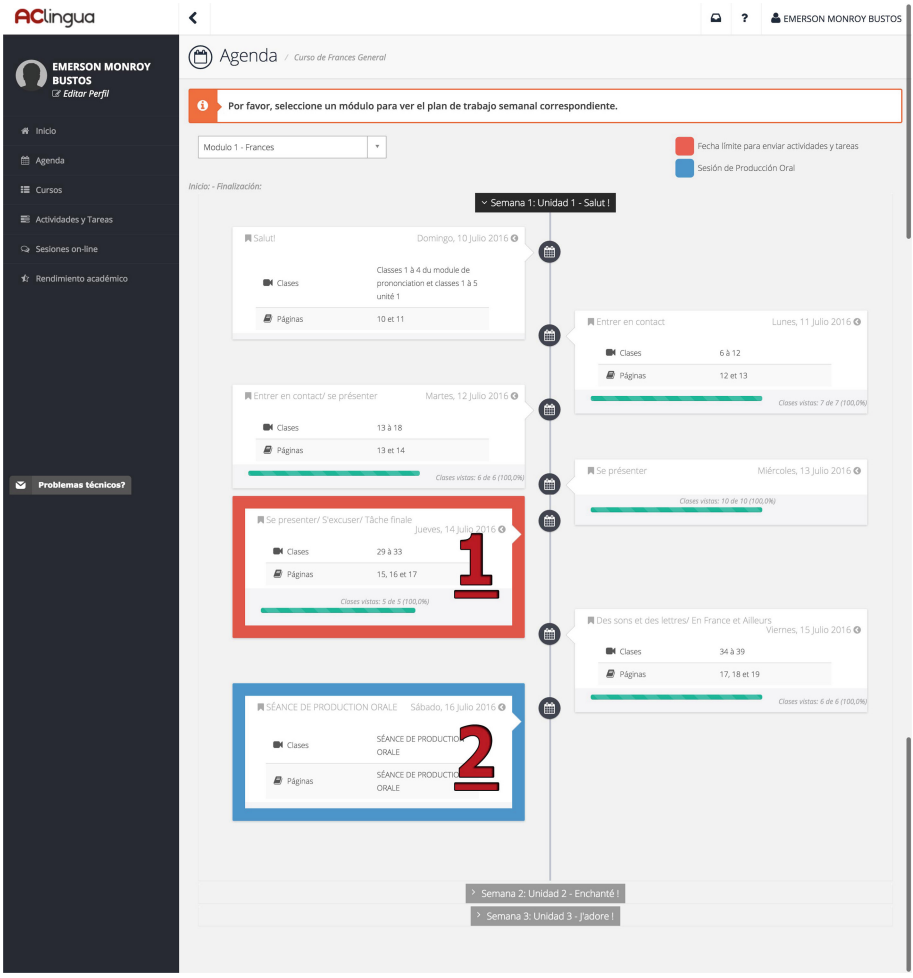

Fig. 4. VLE Agenda.

The agenda module is one of the most important because it allows professors to suggest learning strategies regarding time and space. Also, it gives the opportunity to manage the time that students must invest out of the classroom in order to take advantage of the in site classes making use of the new information learned from the VLE. With this in mind, based on [5], the characteristics of an auto regulated student are the capacity to star several processes such as cognitive, meta-cognitive, affective, and motivational. Nevertheless, [5] suggest that time management and activities planning are the most common problems in this learning method.

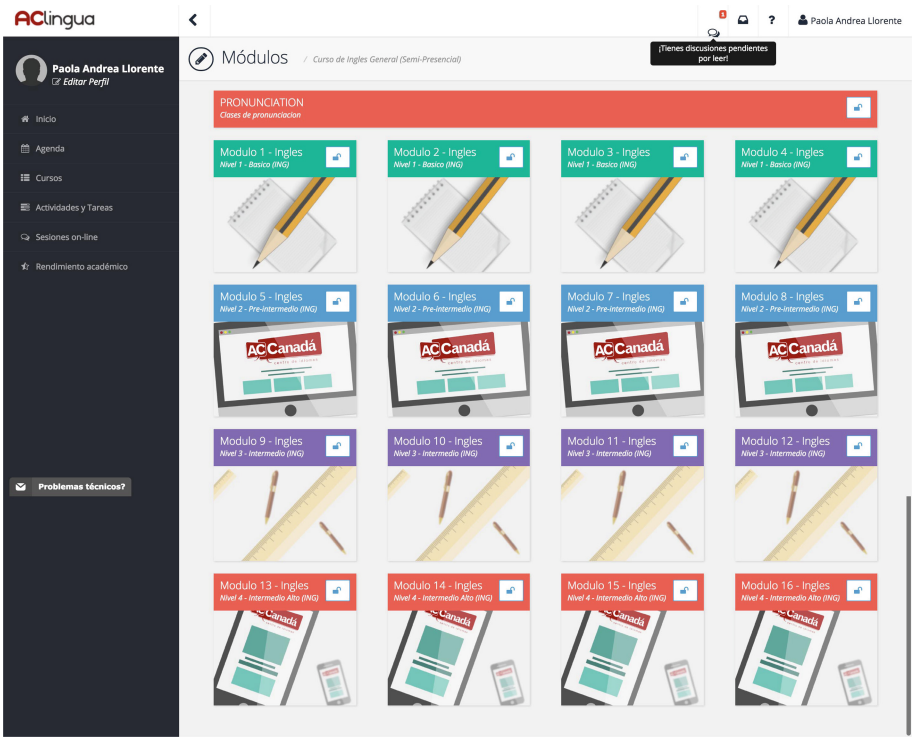

Fig. 5. VLE modules.

For each module, students may interact with the contents of the course as well as with the communications and tracing tools of the VLE. This service is presented in Fig. 6 and includes:

1. Notifications of answered questions made in every class session, where a video is considered a class session [12].
2. Additional content such as pdf documents, audio files, or file to download.
3. Component to browse between modules of the active course. The main contents in the VLE are video classes that allows students to play them several times [12].
4. Presentation of a class session (the VLE includes board and book class sessions) allowing tracing the students interaction with the course contents.
5. Classification by units of the video simulated classes with the corresponding progress stamp, as well as the amount of visualizations done by the student [12].
6. Services menu of the content
7. Component to make questions to tutors or students about the class, in order to simulate some actions or behaviors in the physical classroom.
8. Report of the viewed video classes.

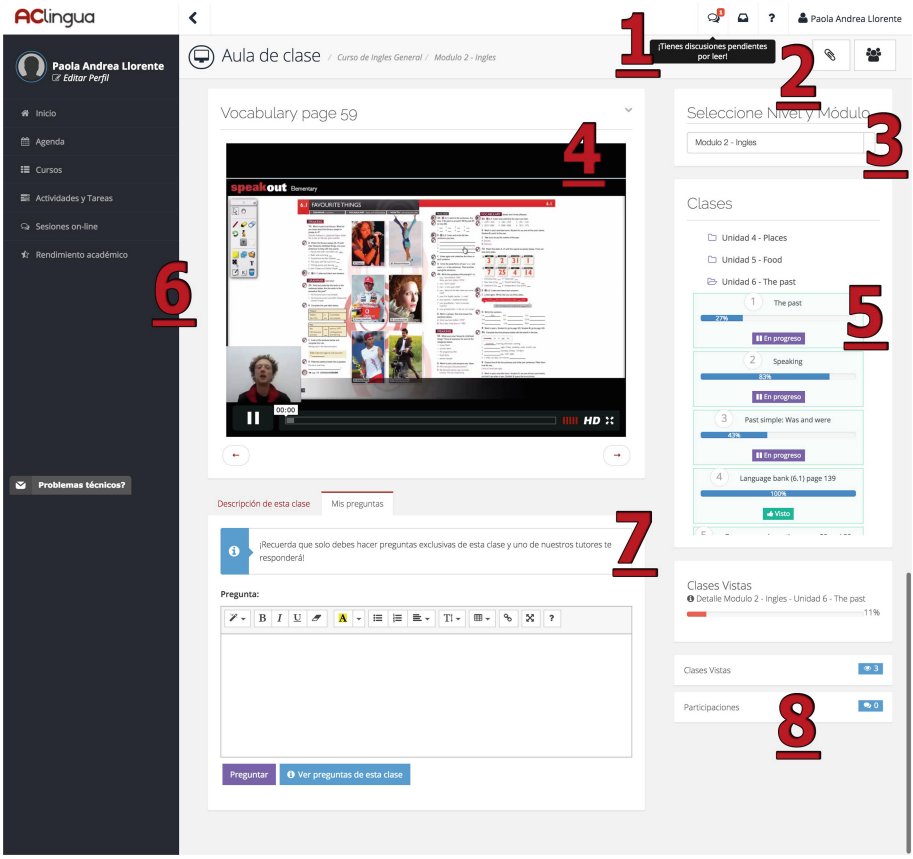

Fig. 6. VLE interaction services.

The VLE allows students to solve questions about proposed topics in real time, storing the information of the activity for posterior analyses by the tutors. For this, a component presented in Fig. 7, which was built based on the framework *Big Blue Button*[5], has the following elements:

1. List of connected student in the online tutorial.
2. Blackboard where the tutor can load presentations or pdf files, as well as write the answers of the corresponding questions.
3. Online chat.

The VLE also includes a component that allows students visualizing the tracking and control activities done by the tutor an the VLE. The main idea is to keep students well informed regarding their activities progress. In addition, it allows tutors to access and observe this information in order to know the students commitment. It helps tutor to prepare contents and strategies for classes in the

[5] https://bigbluebutton.org/.

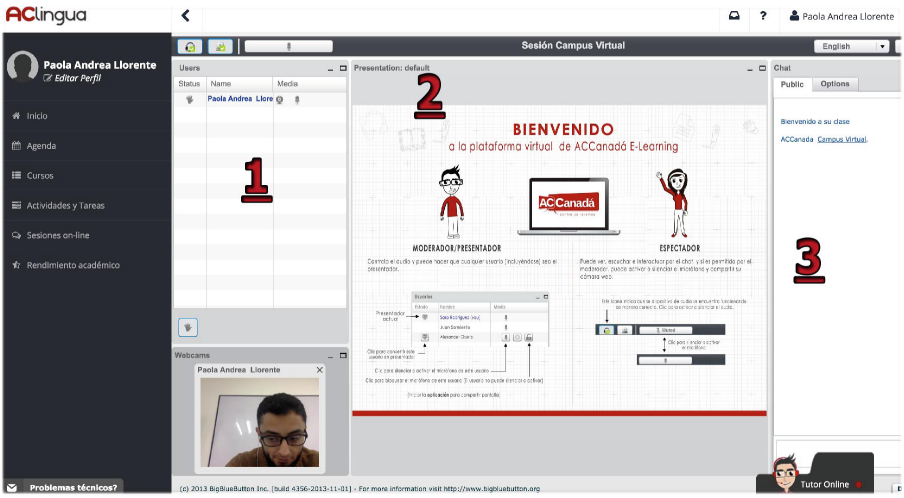

Fig. 7. VLE Online Tutor.

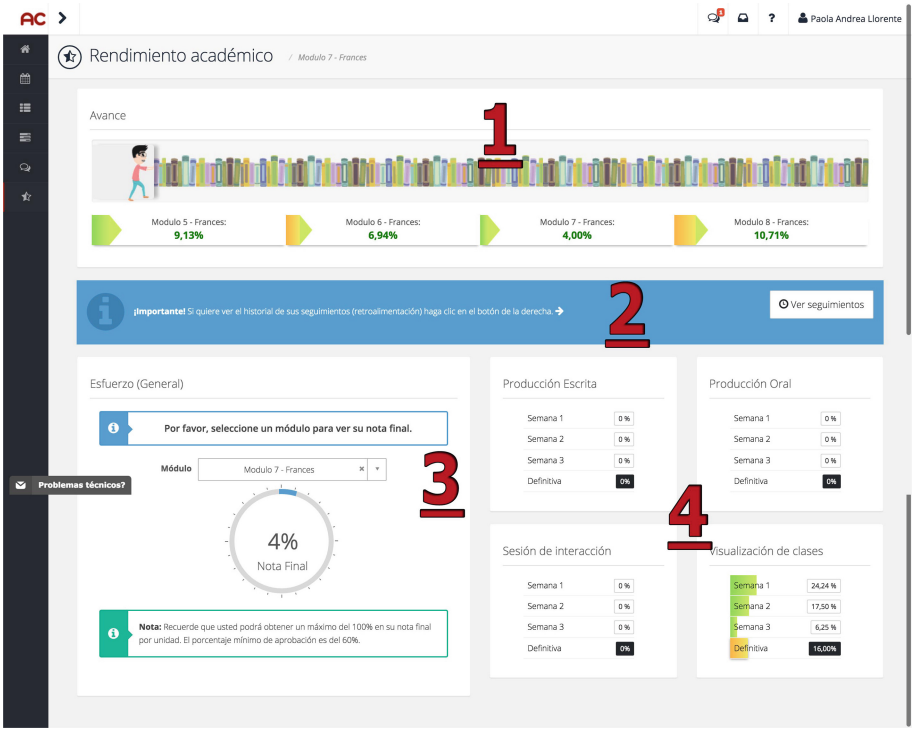

Fig. 8. Students tracking control module.

physical classroom. Figure 8 presents this module. The module has the following parts:

1. Report of the completed modules of the course.
2. Detailed feedback of the activities done by students. This feedback is done by tutors.
3. Historical report of students' academic processes by course and module.
4. Weekly tracking generated while students interact with the VLE through activities such as: submitting homework, watching tutor's videos, chatting with tutors, among others.

This module foregrounds the importance that represents collecting the data of activities done by languages students and tutors through the VLE. This allows making decisions in terms of the impact, pros, and cons focused on the model and its technological components improvement [7].

4 Results

The Common European Framework suggests a minimum time dedication to achieve the necessary skills, when learning a foreign language. Nevertheless, when the learning process is done in a big city, students need to invest a high economic and time cost just moving to the languages academy. It usually impacts directly in the students desertion and low academic performance. In addition, when classes in physical room are 100%, usually there is not detailed tracking of the activities of all students [2].

Based on the explained above, several pedagogic and technological strategies where evaluated in order to strengthen the learning process specifically for languages and to overcome the desertion problem. Then, the VLE based on the blended learning education program and the flipped classroom model allowed reducing the time in the physical classroom and promoting more active students. In addition, the VLE provided tutors technological tools to track the students progress.

The VLE offered student to take the activities in the desired place and time, which also promotes the autonomous work. It is important to highlight that the VLE and the flipped classroom model helped to separate in different environments the superior order skills, which are those skills developed by students in the physical classroom with the inferior order skills, which are those skill developed by students as autonomous work using the VLE.

The tutor is a fundamental part in the development of the academic activity managed by technology. In this way, the tutors team stimulate the pedagogic intention articulating the virtual activities with the activities done in the physical classroom through the flipped classroom model.

Contrasting with other similar studies [6], the role of the technology in this work is fundamental in terms of the motivation and academic performance of students. In addition, the technology allows improving the tutors behavior regarding tracing and comprehension of the activities developed by students out of the physical classroom.

5 Conclusions

The implementation of the VLE posed the question: is it necessary to develop the VLE or is it better using an existing VLE and modifying it?. The answer is based on the experience and background acquired on implementing systems like moodle, chamilo, blackboard, and opendex [1]. Based on this, It is necessary to understand the context in order to know how learning activities are done in order to achieve the pedagogical objectives. This is really important to obtain efficient tools for these tasks. With this in mind, it is necessary to highlight that a pedagogic context not always is focused on just in the existence of students and professors. Academic activity transcends beyond making evident the need of interpreting and integrating the diversity of social contexts as well as the configuration and characterization of components such as managerial, logistics, technological, economical, politics, and cultural that act directly in the academic activity in terms of learning and teaching.

The sum of students' activities defined the scope of the proposed learning goals; thus, the teacher responsibility is oriented to the conditions for getting those activities as ideal as possible [8]. It means, not all existing systems or tools can give a definitive solution to a particular problem. In such cases, it is necessary to create new tools in order to provide solutions that match the developments of the proposed academic activity.

The VLE developed allowed applying properly the flipped classroom learning model because the VLE generated the possibility to built different kinds of contents useful to students in their learning process. Moreover, the blended learning education program was articulated properly to the flipped classroom model through the VLE allowing permanent communication between tutors and in both the virtual and physical contexts.

Based on the VLE, it was possible to make evident the students progress giving as result better language learning processes. Then, as future work, the VLE will be applied in other areas such as basic sciences in order to measure the model in other contexts. In this way, we want to identify the knowledge areas in which this learning model might be applicable.

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