

Use of virtual classrooms to support teaching in the mixed modality, of the subjects of Ecological Engineering and Air conditioning and refrigeration

Empleo de aulas virtuales como apoyo a la enseñanza en la modalidad mixta, de las asignaturas de Ingeniería ecológica y Aire acondicionado y refrigeración

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DOI: 10.35429/JOCT.2023.19.7.1.5

Received March 15, 2023; Accepted June 30, 2023

Resumen

To help reduce the problem of remote knowledge imparting, such as not having access to a computer during class time, not being able to rent an hour of internet or not having Wi-Fi, the authors of the article generated the project PAPIME with PE100222 code, which aims to Generate new didactic resources to improve the teaching-learning process of the aforementioned subjects, so that it can be used in the online and mixed modality. As a first stage, they created virtual classrooms in Classroom and Moodle where they included didactic material such as class videos, notes, support texts, infographics, mind maps, word search, crossword puzzles and practical activities that can be done from home for each subject of the project. . This article presents the actions carried out as the second stage of the project, which includes the adjustments made to each virtual classroom based on the opinions of the students who used them and the generation of virtual classrooms to include support material for the presentation of the extraordinary ones of the subjects involved.

Moodle, Classroom, Mixed teaching

Resumen

Para contribuir a disminuir la problemática de la impartición de conocimientos a distancia, como el no contar con el acceso a una computadora en el horario de la clase, no poder rentar una hora de internet o no tener wifi, los autores del artículo generaron el proyecto PAPIME con clave PE100222, el cual tiene como objetivo generar nuevos recursos didácticos para mejorar el proceso de enseñanza aprendizaje de las asignaturas antes mencionadas, para que sea empleada en la modalidad en línea y mixta. Como primera etapa elaboraron aulas virtuales en Classroom y Moodle en donde incluyeron material didáctico como videos de clase, apuntes, textos de apoyo, infografías, mapas mentales, sopa de letras, crucigramas y actividades prácticas que se pueden realizar desde casa para cada asignatura del proyecto. En el presente artículo se presentan las acciones realizadas como segunda etapa del proyecto, el cual incluye las adecuaciones realizadas a cada aula virtual en función de las opiniones de los estudiantes que las utilizaron y la generación de aulas virtuales para incluir material de apoyo para la presentación de los extraordinarios de las asignaturas involucradas.

Moodle, Classroom, Enseñanza mixta

Citation: HERNÁNDEZ-GÓMEZ, Víctor Hugo & CHAVARRÍA-ORTIZ, Gilberto. Use of virtual classrooms to support teaching in the mixed modality, of the subjects of Ecological Engineering and Air conditioning and refrigeration. Journal of Computational Technologies. 2023. 7-19:1-5

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Introduction

As a result of the worldwide health emergency caused by COVID-19, it was necessary to implement mechanisms for distance learning. Some professors contacted students and conducted videoconferences through platforms such as Zoom or Meet, with the problem that not all students had access to this technology, either because they did not have it, could not rent an hour of internet, did not have wifi or because they could not connect at that time.

To help reduce this situation, the authors of the article generated the PAPIME project "New teaching resources to improve the teaching-learning process of the subjects of Ecological Engineering and Air Conditioning and Refrigeration for online and blended modalities, of the Mechanical and Electrical Engineering Career of FESC with code PE100222, which aims to generate new teaching resources to improve the teaching-learning process of the aforementioned subjects, to be used in the online and blended modality.

As a first stage of the project, Hernández and Chavarria (2022) developed virtual classrooms in Classroom and Moodle where they included didactic material such as class videos, notes, support texts, infographics, mind maps, word search, crossword puzzles, for each subject topic. In addition, they included a section of practical activities that can be done at home, using materials that are easy to find and even recycled.

Since the end of the pandemic, the class was taught entirely online, where students could take the class through the Zoom or Meet platforms, and if for some reason they could not be connected at class time, they could review the videos and notes of each topic directly in the virtual classroom of Classroom, which favored the teaching-learning process for students.

When the opportunity arose to return to face-to-face classes, in semesters 2023-I and 2023-II, the virtual classrooms were used for a teaching process in mixed modality, that is, classes were taught and the corresponding evaluations were carried out face-to-face, but with the support of the didactic material in the Classroom and Moodle virtual classroom.

This favored the students since it was useful for them to review the topic seen in class and reaffirm it with the support videos.

Experience in the use of virtual classrooms

In order to know the opinion of the students who used the virtual classrooms, surveys were conducted for each subject, the questions were as follows:

Full name beginning with last name

Did you pass the course, and if not, why do you think you did not pass?

Regarding the presentation section, syllabus and bibliography, was there any information missing that you needed, why?

Regarding the presentation section, agenda and bibliography, were the videos clear, why?

Regarding each section of the topic, were the videos explaining the topic clear, why?

With respect to each section of the topic, were the notes and subject material clear, why?

With respect to each section of the topic, the notes and subject material, did they help you assimilate the knowledge of the topic, why?

With respect to each section of support material, the videos and texts, were they sufficient, clear, why?

With respect to each section of support material, the videos and texts, did they help you assimilate the knowledge of the topic, why?

Regarding the activities to be developed in each topic, did you like them, were they sufficient, why?

Regarding the activities to be developed in each topic, did you find them boring, did they have to do with the class, why?

Regarding the activities to be developed in each topic, did they help you assimilate the knowledge of the topic, why?

Regarding the practical activities to be developed, were they interesting, why?

Regarding the practical activities to be developed, did they help you to assimilate the knowledge of the topic, why?

Regarding the practical activities to be developed, were the materials to be used economical and easy to acquire? why?

The final project is an application of the knowledge learned, was the evaluation rubric clear? why?

All the activities to be developed had checklists, were the checklists clear, why?

Did you like having online support material, why?

Did you like that the class was conducted in a blended way, i.e., face-to-face with online support, why?

Do you think you learned more or understood the course topics more easily when you had the support of the virtual classroom, why?

Explain what you would like to change about the information in the virtual classroom and why?

Explain what you would like to see included in the virtual classroom and why?

What percentage of the course syllabus do you think was covered, and why?

Write any comments that will help us to improve the teaching process of this course.

From the opinions expressed by the students, the following can be mentioned:

They consider that the presentation section of the course is adequate, the form of evaluation of the course and the tools that will be available during the course are clearly explained.

Regarding the class videos by topic, they consider that the information was precise, concrete, easy to understand and that it supported them to generate the activities of each topic.

Regarding the didactic support material for each topic, they mentioned that since they were not so long, they were able to locate the information they needed, the information was well structured, they were well illustrated and with many explanations. One considered that in some topics there were too many videos and that they did not have time to watch them all, others considered that they were adequate and that it helped them to better understand the subject.

As for the development of the activities, they thought that they were a good way to learn the subject, but they considered that sometimes there were too many activities, they were repetitive and that made them monotonous. Others mentioned that they liked the activities because they were very easy to do, fun and they could do the practical activities as a team. In general, they felt that the activities helped them to better understand the topics.

Regarding the practical activities, they mentioned that they were a way out of the routine, they helped them to better visualize the subject, they could be easily applied at home, that knowing the theory made the practice fascinating, that it was easier to see how things worked and why, they required materials that were easy to acquire, by doing them as a team the cost of materials was reduced and some requested that the instructions or development of the practice be improved.

Regarding the integrative or final project, they mentioned that the rubric contained all the evaluation elements, sectioned and specific, although there was one who did not understand some of the elements requested, such as the summary.

All the activities to be developed had checklists, and they mentioned that they were useful to know what information should be included in their activities.

The students liked having online didactic material because it reduced the research time, increased the quality of information, because being in classroom mode it is not easy to search and ask the teacher at the time they want or need it, contrary to the material that is always available.

They liked taking the class in mixed mode because it reduced the workload, they could make consultations at any time, they had enough time to carry out extra activities, they could reinforce the topics and clarify doubts at any time they needed without having to go to look for the professor, and it was comfortable and not very tedious.

They consider that they learned better by not having to take so many notes in class since they could pay more attention to the professor's explanations, they had resources related to each topic, they had the course information at hand at all times, they were reliable sources of information facilitating the search in appropriate and truthful places and that every doubt that arose in class could be consulted in the virtual classroom.

As for changes in the virtual classroom, they mentioned that the rubric for the final project should be clearer, as well as the instructions for the practical activities, including examples of the projects to be carried out and their respective reports, and including the time and place where the professor could answer questions, in case the material was not sufficient for some students.

Some students added comments to improve the teaching-learning process, among them, to do some practical activities in class, not to do so many activities because the students fall behind, to provide more examples and illustrative information during the theory part of the class, to remove a task from each topic would be easier and to make the classes a little more dynamic.

Updating of virtual classrooms

Based on the students' comments, the following actions were taken for each virtual classroom:

The procedure as well as the materials to be used in the practical activities were reviewed.

The number of activities in each topic and their respective checklists were reviewed and adapted.

The instructions as well as the rubric for the final project were revised.

The support material for each subject (videos and texts) was reviewed and updated.

For each subject, the final exams and extraordinary exams were revised and updated.

New didactic resources

A virtual classroom was created in Classroom for the extraordinary exams of each subject, which are shown in Figure 1.

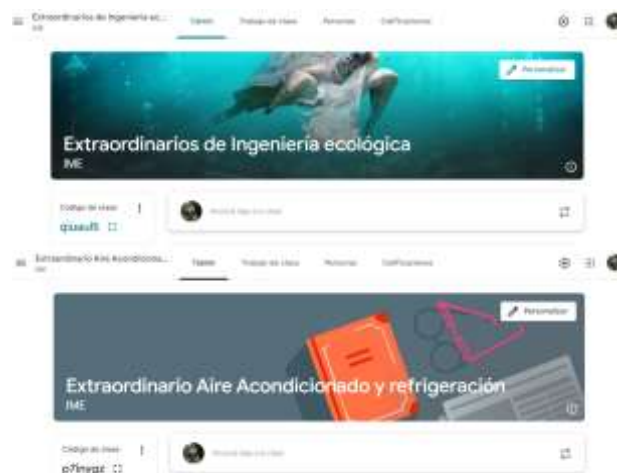


Figure 1 Virtual classroom for extraordinary exams
Source: Self Made

In each virtual classroom, the didactic material section was generated, where several sections were added, such as subject syllabus, forms, videos and reading material. Figure 2 shows the sections for the Ecological Engineering course.



Figure 2 Ecological Engineering support material section
Source: the student's own

Figure 3 for the Air conditioning and refrigeration special course.

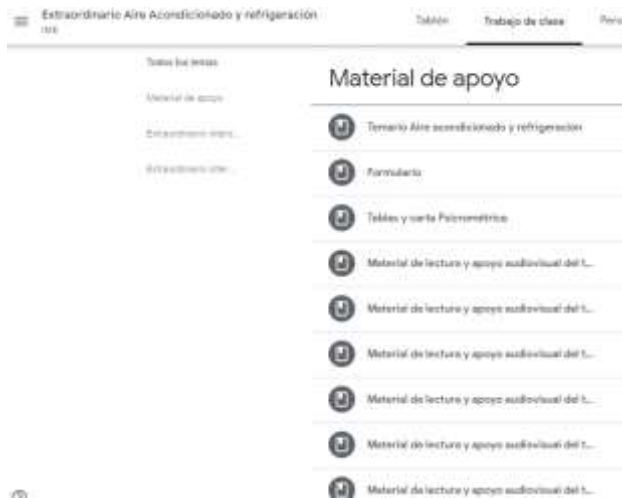


Figure 3 Supporting material section of Air conditioning and refrigeration
Source: Self Made

Within the videos and reading material section, the videos of the support material that were available for the virtual classrooms in each topic were included. Figure 4 shows the videos and reading material for the first topics of the Ecological Engineering course.



Figure 4 Videos and reading material for Ecological Engineering
Source: Self Made

Figure 5 shows the videos and reading material for the final topics of the air conditioning and refrigeration course.



Figure 5 Videos and reading material for air conditioning and refrigeration
Source: Self Made

Even though the special exams are already being held in person, students are invited to join the virtual classroom to learn about the course syllabus and see the didactic material that will support them in accrediting the special exam.

Acknowledgement

Work carried out with the support of the UNAM-DGAPA-PAPIME PE100222 Program.

Conclusions

The virtual classrooms were applied during semesters 2023-I and 2023-II, giving good results in terms of student learning. The fact that the course was carried out in a blended manner helped the students to have not only the teacher's explanation of the topics, but also didactic material that complemented their learning and that was available at any time. The revision and updating of the material included in the virtual classrooms, based on the students' opinions, will be used by the students in semester 2024-I, which will begin in August of this year. At the end of the semester, it is expected that the survey will be carried out and all the didactic material will be revised again, leaving the procedure as a process of continuous improvement.

References

HERNÁNDEZ-GÓMEZ, Víctor Hugo & CHAVARRÍA-ORTIZ, Gilberto. Teaching of the subjects of Ecological Engineering and Air conditioning and refrigeration of the career of Electrical Mechanical Engineer of the FES Cuautitlán in the distance and mixed modality. Journal of Technology and Education. 2022. 6-15:1-7. DOI: 10.35429/JTAE.2022.15.6.1.7.