Teaching and learning experience with a virtual classroom in the field of pedagogical support due to covid-19

Experiencia de enseñanza-aprendizaje con aula virtual en el acompañamiento pedagógico debido al covid-19

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ABSTRACT

This work describes a pedagogical proposal for the dictation of a degree course, which originally had a face-to-face modality, sustained with the e-learning modality in the 2020 school year due to the social health situation caused by Covid-19. An analytical framework based on the pedagogical model of dimensions was applied, adapted for the virtual design of the Medical Informatics subject, of the Medicine career of the National University of Santiago del Estero, Argentina. The proposed dimensioning in the field of the pedagogical accompaniment process projected by the authorities of the faculty, allowed to program the active participation of the students and organize the monitoring of learning, through the axes proposed by the chair: individual work, group work, interactions and interventions. Regarding the results obtained on educational mediation in the virtual classroom, it was possible to identify and propose the guidelines and resources in a new pedagogical dimension on didactic strategies; thus, this proposed dimension is considered a highly usable component for teaching work in search of an autonomous student, in terms of achieving goals in their teaching and learning process, as shown by the presented experience.

Keywords
virtual electronic learning; virtual classroom; pedagogical accompaniment

RESUMEN

En este trabajo se describe una propuesta pedagógica de dictado de una asignatura de grado, que tenía originalmente modalidad presencial, sostenida con la modalidad e-learning en el ciclo lectivo 2020 debido a la situación socio sanitaria ocasionada por el Covid-19. Se aplicó un marco analítico basado en el modelo pedagógico de dimensiones, adaptado para el diseño virtual de la asignatura Informática Médica, de la carrera de Medicina de la Universidad Nacional de Santiago del Estero, Argentina. El dimensionamiento propuesto en el ámbito del proceso de acompañamiento pedagógico proyectado por las autoridades de la facultad, permitió programar la participación activa de los estudiantes y organizar el seguimiento del aprendizaje, a través de los ejes propuestos por la cátedra: trabajos individuales, trabajos grupales, interacciones e intervenciones. En cuanto a los resultados obtenidos sobre mediación educativa en aula virtual, se identificaron y propusieron las pautas y recursos en una nueva dimensión pedagógica sobre estrategias didácticas. Así, la dimensión propuesta se considera un componente altamente aprovechable para el trabajo docente en la búsqueda de un estudiante autónomo, en cuanto al logro de metas en su proceso de enseñanza-aprendizaje, y como lo muestra la experiencia realizada.

Palabras clave
Aprendizaje electrónico virtual; aula virtual; acompañamiento pedagógico

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INTRODUCTION

The dynamics current society is evolving with now, the product of the Covid-19 pandemic, has had a strong impact on the education sphere. At this situation, there is the need to explore pedagogic and technological models that would allow us to adapt on-site teaching aimed to define it in virtual spaces. Because of this, the course of Medicine given at the Faculty of Medical Sciences of the National University of Santiago del Estero, Argentina, with a permanent classroom attendance mode, established that subjects would be taught virtually as a pedagogic accompaniment.

In these conditions, teachers have been in the need to incorporate or redraft virtual classrooms (VC), as they are considered as the only one space for teaching and learning students have to fulfill the objectives of each subject. Therefore, in this document a pedagogic proposal is presented for the medical informatics (MI) course within the field of pedagogic accompaniment required by the faculty.

For the design and construction of VC and MI the following questions were taken into consideration: where is teaching carried out (context)? What is being taught (contents, problems, competencies)? Why is it taught (educational ends)? What type of interactions and mediations occur between the subject who does the teaching and the subject who learns (subject concepts, interaction and mediation)? And, how is teaching and learning verified (assessed)? (Rodriguez, 2006). With the purpose of supplementing this approach, dimensions specified by Area & Adell (2009) were taken into account to design VC, which provided the opportunity to review the instruction content, planned experiences and assessment situations before they were implemented.

Follow-up and control of students' management in the virtual mode are one of the main activities where teachers and students complemented to each other. This process was done within a concept framework adapted to the dimensions used for the construction of VC, where the relevant axes were defined. This allowed us to take proactive actions for the current group and that, in turn, would academically benefit students in the following course.

The proposed vision in this work, in relation to the use and achievement of VC, shows and instructive model that may be used in virtual courses, it incorporates pedagogic accompaniment and student follow-up with summative activities. In turn, it is sought that this model signifies a contribution of proposals for the improvement of the analyzed course, until it is formalized with assessment for the academic closing.

The concept of VC is presented in the following sections as well as a review of works related to their dimensions, the methodology they used, where a review of the pedagogic model of VC is done based on these dimensions, the description of the pedagogic proposal for VC of the Medical

Informatics subject, the learning results and, lastly, the conclusions and the potential future works.

VIRTUAL LEARNING SPACES

Conceptually speaking, virtual surroundings are understood as the Web or software resource with educational ends that enable managing every activity, which is characteristic of teaching and learning of a subject or course. They facilitate learning concepts to be secured into diverse and enriching digital formats, in addition, they make vertical and horizontal communication possible, both in a synchronous and asynchronous manner, collaborative work, control and follow-up of every user, and managing and administering the process (Garcia Aretio, 2014, quoted in Garcia Aretio, 2020). In summary, this is about a technological structure which responds to the demands of a perfectly integrated specific pedagogic design.

These virtual learning surroundings or platforms completely fit in our concept of distance learning as a mediated didactic dialogue, that is to say, educational ends outlined in valuable learning (pedagogic component), necessary dialogue, communication or interaction (social component) and mediation by means of the relevant software (technological component) (Garcia Aretio, 2014, quoted by Garcia Arieto, 2020).

An exemplary element of the first steps of e-learning were the platforms or *Learning Management Systems* (LMS) that would allow interactive contents attached and to facilitate digital resources for synchronous and asynchronous communication with image and sound. Subsequently, these platforms opened to the possibilities of the Web 2.0 and social networks (Garcia Peñalvo & Seoane Pardo, 2015).

An LMS is a software tool which enables managing content, activities and users; in exchange, VC integrate methodology and structure from which the resources are disposed with learning purposes (Humanante Ramos, 2016, quoted in Humanante-Ramos, Fernandez-Acevedo & Jimenez, 2019). There are several platforms in LMS, both with a commercial license and free access; from the latter, there is the Moodle platform (Modular Object-Oriented Dynamic Learning), as an integrated, robust, and safe system to create personalized learning environments.

Currently, Moodle is one of the mostly used tools worldwide, with a market quota of 20% in the United States and Canada, and 65% in Europe, in the face of other tools with similar characteristics (Pedersen & Kuran, 2017, quoted in Humanante-Ramos, Fernandez-Acevedo & Jimenez, 2019). In an analogous manner, in Latin-America, using LMS Moodle is generalized at universities and polytechnic schools (Bermudez Herrera, 2018, quoted in Humanante-Ramos, Fernandez-Acevedo & Jimenez, 2019).

A learning platform is also defined as "a software that provides a set of tools with which an instructor could create and manage both contents comprising a course and the interaction among students in a simple manner" (TEDU, 2019, p. 2). There are two types of markets where learning platforms have been focused on: the academic and the corporate markets. In this document, only reference will be made to the learning platform with an academic approach, among which are Blackboard, Moodle, Canvas, D2L, Sakai and Schoology.

In current generations, students are technology natives, therefore, easy adoption and use interfaces are being sought, in addition that they may be accessed from their mobile communication device. It is important to note that:

> This situation has given rise to a series of reflections around learning platforms, one of them suggests that they will cease to exist, another one says that learning platforms ought to evolve to see to the new educational and technological trends and, lastly, a third one, discusses how the next generation of a digital learning ambience will be. The latter reflection is based on the formation of a learning environment where other educational technologies partake. The central idea is to have a reconfigurable digital learning environment, similar to a Lego-type construction block system that enables the teaching-learning experience throughout the educational process (Brown, Dehoney & Milichap, 2015, quoted in TEDU, 2016, p. 10).

VC is defined as a space or environment created virtually intended for students to gain learning experiences by means of instruction resources and materials, under the supervision of and interaction with a professor. Through this environment a student may have access to and develop a series of similar actions to those taking place in an on-site teaching process, like conversing, reading documents, doing exercises, asking questions to the teacher, working in a tem, among others.

This educational encounter space is not eventful, but intentional, regulated, planned and conducted by the teacher. This implies that when students have access to a VC, they are to gain experience or interact in potentially learning situations in a similar manner to what would happen in on-site teaching scenarios (Area & Adell, 2009). Therefore, virtual platforms ought to be supported by a pedagogic model that articulates the use of active methodologies for teaching, learning and assessing; additionally, a source of major investment in teaching equipment and technological resources is necessary (Hoyos Giraldo, 2015).

Information and communication technologies (ICT) and virtual platforms, as support or an alternative for on-site education, derive from optimistic premises around the fact that they achieve listening and visual stimuli conducive to learning and to reconstruction of knowledge, which enables development of new teaching experiences, as well as teachers' and

students' skills and abilities (Regueyra, 2011, quoted in Granados-Zuñiga, 2019).

BACKGROUNDS

There is a number of backgrounds on the dimensions of VC; with the purpose of having them assessed or designed, below are some of the revised proposals for the analytic framework of our pedagogic model. The authors, Barbera & Badia (2005), have planned two large dimensions of AV: on the one hand, those related to design and planning (objectives, materials, groups, et cetera), and on the other hand, those related to their implementation and development (phases and features of each phase).

Khan (2005) proposes eight dimensions that are to be considered for online courses: institutional, management, technological, pedagogic, ethical, interface design, supports and assessment. The most significant are: a) pedagogic, which includes objectives, contents, organization, methodology, didactic strategy, et cetera; b) technological, which refers to technological elements supporting online courses; c) interface design, which includes how it looks like, how it feels and how it responds to the course interface; d) assessment, which considers learning assessment; and e) online guidance, the teacher's role in attending, following up, and feeding back advances in the learning process of his students.

Similarly, Area & Adell (2009) identified four large pedagogic dimensions in a VC: informational, experimental or praxis, tutorial and evaluative, and communicative. On the other hand, the work presented by Garcia Fernandez (2014) studies the activity of teachers and students in VC to typify its use, intended to guide improvement for the instruction of professionals of education. The author considers two dimensions: content, which is formed by all the digital texts providing valuable information for students' learning, and activity, which includes group and individual attention, tests and examinations, as well as the use of work tools.

Later on, Monteza Calderon (2016) sought to diagnose, characterize and understand the use of ICT and VC by teachers and students of the Faculty of Humanities of the Catholic University Saint Toribio of Mogrovejo (USAT, by its acronym in Spanish), in Peru. Therefore, the dimensions of use, dominion and utility of ICT were defined, as well as the informational, communicative, practical and tutorial dimensions of VC. Years later, Area (2018) considered two pedagogic approaches for the creation of and use of VC: the approach based on the paradigm of expository pedagogy and the one based on the paradigm of active or experiential pedagogy.

The former is characterized by conceiving online surroundings as spaces for presenting knowledge for reception learning, as well as by the development of individual and standardized teaching-learning processes for all. In the second approach, active or experiential pedagogy, spaces are conceived organized as a function of the demand for complying with

activities –assignments and projects which the students have to develop interacting with other students, employing different objects and online resources– and flexibility and adaptability to the personal pace and needs of students.

METHODOLOGY

In order to make a pedagogic proposal of VC and MI, and to follow up students' learning, first off, pedagogic dimensions to be considered were defined, then, informational, assessment and follow-up instruments were designed, and an analysis was done of the results obtained.

Designing a pedagogic proposal for VC and MI presented herein was based on the pedagogic model of the virtual classroom based on the dimensions developed by Area & Adell (2009).

- *Informational dimension:* understood as the "set of resources, materials or elements that present information or other content for students' self-study" (p. 8). They refer to different informational resources that help students to understand the contents of the subject. This dimension covers a set of materials of different nature –self-made or made by others– which, from the classroom allows students to have access to knowledge (Porro, 2017).

- *Experimental dimension*: this proposes individual and group activities with the purpose of development active learning experiences in the construction of knowledge.

- *Evaluative dimension*: this refers to assessments, in a way that students' learning advance is found out and that the subject is passed. The authors consider tutoring in this dimension.

- C*ommunicative dimension*: this refers to the set of resources and actions of social interaction between the students and the professor.

Having considered these dimensions, it was proposed to have them supplemented with the educational mediation dimension in VC, where didactic strategies and the necessary resources are established for implementing VC, for the attainment of the learning objectives and supplementing previous dimensions in a planned manner.

PEDAGOGICAL PROPOSAL FOR THE VIRTUAL CLASSROOM OF MEDICAL INFORMATICS

Studying the subject and student profile

With the purpose of designing the proposal, the context, contents, mode and educational ends of the MI subject were taken into consideration, whose general objective is to lean and reflexively use computing tools in the field of medicine, as a resource for the practice and professional development. From the beginning in 2017, the subject mode was on-site teaching; in 2018, VC was implemented in the Moodle platform to support on-site teaching, which made it possible to have access to educational materials and technological support, in addition to communication with students and to create an activity space.

As a result of social, preventive and mandatory isolation decreed due to Covid-19, in 2020, VC has had a new functional configuration in view of the continuing refining process and adaptation by the new mode. VC was proposed as the sole tool and support, and as the main educational strategy for teaching and learning the subject; likewise, care was taken that when a student has access to a VC, he gets the experience or interaction of significant learning potential situations in a similar way as he would do it in on-site teaching scenarios, reading texts, asking questions, solving problems, turning in their works, partaking in a debate or doing a test, among other academic tasks. To attain this, on designing and managing VC and MI, work was done in different aspects that included the dimensions that were considered.

Informational dimension

Three types of information have been included in the VC of the subject: general, specific on the subject and methodological guidelines. Here, information on the subject is detailed, like welcoming to VC, the faculty members, the subject syllabus, its objectives, the literature and passing conditions.

In view that the VC was organized from the thematic cores described in the subject planning, specific information on the subject has been included in each unit, prepared by teachers of the subject, both the theoretical and the practical part. This material is accompanied of other multimedia information resources of external authors –generally, mandatory and supplementary texts have been included, as well as links to videos and specific software of the unit theme.

Information on the guidelines and methodological references was added in the repository aimed to formalize the presentation and development of student' works, as well as other results obtained from collaborative activities of the VC.

Experimental dimension

Group activities were proposed in this dimension both regarding theory and practice. Theoretical group work was based on the creation of an initial reflexive process of continuing improvement and development with regards to the materials of the study, produced interactions and the technological platform. Likewise, the subject proposed the preparation of six practical works as a group on the following topics: searching for medical information, Excel, Word, EpiInfo, image scanning and slideshow editor and Medical Histories.

Table 1 shows the objectives and expected learning results from the two most representative works. In all of them, there were main criteria considered to do students' follow-up: turning in the document on time and manner, its completeness, and the quality of the work presented.

Table 1. Goals and learning achievements

Practical tasks topic	Learning goals	Expected learning outcomes
Searching for medical information	Know the formal strategies for searching and retrieving information. Know the formal strategies for searching and retrieving information	Analyze, select and apply search strategies Search DeCs, in the Virtual Health Library, and other medical information resources available on the internet
Medical history (MH)	Become familiar with Hospital Information System (IS), especially with MH management systems, in such a way that allows the student to obtain more knowledge about this type of systems	List and describe the elements that make up an IS of MH Understand the advantages involved using electronic MH Analyze and categorize clinical data, and use medical records software for its registration and processing. Install the *software's*

In view of the fact that problems cannot be currently seen in a fragmented and decontextualized form, but that they ought to be approached within a planetary context, comprised by knowledge to solve them (Nivela Cornejo *et al.*, 2019), a horizontal integration group work has been proposed with the subject *"Public Health II"* of the same semester. This type of works or integrating projects bring together knowledge from several subjects and have students achieve full competency, and solve a specific problem. Therefore, the objective is that an interdisciplinary and transdisciplinary

approach is developed on students so that they would deal with disciplinary problems (Nivela Cornejo *et al.,* 2019).

The general purpose of the assigned integrating work was to integrate knowledge and tools used in the Public Health II and MI subjects, applied on the analysis of the health situation of the population, under the coordination of the Primary Assistance Units (PAU) assigned. With this, expected learning results from MI to be attained are: organizing and managing data gathered at PAUs, obtaining significant statistics, assessing computing technologies to organize and manage medical information, integrating knowledge related to study disciplines, working effectively as a member of a group work in multidisciplinary settings, summarizing research performed and concluding with a slideshow of the work.

Evaluative dimension

In the VC there have been several practical and theoretical evaluation works on the topics seen of the subject. A practical assessment has been done in the individual work, which consisted of the solution of problems by using the software seen in the subject; whereas on planning individual theoretical work it was proposed to offer a strategy so that the student helps in the development of his own learning, that an instrument be used to obtain evidence thereof, as a requirement of the current pedagogic accompaniment process, and that virtual mode learning be incentivized.

Communicative dimension

For the proposal, two categories have been considered in the communicative dimension: interactions and interventions. The former has taken the reciprocal relation among students, between students and teachers, and between students and the VC into consideration.

- Student-student interaction: it was concretized in theoretical and practical group works. At the beginning of the subject groups of students were organized, they set the criteria of belonging to their respective commissions. Thus, the groups were formed with peers of the same commission and remained in the group until the end of the activities, some exclusions excepted. In addition, for the integrating work with Public Health II, groups were formed in accordance with the work of assigned PAUs.

- Student-professor interaction/relation: this was by means of synchronous and asynchronous communication through chats, videoconferences and consultation forums for each topic.

- Student-virtual classroom interaction: this was taken as a category because the VC was considered as the only one space to

support teaching and learning. Having this relation into account enables us to do follow-up to students' learning and to detect who had technical communication problems or lack of interest on the subject.

In the case of interventions, they have been divided into two: teachers and students. The teacher's intervention process is another element of the virtual learning environment, in addition to teachers as tutors and students as learners. At this time of the current course, different intervention may be noticed required from students from professors in the communication spaces and in the development of activities; here, the purpose of information, organization, feedback by teachers, response to requests for help, among others were identified.

With the purpose of managing set times in the course, in addition to ordering and conducting their development, teachers specified information or content intervention. The beginning dates of each theoretical and practical topic, the materials to be inquired, the software to be installed, and all the information related to the course were published and sent by teachers to the students, in a number of messages through the platform and by email. As a teacher-tutor, the professors also get involved to help in the organization, support and guidance of students' tasks, to order times for the execution thereof, or in the most interesting sequences as a function of the characteristics or learning styles of each student.

In feedback intervention, a feedback is done with students as a time for the promotion and construction of knowledge and learning. this feedback almost always is offered in relation to a product made by students, that is, a task. In this intervention, a judgment of value is made about the task done by students, of whom, later, is expected to show new information linked with the previous one. These interventions may be seen above all in returns of practical works, in the practical assessment activity and in the group research work. Regarding the intervention to respond to specific requests of students, information was provided as an answer to a demand made by a student, by email.

Regarding intervention realized by students, the following purposes were identified: to respond to demands requested by the tutor –by email, they are done by students to comply with the requests made by the tutor as course tasks– and to request help to clarify any conceptual or procedural content –at this point, collaborative aid may be expected from mates, as the forum is the ideal place for this development. Both interventions are reflected in emails sent by students, mostly privately, to teacher-tutors.

In consideration of the foregoing, the viewpoints and interpretations among the students and the participation as tutors, may be seen in interactions and interventions. Notwithstanding, the protagonist role in

the classroom is held by students, for they perform an active role in their own learning.

Educational mediation dimension in the virtual classroom

Didactic strategies, with their respective techniques and resources, as a new incorporated dimension is described in table 2. It is expected that, as of this information, an application is provided centered in an autonomous student, with regards the attainment of his/her goals in the teaching-learning process.

Table 2. Educational mediation in the virtual classroom

Teaching strategies	Resources
For each study unit, the theoretical and practical presentation prepared by teachers, bibliographic material and research activities / practical work were on the virtual classroom. The main strategies used were: *Individual study*: the student conducted the study of the unit and, subsequently, was enabled him in the schedule of the theoretical classes a chat or videoconference of consultations and a forum for individual consultations. *Individual/collective tasks*: To resolve the practice, chats of consultations and videoconferences were scheduled in which the general explanations were provided and doubts were solved about the proposed exercises. *Collaborative*: research and development activities were carried out on some subjects of the subject, with exchange and setting of study objectives	Slideshows Videos Questionnaires Consultative forum Chats Videoconference Bibliography selected by the chair Specific *software*
Problem-based learning: refers to group work that is carried out with the subject Public Health II	Those described above
Practical appraisal activity: an individual practical activity has been developed to monitor the students	Questionnaire Consultation chat
Questionnaire for self-study: This instrument was applied to fix and collect learning evidences	Questionnaire Consultation chat

RESULTS FROM LEARNINGS

Based on the dimensions of the pedagogic model presented herein, the following procedural axes have been considered for students' follow-up.

- Axis 1. Practice and theory group works
- Axis 2. Individual practical and theoretical evaluation works
- Axis 3. Interactions
- Axis 4. Interventions

The subject may get a passing grade of seven or higher in all the learning activities, and a student may become regular with a grade of five or higher. Summative evaluation and fixed learning activities were used as mediating and reflexive actions between teachers and students, and were used to guide the gradual and systematic approach of the group of students. Below are described the learning results obtained for each axis.

Axis 1. Group work

Group works were done throughout the subject and the results obtained are evidence of the high return of students in the medical search for information work, and it is concluded that students are capable of locating and exploiting the main sources of medical information by means of the application of relevant strategies. Chart 1 shows that, over a group of 138 students, 17.39% have reached the highest score, 3.62% a score of 70 points and 77.53% got a score between 80 and 97 points. In addition, 1.47% of the students have not done the task, therefore the score they got is zero.

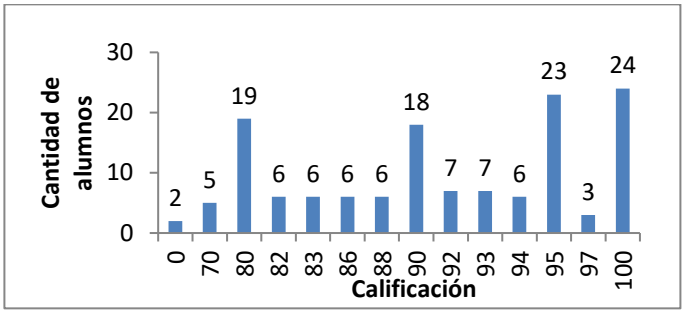

Chart 1. Results of the practical work, Search for Medical Information.

Generally, learning results of the students obtained in all the practical works show that students are capable of skillfully apply the edition and personal communication tools, to perform search for information with criteria, to know standards and to manage medical images, to analyze and categorize clinical data, and to employ HC software to register and do basic statistics.

As seen in chart 2, except for two students, the rest of them has reached a score considered for their promotion. With the evaluation of all the practical works it may be concluded that the students have worked properly in workgroups with teacher interventions.

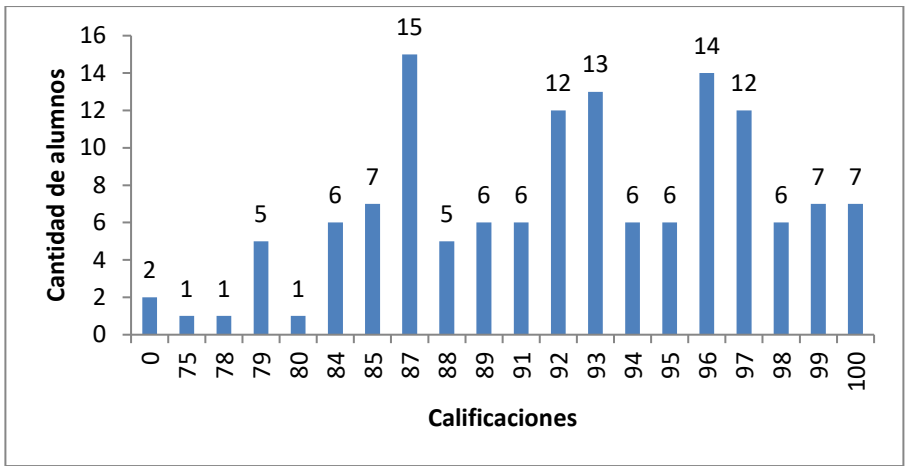

Chart 2. Grade averages of practical works.

The scores obtained in the horizontal integration group work with another subject are evidence that students, due to their knowledge, skills and capabilities obtained previously in the subject, have made them build new meanings and to give a sense, functionality and practical application of MI topics in a real situation of their profession; furthermore, under this item, a commitment has also been seen with the work and with the group of mates. From the data obtained from the evaluation of the work (see chart 3), it may be concluded that, with regards the total group of 138 students, five students did not do the work because they did not take the Public Health II subject. Of the 133 remaining students, two students did not turn in the task, 6% reached the highest score, while the score of 92.4% is between 80 and 95 points.

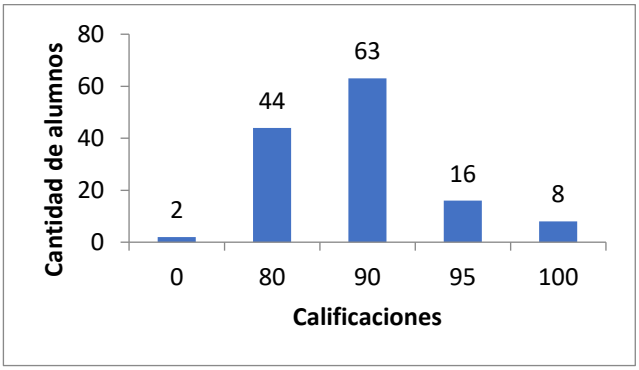

Chart 3. Grades of the integrating work.

With regards the theoretical group work, in the group of 133 students there was a grade trend of seven to ten points, and the ninth score was centered as a very good result within the range mentioned as being accepted for promotion (see chart 4).

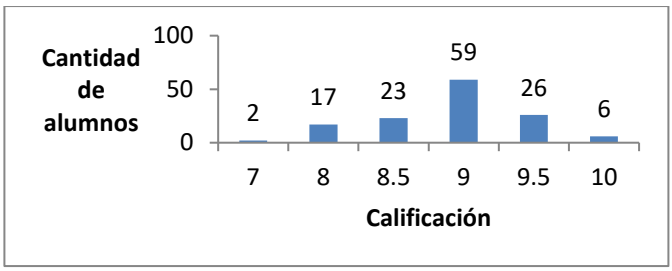

Chart 4. Results trend of the theory group work.

Axis 2. Individual practical and theoretical evaluation works

An evaluation activity was done in individual works on the practical contents of the subject, before this, the guidelines were informed for the performance thereof, a time for which an inquiry chat was set in place, the purpose of which was to answer questions that may be posed. From the conversations in the inquiries chat, it was shown that several students had problems to load the exercises solution filed onto the platform, whether the questionnaire was closed up because the established timeline was exceeded, or because they were not aware of the mechanics to upload several files.

In accordance with the statistics done (see chart 5) it is noted that 72 students (62%) have a higher score or equal to seven, whereas 44 (38%) have scores less than seven. From this, the following learning results were reached:

- To analyze and categorize clinical data, as well as to employ HC software for registration and processing.
- To analyze the problem, organize data and obtain statistics by using Excel and EpiInfo.
- To handle tools to manage medical images.

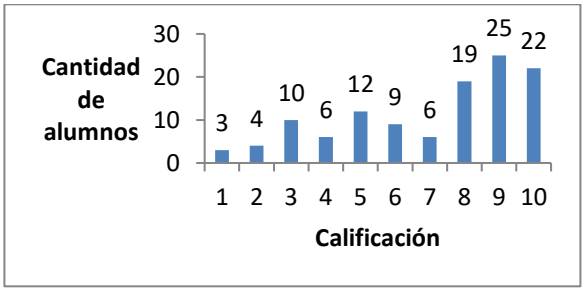

Chart 5. Trend of the evaluation activity of the individual practice.

From the analysis of the results obtained, the professors decided to do several kinds of inquiries, of additional exercise and, lastly, a final assessment for the students who did not meet the planned learning objectives.

In the theoretical work, there were 125 students participating, of which 83% (104 students) obtained a score higher or equal to seven, and there were 13 absent students (see chart 6). The participation of students in this activity is notably high, and a high percentage of students with excellent and very good scores, which allows us to see the value of and importance given to the pedagogic accompaniment process.

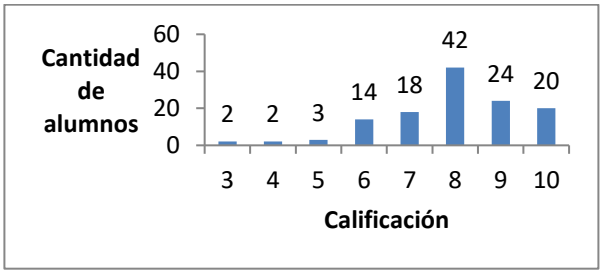

Chart 6. Trend of the questionnaire for self-regulation of theoretical learning.

Axis 3. Interactions

In the student-student interaction there were 25 workgroups organized. Because of the preventive and mandatory isolation decreed due to the Covid-19 pandemic, communication between them was done by WhatsApp. In order to carry out collaborative work they also used Google Drive and email. On the other hand, the relationship between students and teachers was done through the Moodle platform, which allowed us to obtain statistics of this interaction in relation to chats and forums. No statistics were obtained from video-conferences, emails, or WhatsApp messages.

About inquiry chats, it was concluded that 29 have been taken place, the number of students ranges between 12 and 132 students who partook and did the follow-up of this resource. Regarding forums, there have been five, and the number of students who have seen the resource ranges between 19 and 123. Chart 7 shows the average of times when a student saw the interaction resources (chat of forum).

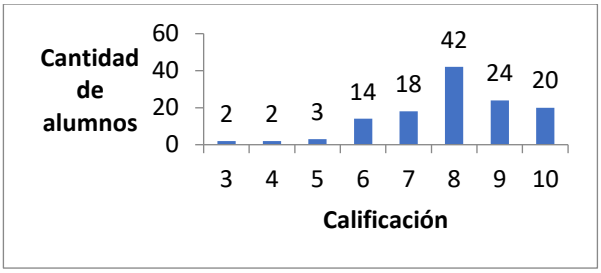

Chart 7. Average visits of interaction resources.

In respect to the interaction of students with the virtual classroom, chart 8 shows the number of times in average that a student has visited the resource or activity of the VC.

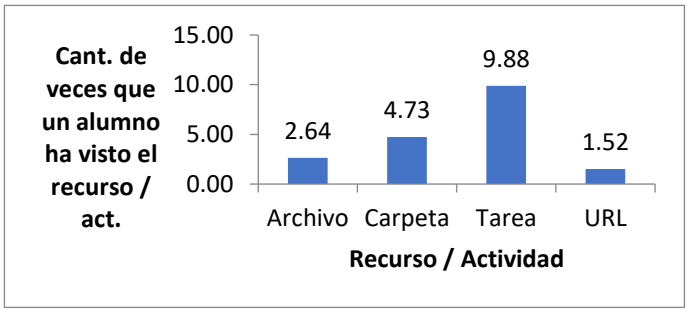

Chart 8. Average visits of a resource/activity.

Axis 4. Interventions

It was found that students ought to see the process and the group participation dynamics for the production of experimentation, reflection and adjustment of the ways and times of participation. Therefore, in order to reach the desired participation in the activities, a requirement was previously defined in the mandatory participation slogans in some activities, in such a way that resistance in respect to the use thereof was minimized.

CONCLUSIONS

From the results and the evidence of the learning described herein, the pedagogic VC design proposed enabled, in relation with the informational dimension, the organization per topics of materials produced by subject teachers, as well as to do a search and selection of other supplementary multimedia materials. It is considered that the experimental dimension favored the practical experiences of each thematic unit and, regarding the

evaluation dimension, this facilitated incorporation of theoretical and practical evaluation activities to do the follow-up of students' progress, as well as reached achievement accompanied by teachers' feedback. The pedagogic design allowed us to provide instructional aides on the contents and the practical activities proposed by the subject and by the interaction among students, as this is the main contribution on the communicative dimension.

Regarding the educational dimension in the VC, this enabled the organization and the setting of guidelines and the resources of didactic strategies, which is considered as a highly beneficial component for the teaching work in teaching and learning environments with the virtual mode, since teachers need to organize and structure their thought with consistent didactic mechanisms to address the class, in such a way that learning and working guidelines are applied to achieve the interest and proactivity among students in the teaching-learning environment.

From the experience described above, we expect to incorporate the use of a Student's Didactic Guidelines in the 2021 term as a guiding map and resource of the VC, because due to the prompt and unexpected current sanitary conditions, we were not able to do it in advance and with the necessary programming. Regarding the statistics under analysis, it is deemed to deepen in the study of axis 4, corresponding to interactions, with the purpose of attaining greater cohesion and strengthening of students.

Finally, from the results reached in this virtual classroom experience, considered by the professorship to be highly productive and significant, regarding academic instruction and as an experience of teaching pedagogic innovation, the relevant academic officials may be requested permission for teaching the subject under the mixed teaching-learning model, or blended learning, for the next 2021 term.

Also, as an extension of this pedagogic experience, already defined as an innovation proposal, there is a desire to commence centered digital literacy on learning, based on competencies, which is necessary to integrate students into the digital culture and in the society of the future medical professional.

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