CIENCIAS HUMANAS:

POLÍTICA DE DIÁLOGO Y COLABORACIÓN

Fabiano Eloy Atílio Batista
Glauber Soares Junior
Ítalo José de Madeiros Dantas
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Estimados leitores e leitoras;

Em sua sexta edição, a obra **'Ciencias humanas: política de diálogo y colaboración 6'** busca suscitar uma continuidade das discussões no entorno de questões que abrangem problemáticas sociais e culturais, apresentando um conjunto de artigos que possuem perspectivas teóricas e metodológicas centradas em discussões interdisciplinares, multidisciplinares e transversais.

Esta edição possui em seu conjunto 16 textos escritos em três idiomas – espanhol, inglês e português – que estabelecem um importante diálogo entre pesquisas e pesquisadores que analisam diferentes contextos da sociedade latino-americana. Esses textos auxiliam na formação de indagações e explicações que desvelam as dificuldades encontradas e as atuações das ciências humanas e sociais, sobretudo, salientando as possíveis e necessárias articulações entre o campo acadêmico-científico e a sociedade no geral.

Entre as temáticas evidenciadas, destacam-se a área da educação que é investigada por distintas óticas, que abordam sobretudo, a categoria inovação social. Tem-se pesquisas que focalizam a análise de currículo escolar; desenvolvimento de guias, instrumentos educativos e metodologias, em especial apresentando estratégias desenvolvidas para o enfrentamento da covid-19 no que toca ao estabelecimento de aulas no formato online. Discute-se aspectos relacionados ao processo de docência, em específico, no que tange ao processo de planejamento e na articulação entre ensino com a inteligência emocional.

São também expostas investigações que ressaltam aspectos vinculados a psicologia no processo de ensino-aprendizagem, explicitando temáticas como a saúde mental de crianças com hiperatividade; a ligação do desempenho escolar com a exclusão da figura paterna; e a influência da escrita no funcionamento do cérebro. Ainda, são evidenciados manuscritos que investigam produtos culturais – literatura, série televisiva e o futebol – na perspectiva da educação e da identidade cultural. Por fim, também perpassa por esse compilado um artigo que observa a relação do turismo com a paisagem local.

A todos e todas, esperamos que gostem e que tenham uma agradável leitura!

Fabiano Eloy Atílio Batista
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SUMÁRIO

CAPÍTULO 2

ADAPTING TO ONLINE EDUCATION THROUGH PROJECT-BASED LEARNING IN A COMPLEX REMOTE ZONE. (MAGALLANES /CHILE)

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ABSTRACT: Faced with the health emergency caused by the SARS-CoV-2 virus, the Chilean government declared a state of catastrophe due to public calamity throughout Chilean territory. The University of Magallanes, since the beginning of the 2020 academic year, has since been reinstated by online classes. Accelerated changes and modifications have been motivated in the development of theoretical and practical classes in laboratories, both for academics and students of course of Construction Engineering, thus adapting to this new form and facing the learning of ingenuity from the intimate spaces of their homes. The purpose of this research was to evaluate the learning process carried out during the academic period, as well as the effectiveness of the implementation of the learning process, learning in a virtual model of the design of the courses of General Construction (GC) and Structural Analysis I (SA-I). One of the ways to know the student's perception of the implementation of the virtual learning were taking a final survey on both subjects, that evaluated the criteria of internet quality, satisfaction with the activity carried out, and the quality of the item. In the course General Construction, the laboratory was evaluated using the construction development of prototype of a house carried out through collaborative work through a project located in a e-cloud, determined in stages, surveys about of the performance of the students were around of 90.9% of approbation. For the Structural Analysis I teaching methodology, "Design Thinking" was used. The activity consists of making models with accessible materials in their home and of which the structural models differ just these two, an inverted catenary and a suspension bridge. The evaluation was carried on by creating a video with teacher feedback; surveys reveal that students evaluation were about of 72.7% of approbation. The final impression was positive, and the department is trying to improve the methodology the following semester.

KEYWORDS: Online classes; Construction Engineering; Assessment; Project Based Learning.

1 | INTRODUCTION

Given the health emergency caused by the SARS-CoV-2 virus, the Economic Commission for Latin America and the Caribbean (ECLAC) indicates that in the field of education, a large part of the measures adopted by the countries of the region in response to the crisis was the suspension of face-to-face classes at all levels, which has given rise to the deployment of distance learning modalities, using a variety of formats and platforms (with or without the use of technology)(NU.CEPAL, 2020).

With the arrival of the pandemic, the challenge worldwide was to face the transition and subsequent adaptation of face-to-face classes by teleworking in universities. University of Magallanes has had the Virtual Development Unit (UDV) since 2014, which was born out of the need to have an educational option in the field of undergraduate, postgraduate and continuing education for those located in geographically dispersed locations, in order to support professional development and updating among its guidelines are those of defining policies that allow for the successful administration and development of academic programs in E-learning and B-learning modalities. Currently, the most widely used tools for the Construction Engineering degree are the Moodle© platform (UMAG, 2020b) y Google Drive©.

In 2017, academics staff from the Faculty of Engineering (FI-UMag) to promote the use of problem-based learning (PBL) in lessons and improve relevant aspects, such as linking with the environment, incorporating real problems, techniques that involve comprehensive development and strengthen soft skills and consider the opinions of local industry (Lagos et al., 2018). Several academics were trained and indicated that PBL activities have been used in their classes for some time and on a regular basis, but they were unaware of the concept. The use of PBL dates back to before the pandemic, as it poses a problem and develops problem-solving skills through self-directed learning. (González & del Valle López, 2008)(Barrows, 1986). This methodology is used in the General Construction (GC) subject and the E-Portfolio, a folder stored in Virtual Undergraduate or Google Drive©, was used as an evaluation element in the virtual environment, with the aim of assessing the evolution of the performance of the future engineer through the exchange of learning files and the use of collaborative work tools. (Tapia Saucedo, 2013).

Another methodology used is Design Thinking (DT) which focuses on problem solving and applies to any field that requires a creative approach, which allows working in multidisciplinary teams to develop solutions in an open and collaborative way; it stimulates cooperation and creativity and breaks with established ideas to generate new innovative options to address problems or improve situations. Globally it has become an indispensable method in the innovation process. It is used in companies such as Apple©, General Electric© and Philips©, among others, and Design Thinking is currently widely applied in business schools and innovation centres of universities such as Stanford, Berkeley and MTI, among

many others. (Levine et al., 2016) (Mabogunje et al., 2016).

In addition to spreading the DT methodology beyond engineering disciplines, and involving students in projects with a strong social impact, programs are increasingly harnessing the potential of the Internet and social media platforms to support open innovation processes on a larger scale (Steinbeck, 2011). This methodology was used in the Structural Analysis I (SA-I) course and the form of evaluation was the use of video, which should provoke debate in the student when delivering the contents and analysis of what was requested by the academic staff (Jackson et al., 2013), i.e. learners should be able to express knowledge, understanding and reflection of the content (Campbell et al., 2019).

The development of virtual classrooms has made the vulnerability of broad social sectors, including the education sector, more visible (Llerena L. & Sánchez N., 2020). The strategies generated by UMAG were to provide internet accessibility and equipment to students with problems and to be able to develop virtual classes.

There are 3.6 million fixed internet accesses in Chile, an annual growth of 5.5%, and 32.8% of these are through fiber optic technology, according to the latest statistical series of the Sub-secretariat of Telecommunications (SUBTEL) for the first half of 2020 (SUBTEL, 2020). In Magallanes region, the quality of internet and fixed high- speed services continues to show the already known deficiencies, such as a gradual decrease in internet speed and availability in certain sectors of Punta Arenas and nearby localities, in the survey of GC and SA-I students it is highlighted that the main problems are highly variable internet speed and external factors, especially climatic ones.

Under these conditions, both student-teacher parties had to adjust to the changes and request technological support. In addition, we should mention that in the Magallanes region we were in an extensive territorial quarantine reaching 114 days, this caused a lack of motivation in the students to develop some key soft skills for the development of practical activities.

This work aims to analyze the teaching-learning adaptation of the practical lessons to a virtual modality in the courses of General Construction (GC) and Structural Analysis I (SA-I). The following activities were carried out: literature review, application of an instrument to measure satisfaction with the virtual classes and evaluation, the results and conclusions are presented.

2 | METHODOLOGY

2.1 Subjects characteristics

The Construction Engineering course is based on the guidelines of the Educational Project for Institutions (PEDI), which is based on three pillars: education in values, education centered on learning and relevant education, all of which have a formative focus on competences, which are grouped into two categories, generic competences and specific

competences (E) whose level of performance (N) establishes the depth, scope and precision of the expected learning. (UMAG, 2014).

Table 1 shows the specific competences (E) of the 2 courses that will be analyzed from the theoretical-practical integration. The "practical" part increases knowledge by means of laboratory and/or workshops contextualizing the environment in which the future professional will be situated (UMAG, 2020a). In the GC subject, students demonstrate general knowledge of construction processes and codes governing the construction industry and the SA-I course aims for students to determine reactions and internal stress diagrams, be able to understand the way of working and analysis of hyperstatic structures, to apply design methods and calculation of combined structural elements.

Subjects	CT*	Cód.	Competition Involved
General Construction (GC)	3	E2	Design, conduct and perform experiments as well as analyze and interpret theirresults.
		E4	Works in multidisciplinary teams.
Structural Analysis I (SA-I)	3	E1	Applied mathematics, scientific and engineering knowledge
		E5	Identifies, formulates, and solves engineering problems.

*Transferable Credits

Table 1. Specific competences (E) of the courses.

2.2 Attendances

The students in the target population are in the 2nd and 3rd year. In the Table 2. shows the number of students for each subject, the number of students by gender, age range and pass rates.

Subjects	Number			Age			% Approval
	Total	Men(%)	Women(%)	19-20	21-22	23-24	
General Construction (GC)	11	81,2	18,2	67 %	11 %	22 %	90,9
Structural Analysis I (SA-I)	11	72,7	27,3	7%	50%	43 %	72,7

** Obtained data Eduational Information System (EIS), UMAG.

Table 2. Number of students for each subject.**

In addition, it was determined that most students live in the city of Punta Arenas with 93% of the total, while 7% live in Natales (see Figure 1.). In the Figure 2 shows the geographical location of the two cities, which are 248 km apart.

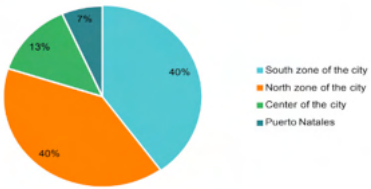

Figure 1. Area of the city of Punta Arenas where the students took their classes.

Figure 2. Location of the Magallanes region. (COMAPA, 2017)

Then, the researchers show a model to determine the reliability of a measurement instrument by applying Cronbach's alpha coefficient and using an Excel© spreadsheet for data analysis. A questionnaire with five questions and five response options, using Likert scale (1. Never, 2.Occasionally, 3.Sometimes, 4.Frequently, 5. Always) and 13 questions with Linkert scale (1. Very Dissatisfied, 2. Dissatisfied, 3. Neither Satisfied/Nor Dissatisfied, 4. Satisfied, 5.) The coefficient values for GC of a= 0.93 and SA-I a=0.89 indicate excellent internal consistency. (Cronbach, 1951)(Frias-Navarro, 2020)

2.3 Student attendance online classes

To know the participation of the students in the virtual classes, a survey was carried out by means of a Google© form at the end of the academic year, whose objective was to know the type of connection and how they developed their learning from virtuality, it is highlighted that 80% of the students had a fixed internet plan at home and at work and used a laptop. When they lost the connection, 73% of the students answered that they went to someone else's home to solve the problem. In addition, if students were unable to participate in class, 27% in asynchronous way and 53% "got together with their classmates for the subjects they had missed".

Figure 3. shows the assessment of the main factors that affected the students when they entered the virtual class. It is highlighted that the main problems are the very variable internet speed and external factors, especially weather.

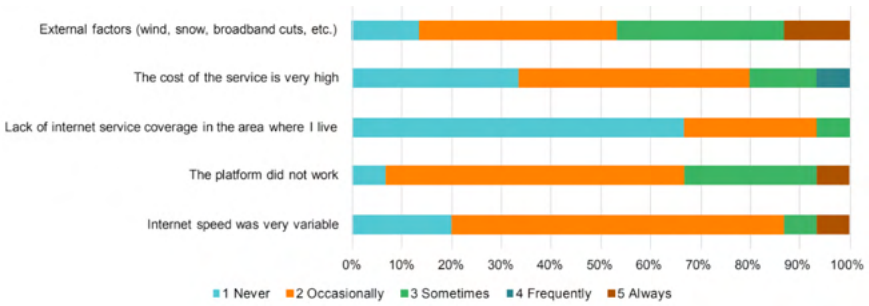

Figure 3. Estimation of the main factors that affected the students.

A satisfaction survey was carried out with the students in the practical virtual classes of both subjects AE-1 and CG, to determine whether the students recognize any difference in learning in the online modality. In this second section, it was evaluated whether the practical work of the subject was useful, entertaining, could be done in groups, helped to consolidate knowledge and was a good complement to the theory; the load was adequate, the help and follow-up were sufficient and whether the wording was clear.

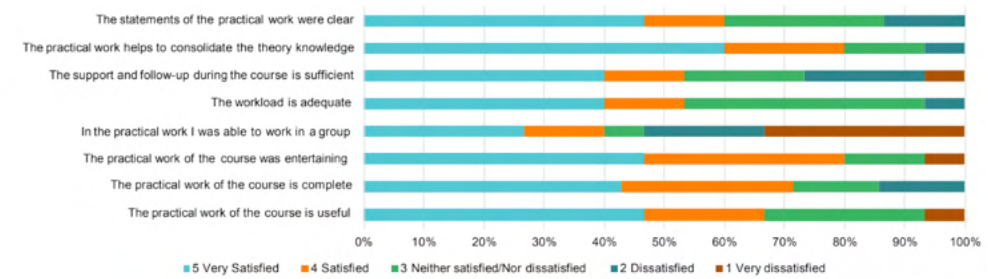

Figure 4. Degree of satisfaction of the practical virtual classes GC and SA-I.

Shows that the students rated the practical part of the course positively, being a complement to the theory and an entertaining activity, reaching 80%. Regarding the tasks to be carried out, they were clear, reaching 60%, and the workload was adequate, reaching 55%. The alternative with the lowest evaluation corresponds to teamwork, which only reached 40% between very satisfied and satisfied.

2.4 Satisfaction with the practical virtual classes

For the GC subject, the survey had a third section, which asked about satisfaction using a framework that sets out criteria and standards for different levels of performance and describes what performance would look like at each level called rubric. The rubric is an element created for normal class periods and was used in the same way during the pandemic, which is why it can be highlighted that the students in general terms are very satisfied, as can be seen in Figure 5. , the rubric served as a guide for them to prepare their work, providing the main elements to develop, expressing 85% satisfaction. In addition, the guideline was easy to understand and helped them to improve their work, both statements reach 72% satisfaction.

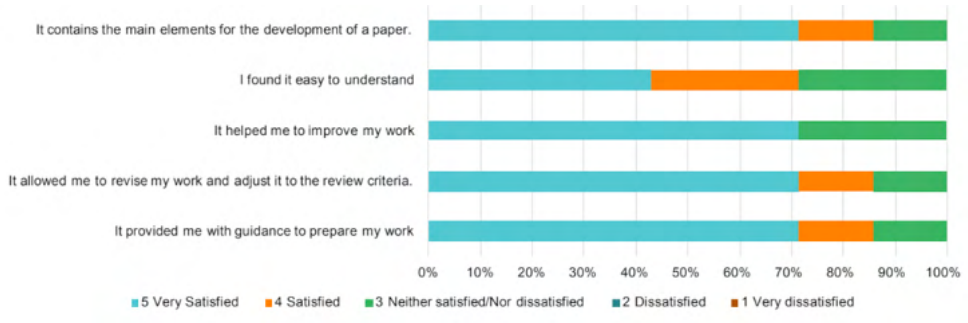

Figure 5. Degree of satisfaction of the rubric of the GC laboratory classes.

2.5 Assessment guideline

Each subject was supported in the virtual classroom of the UMAG Campus - Virtual Undergraduate (Moodle©), Google Drive© and Classroom© where instructions, news, contents, guides, and evaluation were coordinated in a general way. In short, a technological variety has been created for the development of collaborative work. The virtual classes were held via Meet©.

The practical part of the GC subject is based on the application of a PBL type activity and in virtuality the evaluation was carried out through the use of E-Portfolio as described below: "the housing deficit in the region of Magallanes and Chilean Antarctic, according to the CASEN survey 2017 was 3.601units. (CChC, 2018); to improve this index and increase the amount of employment by COVID-19, the state has invested in the last year $36 MM for the construction of 1,225 social housing units in 11 lots. (MINVU, 2020). In spite of this, the deficit continues. Based on this problem, the construction engineer, owner of a construction company, must design the housing solution for those citizens who cannot access state housing subsidies. For this, they must take into account the following: i) Surface area of the dwelling, ii) Construction systems and types of materials and iii) Project execution time". The use of E-Portfolio is an appropriate tool to consolidate collaborative learning and facilitates academic work. This activity was called "Construction of a single-family house", the purpose of which is to keep learning resources, feedback and the students' entry record updated during the semester.

In the subject SA-I, the practical part is based on the application of an activity using Design Thinking "For the application of this teaching model, the student must answer the following question: What is the difference between an inverted catenary and a suspension bridge? To answer this question, each student must study both structural models, propose the design of two structures, one using the inverted catenary as a model and the other one must correspond to a suspension structure, both designs must support a load of 1 kg. The models shall be made with materials of your choice". The virtual assessment was carried out

by means of a video, in which the student had to edit and explain the difference between the two structural systems, what each of the designed models consists of, how it was executed and demonstrate that the models can withstand the requested load. As a result of the results obtained, the students had to draw their own conclusions, which were later discussed in class together with the other students, guided by the teacher.

3 I EXPERIENCE AND RESULTS

The GC subject was historically carried out in the laboratorial practice, whose main competences are presented in Table 1, and the students must understand the fundamental elements of design in order to interpret the results, through teamwork. Figure 6 shows the working diagram of the Problem-Based Learning (PBL), where the didactic strategy used is important and the role of the students consisted of their participation in the process of evaluation and design of their knowledge. In summary: Step 1 - House design: the student presents the project of a single- family house; architectural plan, foundations and wooden structure; Step 2 - Construction company: the learner organizes and plans the functions of the company that will carry out the construction work of the “sketch”; Step 3 - Inspection: the student assistant monitors the work through weekly progress of the “model” and review of the work book (through the use of the portfolio) and Step 4 - Construction of the house model: at the end of the semester the student will deliver the model, by means of a photographic set and defense by Meet©.

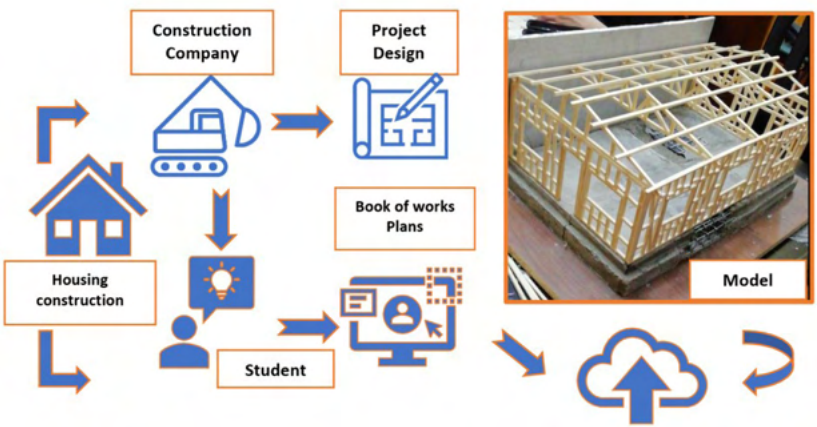

Figure 6. Wooden house construction work - flow.

It should be noted that in the practical classes, the students studied the construction systems every week and presented the progress of their models. In addition, they exchanged their experiences of the work they had done and solved their problems among

themselves. The contribution of all this is that it develops and shapes a self-taught culture in the students with respect to their learning, applying the capacity for organization, creativity and responsibility. In addition, it strengthens the links between the virtual classroom and the participative work between student - assistant - teacher. All this led to the development of oral expression and strengthening of character, meeting the project's scheduled times.

To produce the models for the SA-I subject, the students followed the following steps: i) Research of the topic, ii) Analysis and calculation of the results, iii) Choice of the materials to be used in the model and iv) Production of the model.

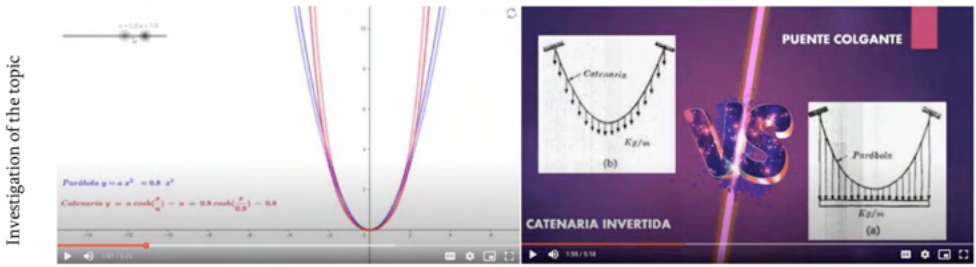

Figure 7. Theory of the catenary v / s parable.

According to the phases of DT, in the first phase the User - Student explains the concept of catenary and parabola, and in which type of structures they are used, i.e., empathises and defines the concepts to be used in order to create the project that solves the problem being viable and meaningful. (Villarroel et al., 2017) (see ¡Error! No se encuentra el origen de la referencia.).

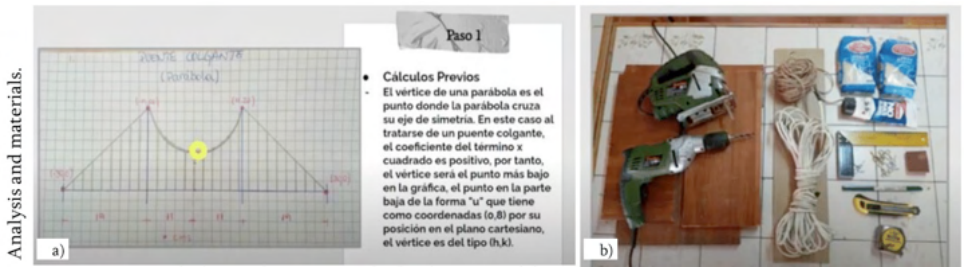

Figure 8. a) Calculation of a suspension bridge, by means of the parable and b) Materials for the elaboration of the model.

When carrying out the analysis and later the calculation (see ¡Error! No se encuentra el origen de la referencia.the pupils executed their design firstly in sketches that served as a guide for the construction and/or elaboration of the model. In the Figure 8 ¡Error! No se encuentra el origen de la referencia.the choice of materials for the model was free choice,

prioritizing the use of disused-recycled materials found in the home. In this phase, students developed the model used and tested the prototypes that met the requirement - testing the structure with 1 kg (Villarroel et al., 2017).

Each student built 2 models representing the concept catenary structure and suspension bridge, respectively. In phase 3 of the DT method, the solution is evaluated, in this case it is 100% technical by fulfilling the resistance with 1 kg (sugar and/or pulses) Figure 9.a)

At the end of the activity, all students presented their work to the course group, generating a forum discussion of the observations and results obtained individually. All of this was guided by the teacher responsible for the subject.

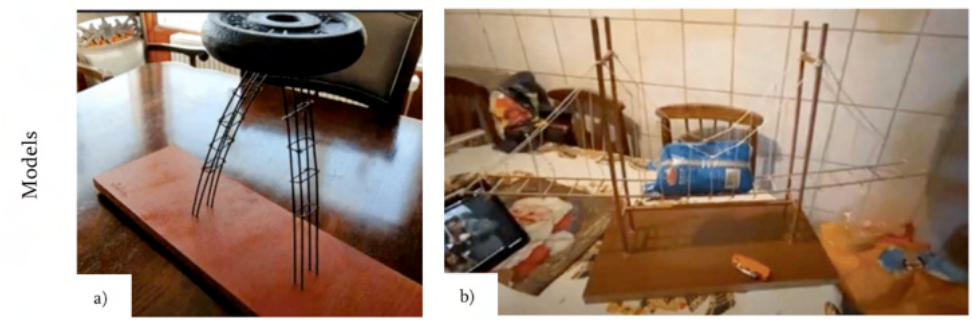

Figure 9.a) Arch created by using the catenary and b) Suspension bridge, using the parable.

In summary, this research helped us determine the existence of gaps such as access to connectivity, digital skills (teacher-students), and skills in teaching methodologies. Added to this is the resilience of students and teachers to work with more time to comply with scheduled activities. Based on this, future classes will be hybrids, where classroom attendance in laboratories will prevail, and theoretical classes will have to work and adapt to learning experiences through technology.

4 I CONCLUSION

This research is summarized in two parts, the adaptation of the practical classes to virtual classes throughout the academic year 2020 and the perception of the students by means of a survey.

Regarding the practical virtual classes, the students highlight that they are a complement to the theory and an entertaining activity, reaching 80% satisfaction. Despite having in some cases, a variable speed internet connection, 27% of the students indicated that they “watched the videos later” and 53% that they “got to know the past subjects with their classmates”.

The perception of the academics is also important as they had to redesign the practical experiences and adapt them to reality. In addition, facing the lack of motivation of the students at the beginning of the pandemic and where distance learning, which is based on autonomy in their learning process, often did not happen. But despite that, the students managed to develop their organizational skills, creativity and responsibility in fulfilling the objectives set in the different activities. They also had to deal with another problem, access to the materials to make the models, since the local shops were closed due to their confinement (over 114 days), which meant that they had to use recycled materials found at home.

In relation to the teaching methodologies used in the GC/PBL and SA-I/DT subjects, both were implemented even though they were based on collaborative work and that the students worked most of the time from the solitude of their homes and met in the Virtual Room once a week. They managed to understand and relate the concepts. And they developed greater autonomy in their learning process.

Finally, this research focused on the transformation of the teaching-learning processes from practice to virtualization of the main problems detected by both students and academics, considering the emergency caused by the COVID- 19 pandemic experienced so far and the positive results of the process.

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