Challenges of Database Systems Teaching Amidst the Covid-19 Pandemic

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***Abstract*—Context: The Database Systems (DS) subject is a significant subject in Computer Science and Engineering-related undergraduate programs, as it supplies knowledge and abilities required for professional practice within the software industry. Teaching DS principles, concepts, and practices and relating them to real-world scenarios is challenging, particularly in social isolation circumstances due to Covid-19. Moreover, teaching resources can pose additional setbacks for teachers and students who are unfamiliar with remote learning. Purpose: This study investigates the DS students' perception regarding the methodology and teaching practices adopted by the teacher during the social isolation period. Method: We conducted a survey with the DS subject students to investigate their perception regarding the teaching methodology adopted, the challenges, and their motivation during this period of social isolation. Results: Our findings revealed that most students have adequate study conditions, i.e., a suitable environment for studying at home and the necessary equipment to attend online classes and perform the subject's practical tasks. Moreover, 79% of the students felt motivated to study the subject remotely, and more than 74% of the students endorsed the teaching methodology adopted by the teacher.**

***Index Terms*—Covid-19, Database Systems, Project-Based Learning, Students' Perception.**

I. Introduction

In early March 2020, the first case of COVID-19 was reported in the city of Brasília, Brazil, and all scholarly activities were suspended for five days through the Governor's decree. As the pandemic became increasingly severe, the decision was extended another 15 days and then indefinitely. All University classes remained halted, and we had no school-related activities between March and August. As classes resumed remotely, a period of uncertainty and research regarding the students' feelings during the social isolation period and their circumstances surrounding remote lectures began.

Several committees were set up to follow starting classes and how they would be throughout the period. Several committees were defined to monitor classes' commencement in a remote environment and how they would proceed throughout the term. Parallel to these commissions' activities, in the Database Systems subject, a class composed of 50 computer science students this research is focused on, the lecturer also performed a survey with anonymous responses towards the end of the semester to assess the students' perception regarding their experience in learning and how they adapted to the activities during the pandemic despite being exposed to a plethora of issues, such as difficulties in getting access to computer resources necessary to attend the classes, access to the internet, a suitable environment to attend the classes, and emotional issues related to the effects of the pandemic.

The survey also inquired about issues concerning the subject teacher, such as whether he/she was able to communicate effectively with the students, whether synchronous and asynchronous resources had been employed to facilitate learning the subject content, how effective was the didactic strategy adopted, and whether there were student-teacher communication and interaction throughout this semester.

Our main findings were: More than 90% of the students have not been diagnosed with Covid-19, although more than 56% of their family members have. Most of the students stated they had computer resources and a suitable environment to attend lectures. Over 70% stated that the course conduction during the social isolation period, utilizing virtual learning environment tools, provided proper subject conduction. Surprisingly, over 79% of the students expressed enthusiasm in the Database Systems subject, an efficient and demanding discipline that includes many hands-on activities with modeling tools. Furthermore, most students rated their subject performance as acceptable.

Concerning the professor's performance, about 90% of the students were satisfied, and the teaching resources employed to support the students' learning were deemed sufficient. The students gave some interesting suggestions, such as adopting a more user-friendly modeling tool and providing workbooks composed of different approaches to answer a given topic.

II. Background

Teaching the Database Systems (DS) subject involves several challenges, including the demand for students to have exposure to small, medium, and large real-world software systems. The subject's curricular guidelines advise that the curriculum should ensure coexistence between theory and practice to allow the students to experience real projects and adapt themselves to the day-to-day activities of a database operator. The teacher has to not only ensure access to a solid

theoretical foundation in teaching but also provide opportunities that allow students to have contact with problem-solving and develop basic communication and teamwork skills, which are necessary for a database programmer [1].

Traditional lectures that discuss the fundamentals of Database Systems, without a clear understanding of how these principles can be applied in reality, are unlikely to attract the students' interest [2]. A teaching-learning approach based on hands-on, realistic teaching rather than only traditional lectures is of great importance for student understanding [3].

Integrating realistic practices into formal education poses a demanding task for the teacher, given the need to provide an effective mapping between pedagogical goals and actual practical experience and the requirement to cover the subject content throughout the term [3]. Therefore, developing real-world projects in the classroom or interacting with companies in a scholarly context becomes a significant hurdle [4].

A. Theoretical Pedagogical Framework

Among the most effective methods of guiding the educational development of young IT practitioners, especially when it comes to new tendencies and their profession's core knowledge, is by teaching through practical assignments designed to simulate day-to-day situations typically experienced by professionals in the software industry [5]. Thus, the teaching approach adopted in the Database Systems subject was based around the Project-Based Learning (PBL) method [6], [7]. The underlying concept of PBL is that students develop their knowledge by constructing artifacts within a real-world context that can be perceived and assessed by other individuals [8].

PBL is a teaching approach that employs projects as pedagogical tools [9], and a teacher's role within a PBL class is not that of a lecturer but that of a mentor or instructor [10]. The PBL focus is on developing social, cognitive, and metacognitive capabilities through real-world motivated artifact-building tasks [11], [12], and not only by immersing students in professional practice environments, as occurs in supervised internships. The possibility that the produced artifact will be perceived, well evaluated, and used by real people is one of the primary motivators for the special attention devoted to authenticity in constructionist teaching frameworks, such as PBL [13].

Considering that the artifacts built through PBL provide value to others or the external community beyond the classroom, students can develop software products with more ease and confidence. Thus, designing a database in a DS subject using PBL can offer students a hands-on experience and allow them to develop competitive products and acquire skills needed to perform their roles in the labor market as database designers or database managers.

B. Teaching Methodology Adopted in the Subject

The Database Systems program has a 60-hour workload, divided into 30 hours of theoretical teaching and 30 hours of practical teaching. The subject covers Database System Technologies; Database Management System; Database Projects; Entity-Relationship Model; Relational Model; Relational Algebra; Normalization; SQL Language; Transactions; and New Database Applications. The program includes both synchronous and asynchronous activities. These activities were chosen based on the teacher's experience in performing them in presential classes due to the urgent need to implement remote teaching in order to provide continuity to the teaching activities conducted before the Covid-19 pandemic. All classes were held synchronously using the Teams platform [1] and were complemented by the existing material provided for the presential lessons available on the Moodle platform [2]. The synchronous classes were recorded and made available on Teams for posterior student access.

During the first two semesters, we employed active methodologies such as project-based learning and flipped class. However, we did not abandon traditional teacher-centered teaching, which took place through instructing students directly or on-demand during synchronous classes. Half the classes were devoted to practical activities after introducing theoretical concepts related to the teacher's topics of the Database Systems curriculum. Thus, during the lecture classes, the students were given suggestions of practical exercises to be executed during and after the synchronous class. Several exercises were proposed, and their objective was to guide the practice on taught topics and provide material that would encourage student participation in later classes through discussion and presentation.

The students were graded within the subject through the presentation of an individual seminar and a group project. As Database Systems classes at the University of Brasília usually have between 45 and 50 students per semester, the students were divided into small groups; this distribution revolved around groups with 2 to 3 students. According to Ferreira and Canedo [14], dividing students into small groups increases their academic performance (grades) and the perception of their learning.

The teacher defined the lifecycle for conducting the hands-on project was defined by the teacher and presented it to the students on the first day of the remote class. The application planning for the PBL methodology occurred in 4 primary phases, which were:

1) Initiation: In this phase, the preliminary definitions and the students' initial project scope were presented. Thus, the teacher provided the specification of several different scenarios (mini-worlds) in order for the groups to choose themes in which to execute their practical projects. These scenarios were based on real requirements and contained various information to enable the students to execute the project. After the scenarios were uploaded to the subject's page on Teams and Moodle, the groups

[1] https://teams.microsoft.com

[2] https://aprender3.unb.br/login/index.php

were formed, containing a maximum of 3 students per group.
2) Elaboration: This phase included the definition of techniques, methods, and tools necessary to develop the Entity-Relationship Model (ER Model) and the Database. Students could choose which tool they would use to perform the modeling and which was the Database Management System (DBMS) from a set of tools presented by the professor. Additionally, in this stage, some adjustments were made to the project's business requirements. All projects had their scope adjusted in order to add the enhancements proposed during the validation meetings with the teacher. Scope changes could only occur until the end of this phase.
3) Construction: In this phase, the logical and deployment ER Model was built. Once the models were developed, the students created the database and handled the data management: inserting, modifying, querying, and deleting information. Towards the end of this phase, the students presented some specific functionalities requested by the teacher to verify that the development was according to the project's specified requirements.
4) Conclusion: At this point, the project's final report had to be completed and delivered to the teacher through the Moodle platform. In their final report, the students had to mention their most significant difficulties in the project's development. Towards the end of this phase, the students had to present their project to the whole class in an online meeting. Each group had 15 minutes to present their proposed solution.

The teacher simulated the role of a stakeholder in all practical project scenarios the students were involved in. Actual situations were simulated, such as changing requirements during ER Model design, scope changes, and technology changes. These were intended to develop students' problem-solving skills once they had to solve them during the project's execution phase (which is quite common in real projects).

Regarding the individual seminars, the professor provided a list of topics involving recent themes in the Database Systems area, such as Privacy in Database, Security in Database, Distributed Database Systems, Machine Learning in databases, Blockchain Architectures for Data Management, Database Techniques to support Data Mining, Social Data Processing, among others.

C. Related Work

Trinta et al. [15] presented an experience report in two courses: Distributed Systems and Software Development for the Cloud. The authors adopted active methodologies, problem-based learning, and flipped classrooms in some of their classes, and the students were evaluated by seminars, tests, and programming activities. The authors conducted a survey with 42 undergraduate and graduate students to identify their perception of the professors' methodology in these courses. Some students stated that they had difficulties performing the programming exercises, and their main obstacles were the psychological context and the need to conciliate the subjects' activities with domestic chores and with the demands of working at home due to the Covid-19 pandemic.

William and Elmore [16] reported on their experience teaching business analytics in an undergraduate program during the Covid-19 pandemic. The authors focused on two challenges that arose during the transition to remote emergency teaching: engaging students and teaching them to use the software adopted for the remote classes. The authors concluded that teachers must make pedagogical changes to overcome the obstacles encountered during this period.

Daumiller et al. [17] conducted a longitudinal study to understand how university professors experienced and reacted to the shift from face-to-face to online teaching and learning during the Covid-19 pandemic. The authors examined the teaching behaviors of 80 faculty members and their correlation with motivations for online teaching and burnout/engagement and student learning during the first semester with enforced online teaching. The authors also conducted 703 student evaluations regarding the quality of the 80 teachers' teaching. The results indicated that the students considered the learning approach taken by the teachers to be successful. However, many students stated an increased dropout rate due to the switch to online teaching, as there was an increase in the level of burnout, worsening the students' assessment.

Iglesías-Pradas et al. [18] analyzed the migration to remote emergency teaching in the School of Telecommunication Engineering at the Universidad Politécnica de Madrid due to Covid-19, and the impact of organizational aspects related to this unexpected move concerning class size, synchronous or asynchronous teaching mode, use of digital technologies, and students' academic performance. The authors concluded that there was an increase in student academic performance using online teaching and state that organizational factors may have contributed to the successful implementation of emergency online teaching. The authors did not identify differences between courses with different class sizes, synchronous and asynchronous classes.

Marques et al. [19] presented an experience report on a subject that addresses the concepts of usability and user experience (UX) in the Emergency Remote Education (ERE) system. The authors discussed the methodology adopted and investigated the students' perception of the course experience. The authors concluded that, even in a remote context, the students considered performing the practical work on usability and UX evaluation in software systems as the factor contributing the most to their learning. The students mentioned as the main challenge faced in performing the practical work in the subject, the recruitment of people to participate in the evaluations, due to the social isolation caused by Covid-19.

There are several other papers available in the literature that investigate the transition from face-to-face teaching to online teaching during Covid-19 [20]–[26].

III. Study Settings

Figure 1 illustrates the study's methodological steps. After elaborating the questionnaire distributed among the Database Systems (DS) students, we validated and applied the data collection instrument with other professors who teach DS in the undergraduate Computer Science and Engineering courses at the University of Brasília. In summary, we have five undergraduate programs that offer the DS course in their curricula.

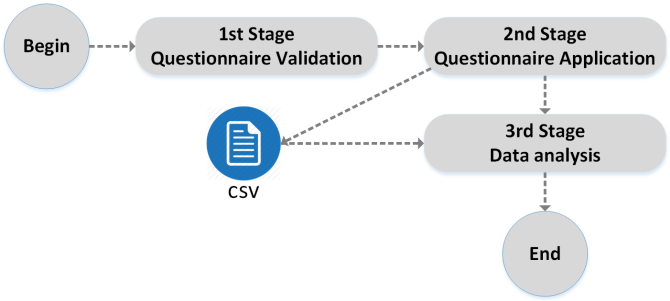

Fig. 1. Research Stages

A. Questionnaire Validation

The questionnaire consisted of fifteen questions, organized in four sections: (i) a section with data collection questions of demographic nature: gender and age; (ii) a section with queries about the home environment and the devices students possess to attend their remote classes; (iii) a section with questions related to Covid-19; (iv) a section with questions related to discipline motivation, performance, and perceptions. After the questionnaire was developed, the document was available for evaluation by the other DS professors. The teachers had access to the instrument and answered another survey, evaluating criteria related to (i) organization; (ii) objectivity; (iii) ease of reading and understanding the questions; and (iv) the time needed to answer the questionnaire.

B. Questionnaire Application

The questionnaire invitation was sent in the DS discipline environment in the Teams platform during the 2020 first and second semesters. The questionnaire was available for a period of 5 days, extended for another 5 days (in each semester). The average time spent to answer the questionnaire was 10 minutes.

IV. Results

We conducted a survey with the Database Systems undergraduate students of the Computer Science and Engineering programs at the University of Brasília to investigate their perception towards the teaching methodology adopted in the discipline. We also inquired about how the students are feeling during the remote class period. Among the 100 subject students (50 per semester), 81 students completed the survey conducted during the discipline.

Of the 81 students, 81.5% are male (66 students) and 18.5% (15 students) are female. 66.7% are between 20 and 22 years old, 17.3% are between 23 and 25 years old, while 7.4% are under 19 years old. Regarding which device the student used to attend the Database Systems classes, 40.7% of the students used their cell phones and notebooks, 30.9% used only their notebooks, 19.8% used a desktop computer, and 8.6% said they used only their cell phones to watch the lectures, as shown in Figure 2.

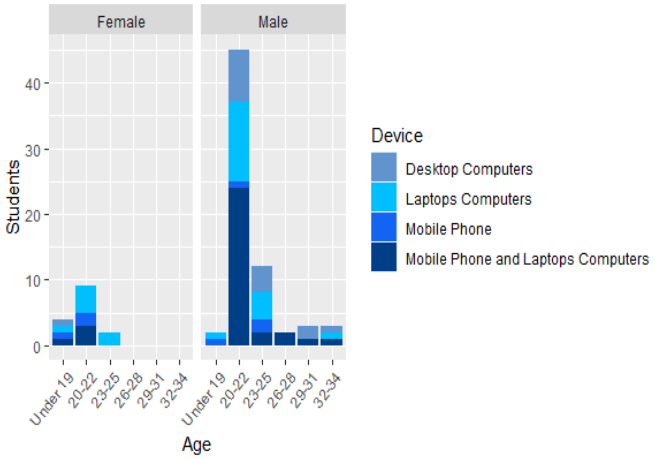

Fig. 2. Students Profiling

90.2% of the students in the course stated that they had not been diagnosed with Covid-19, while 9.8% claimed that they had. Regarding whether their relatives have been diagnosed with Covid-19, 56.1% reported they had not, and 43.9% stated that their family members were diagnosed with Covid-19 during this period. In addition, 70.7% of participants stated that some friend or colleague of theirs was diagnosed with Covid-19, and 29.3% had no colleague or friend diagnosed with Covid-19, as presented in Figure 1.

57 students reported not living with children under 12 years old, and 50 students stated that they live with more than four people at home.

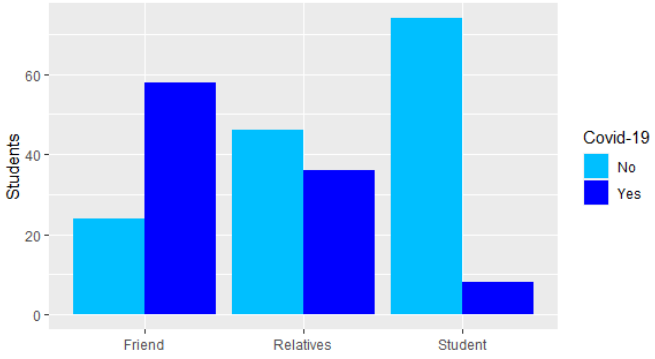

Fig. 3. Students, relatives and friends diagnosed with Covid-19

We requested the students to assess according to the Likert scale [27] (Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree and Strongly Agree) their study, orientation, and teaching conditions in the Database Systems subject during the last two semesters. 80% of the students stated that they have a suitable study environment at home, and 13% stated that they do not have a suitable environment at home to follow the subject activities, as presented in Figure 4 (Q01).

62% of the students had a quiet and undisturbed study environment, while 30% said they did not and 7% did not know, i.e., they did not have a stable enough environment to access as quiet and undisturbed or not (Figure 4 (Q02)). 85% of the students stated that the lighting in their study environment was adequate (Figure 4 (Q03)). 89% of the students stated that the study devices they have at home, such as computers, quality of Internet access, and printer, meet their needs for performing the subject activities (Figure 4 (Q04)).

63% of the students need to support their family members in domestic activities, such as washing the dishes, cleaning the house, and helping to take care of their siblings during the subject lessons (Figure 4 (Q05)). Only 9% of the students need to divide their study time between domestic activities and their children (Figure 4 (Q06)).

65% of students felt comfortable doing their study activities at home, and 21% said they were uncomfortable with remote learning, as per Figure 4 (Q07). 48% of the participants reported that they were able to fulfill the same workload as they did in person to attend subjects at home, and 45% reported that they were not (Figure 4 (Q08)).

Only 11% of the DS students shared electronic equipment (desktop computers, laptop computers, and mobile phones) with other people living with them to perform their studies and activities. This kind of equipment sharing made it difficult for them to keep up with the subject activities. However, 83% of the students did not have to share devices with other family members (Figure 4 (Q09)).

Regarding the communication mechanisms adopted in the subject, such as WhatsApp, e-mail, social networks, and the question/answer board in the teaching platforms (Teams and Moodle) used for interacting with classmates and the teacher, 51% of the students stated that they were adequate, while 38% said they were not. Only 11% of the students neither agreed nor disagreed (Figure 4 (Q10)).

24% of the students reported that they often had online work meetings simultaneously as their class, which increased the difficulty in following the class lectures. 61% did not have this problem (Figure 4 (Q11)). The subject activity schedule was executed as usual in the face-to-face activities by 55% of the students, while 39% of them could not perform the remote teaching activities in the same way as in the presential teaching (Figure 4 (Q12)).

According to 38% of the students, the number of demands in their course subjects remained the same compared to those performed in person. For 54%, the number of activities in remote teaching is not equal to those in face-to-face teaching, as presented in Figure 4 (Q13).

76% of students claimed that their contact with their fellow undergraduate students in the subjects they are attending during this social isolation period was impaired and 20% considered that it was not affected due to the Covid-19 pandemic (Figure 4 (Q14)). 39% reported that they experienced difficulty in fulfilling the necessary workload to carry out the subject activities. However, 50% of the students reported that they had no difficulty with the required workload (Figure 4 (Q15)).

Only 26% of the students had frequent communication with other DS students, and 62% said they did not (Figure 4 (Q16)). 38% of the students stated that they had frequent interaction with the teacher, and 41% stated that they did not (Figure 4 (Q17)). 30% of the students made extensive use of the Teams platform and Moodle communication channels to discuss their questions and receive the necessary feedback from both the teacher and the subject tutor.

52% of the students did not use the communication channels provided for the subject's remote teaching (Figure 4 (Q18)). 55% of the students in the class have struggled to study due to the overload of activities, both academic and non-academic, that social isolation has brought them. Only 38% did not experience any activities accumulation during the pandemic (Figure 4 (Q19)).

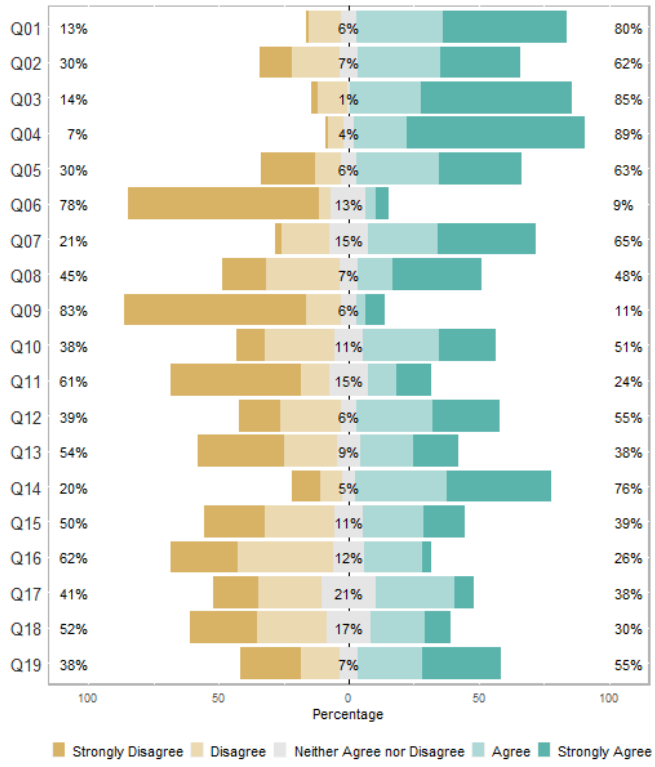

Fig. 4. Students' perceptions regarding study, communication and teaching conditions

Regarding the students' functional, physical, and health conditions during the subject, only 9% of the students stated that they had some physical/functional restriction that affected their performance in the subject activities, while 88% stated

that they did not have any restrictions (Figure 5 (Q20)). 37% of the students had experienced psychological restrictions that hindered their performance in the subject activities, while 51% reported that they did not (Figure 5 (Q21)).

78% had a suitable environment to study and watch the lectures (Figure 5 (Q22)), and 80% had a suitable environment to do the practical exercises and assignments (Figure 5 (Q23)). 73% of the students had time available to conduct the activities within the classes duration (Figure 5 (Q24)), and 59% stated that they only had time to do the activities outside of class (Figure 5 (Q25)).

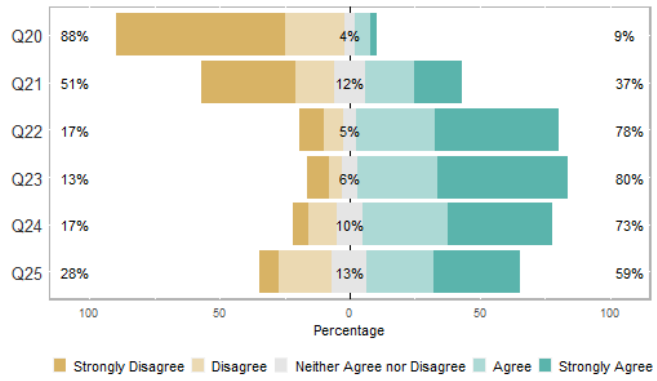

Fig. 5. Students' perception regarding their functional, physical, and health conditions

Regarding the subjects attended until the second half of 2019 being challenging, in terms of learning and approval, 72% of students strongly agree and agree, 15% neither agree nor disagree, 13% disagree and strongly disagree that the subjects taken before Covid-19 were difficult, as presented in Figure 6 (Q26).

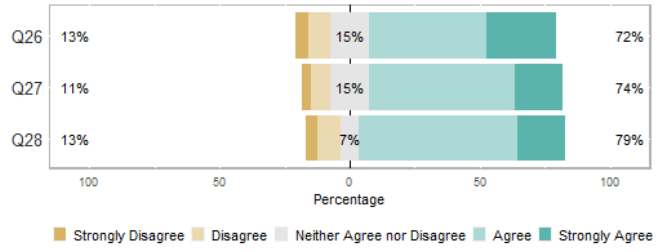

Fig. 6. Students' perception towards courses attended before and during the Covid-19 pandemic

74% of students strongly agree and agree that the conduction of the Database Systems subject in the social isolation period using the Teams platform and the Moodle environment was adequate for teaching and learning the subject. 15% neither agree nor disagree, and 11% disagree and strongly disagree, as presented in Figure 6 (Q27). This result enables us to infer that the teaching methodology adopted in the subject was satisfactory for most students.

We further questioned the students about whether they felt motivated in the Database System subject. 79% of the students answered that they felt motivated throughout the subject. 7% neither agree nor disagree, while 13% of the students stated that they did not feel motivated (Figure 6 (Q28). Based on this finding, we can conclude that using Project-Based Learning and Flipped Class active methodologies for conducting the DS subject motivated more than 78% of the students, despite the difficult period in which students had to complete their assignments.

We requested students to assess their performance in the DS subject on a scale from 0 to 10, in which ten means maximum performance. 70.7% of the participants rated their performance between 7 and 10. 20.7% rated it within 5 and 6, and only 8.6% rated it below 5, as presented in Figure 7. This outcome enables us to assume that more than 90 percent of the students in the class considered their performance to be satisfactory and expected to succeed in the subject since the university's passing grade is 5.0.

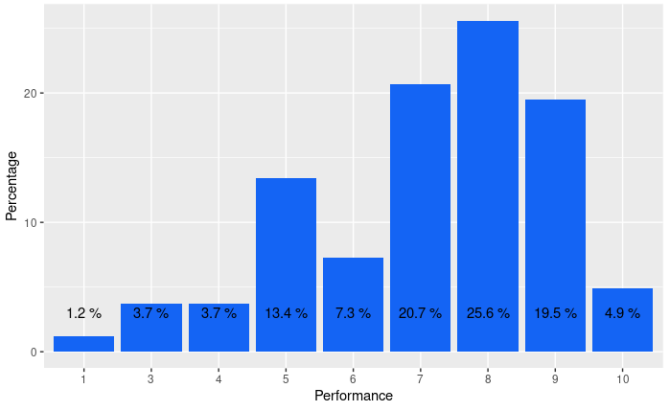

Fig. 7. Students' perception towards their performance in the DS subject

Concerning the teacher's performance during the remote classes, the following items were considered: teaching methodology adopted, communication with students, didactic material made available to support the classes, exercises proposed after the end of each content, feedback and correction of the proposed exercises, flexibility in changing the delivery dates for the proposed activities, and transparency regarding the subject's schedule.

91.4% of the students rated the teacher's overall performance above 6. This observation indicates that the PBL methodology adopted to encourage student learning and the mechanisms defined for communication with both students and between students and teacher were regarded as adequate by the students. Thus, we can consider that we were successful in the decisions we made. Perhaps we obtained this result because the practical project involved more broad and complex tasks than a single practical modeling exercise or a single exam at the end of the semester to assess the students' knowledge. This traditional assessment method might have had a more positive impact on the students' evaluation. Another possibility is that the practical project, being worth 70 percent of the subject grade, led the students to dedicate themselves more, bringing

more benefits to their learning.

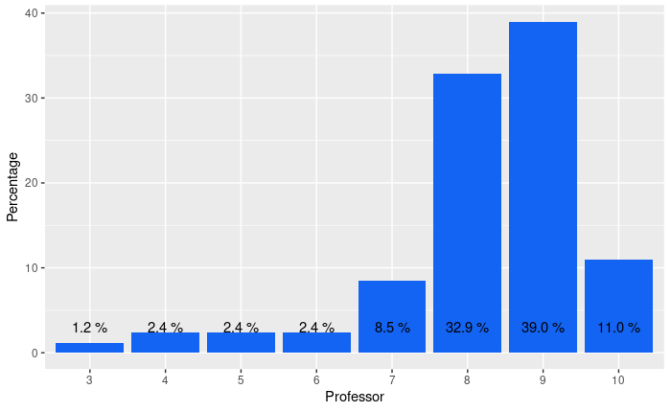

Fig. 8. Students' perspective on the teacher's performance

It is worth noting these findings are currently being used in the ongoing subject improvement, which will continue remotely until December 2021.

A. Student-Reported Challenges

In their final report on the hands-on project, the students mentioned the main challenges they encountered in developing the project remotely, as the groups needed to meet online outside of class to make decisions and divide the tasks to be carried out, along with understanding and discussing together the project scenario context. It is worth noting these findings are currently being used in the ongoing subject improvement, which will continue remotely until December 2021.

Some groups experienced difficulties due to some colleagues' commitment. For instance, in some groups, a certain team member did not do his assignment on time or missed the remote meetings because of other appointments. The majority of the students also reported problems related to setting up the computer resources needed to implement the project. Some of the reports were:

> " *Since the execution of the project was done remotely by each participant, my group mate took too long to answer my messages and did not deliver the activities that were allocated for him to do in the scheduled time. I ended up performing most of the tasks that were his responsibility.* "

> " *My group mate missed most of the meetings scheduled to implement the practical project. He always claimed that he had a work meeting at the same time or that he had some other domestic activity to do at the time that we had scheduled to do the project.* "

> " *I had problems with the installation and configuration of the modeling tool on my computer. The database installation was also not a trivial activity. I think that if the classes were face-to-face this problem would have been minimized, because I could have the support of the teacher and the monitor during the face-to-face class time to install the tool, or even I could have used only the lab's computer, which already has the tools installed.* "

> " *Although I have a computer with a good setup, I had problems installing the database with ease. I had to resort to Internet question forums to get assistance in the installation and configuration processes.* "

> " *I think that a practical subject like this should not have been offered during the remote teaching period. I think that the lab practice with the teacher is important for learning the DS subject. Although I did the whole project and understood how it works, I think I could have learned better if the course had been in person.* "

Only two students reported difficulties related to the usability of the tools selected to conduct the data modeling, and none of them is related to the context of social isolation and the performance of activities remotely. This is understandable, given that familiarity with the chosen tool involves a significant amount of individual work. The student could choose the tool he/she wanted to use in the subject to implement the exercises and the practical project.

Regarding the difficulties reported about the tools installation and the issues with student commitment during the activities, we believe that these may also occur in presential classes, since some students may not have the same accountability as the other students in the group, concerning the schedule and the execution of the tasks assigned to them. Even in a subject offered in person, it is difficult to help 50 students to install a support tool on their personal computer. Of course, it is easier when everyone uses the lab computers because, at the beginning of each academic semester, the software and tools required for each subject are installed by the institution's Information Technology personnel in charge of the labs' operation.

V. Threats To Validity

The outcomes presented in this paper concern an experience report on remote teaching within the Database Systems subject during two school semesters. Therefore, a more comprehensive investigation of the strategies and findings reported in this research is necessary to generalize these results.

Remote teaching implementation as a replacement for presential teaching can be considered a threat, along with the students', teachers', and tutors' adaptation to this teaching approach. Although all the participants involved in this process are from the Computer Science or Engineering areas, adapting to the remote context involves more than adequately using the existing technologies, as it involves sentimental and familiar issues. Besides, it is necessary to adapt the didactic

material, teach it, and adapt the techniques, exercises, and evaluation tests. However, this report provides indications of a methodology that can be applied to teach Database Systems remotely, considering the perception and learning of the students featured in this work.

Another important aspect is that the survey used to obtain feedback from the participants was designed specifically for this research. This can be a threat in the sense that no previously validated methodology evaluation technique was used. However, to lessen the risks of the survey, it was submitted to other professors of the Database Systems subject at the university for review, all of whom have experience in face-to-face teaching the subject.

VI. Conclusion

This paper presents an experience report on remote teaching in Database Systems in a Computer Science program. In this experience, a methodology based on synchronous meetings and Project-Based Learning was adopted. The synchronous meetings were primarily based on expository lectures with theoretical content, discussion, correction of practical exercises, presentation of individual seminars, and practical projects developed by groups of 2 to 3 students.

According to the students' perception, the practical project implementation was one of the methodology elements that contributed the most to their learning about database systems, despite some students reporting issues regarding the software and tools necessary for the project setup.

As a future project, we intend to repeat the teaching methodology described in this article in the following semesters of remote teaching in order to obtain the perspective of other students about the methodology adopted. Also, it is planned to implement the improvements identified by this research, such as the introduction of more practical exercises and asynchronous classes.

Another improvement would be to investigate the methodology's suitability by means other than the survey. For example, from individual interviews or focus groups, it may be possible to deepen the comprehension concerning the difficulties and problems faced by students in the context of remote teaching in Database Systems teaching. This will allow the perception of different students to be obtained in a more in-depth approach, helping to reinforce the findings and contributing to a further discussion about the positive and negative aspects of the teaching strategy adopted in the remote context. It will also allow adjustments to the proposed methodology in accordance with the experience gained from the current situation. Additionally, another possibility is to investigate unexplored aspects of the discussed teaching methodology, including graded exams, and replace the project presentations or seminars in synchronous meetings with video recordings by student groups. The videos can be watched and commented on by the other students asynchronously.

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