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Lessons from Experience: Student Satisfaction About Remote Modality Adaptation of a Chemistry Course

Patricia Morales Bueno[1], Rosario Santos Rodas[2]

Pontificia Universidad Católica del Perú PUCP, Perú[1]
Pontificia Universidad Católica del Perú PUCP, Perú[2]

Abstract

Teaching science has always been a great challenge for teachers since frequently they must face with an attitude of little interest and involvement of students. On the other hand, the different frameworks proposed for desirable skills and competencies in 21st century education pose even higher challenges as they include, among others, communication skills, collaboration, information and research skills, digital literacy, as well as critical thinking, metacognition, and autonomous learning. The scenario became even more complex due to the health emergency, which forced most educational systems to adapt to the non-face-to-face or remote modality. In this adaptation process, several critical aspects related to the students, their environment, accessibility to the Internet, their skills for autonomous work, etc. can be identified. As for the teachers, an important critical factor is related to their abilities to use digital tools for teaching, in addition to their experience in developing a mediating role for learning through the design of pedagogical strategies in the environment of ICT. Institutions are also part of the process through the support they can provide in terms of resources, training, monitoring and evaluation of the educational process. After the initial experience, it is necessary to think about the transition to new teaching models that include the most positive aspects for the achievement of quality learning in students. In this sense, this work reports the result of the satisfaction monitoring of first-year Science and Engineering students at a Peruvian university during 2020 and 2021, in the context of a General Chemistry course adapted to the remote modality. A survey was applied that considers the following dimensions: course design, course components, attitudes and abilities of teachers and students. The results show that students significantly value several components that are related to those that promote autonomous learning, although they maintain some more traditional perceptions in relation to teaching.

Keywords: *Student satisfaction, remote teaching, science education*

1. Introduction

For a long time, the need to incorporate changes in pedagogical models of the different educational levels has been discussed. A variety of strategies and techniques have been proposed that have in common the involvement of the student in his own learning process, in which he assumes an active role in developing the skills required in the current social and work context. Undoubtedly, the health emergency brought institutions, teachers, and students to a breaking point, where these changes must inevitably occur to continue with the educational process in this new context.

The proposals that have arisen to face this situation frequently raise the definition of central and significant learning objectives, as well as the design of strategies that allow reaching these objectives and that use a diversity of technological media. For this, teachers have faced the challenge of adapting to the role of managers and facilitators with the task of building the most appropriate learning context for their students and monitoring each one of them to verify that everyone participates in the process and reaches the intended objectives [1].

The use of ICT ceases to be an option as a resource for the development of the educational process and thus becomes a priority need. Digital literacy has already been included in the different skills and competencies frameworks for 21st century education, along with communication, collaboration, information, and research skills, as well as critical thinking, metacognition, and autonomous learning [2]. However, the level of ICT adoption has been very heterogeneous since it depends on several contextual factors that include the type of involvement of institution, teachers, and students. A critical aspect in this process is recognizing that it is not about continuing to work in the same way using technology, but rather about redesigning pedagogy incorporating technology as a resource [3], [4].

It could be pointed out that the challenge is greater in the case of science education since it is a field where the traditional modality of teaching has prevailed to a greater degree. The negative attitudes and rejection of students towards the study of science have been extensively studied. In the case of

Ibero-American youth, it has been reported that the causes of this rejection are related to the perception of difficulty and little use of motivating resources by teachers [5].
It is necessary to identify the positive aspects of this transition experience towards new modes of teaching, to make the necessary adjustments that allow the elaboration of proposals that contribute to improving the quality of student learning and their level of motivation and involvement. In this line, this work reports the results of a satisfaction monitoring carried out with first-year science and engineering students from a Peruvian university, during the years 2020 and 2021, in General Chemistry courses adapted to the remote modality.

2. Methodology

2.1 Participants

The participants in this study were first-year science and engineering students from a Peruvian university. They were enrolled in two General Chemistry courses: Course 1 (first semester) and Course 2 (second semester), in 2020 and 2021. Table 1 shows the demographic data of the students.

Table 1. Participant demographics

Group	Age	Gender	
		Male (%)	Female (%)
Course 1 2020 (N = 49)	16 - 20	71,43	28,57
Course 1 2021 (N = 52)	16 - 20	67,30	32,70
Course 2 2020 (N = 35)	17 - 20	68,57	31,43
Course 2 2021 (N = 28)	17 - 20	57,14	42,86

2.2 Context of the study

The university where the study was conducted has an institutional platform Moodle to develop courses in virtual mode. Teachers and students received basic training in the use of this platform.
The teacher in charge of the participating groups had experience in implementing active student-centered strategies in science courses. The institution provided a certain degree of freedom for the design of teaching strategies; however, the evaluation system was common to all groups.
Students were organized into work groups for the semester. Their performance was permanently monitored by the professor and teaching assistants through using forums and email.
Figure 1 shows a scheme of the planning followed in the remote mode of both courses.

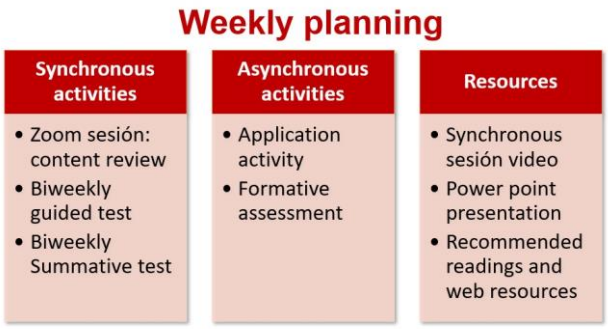

Figure 1. Weekly planning applied in the courses

2.3 Instrument

A survey was developed for the purposes of this study. The first section collects demographic information about the participants. Then 35 items grouped into four dimensions are presented: course design, course components, teacher and student attitudes and skills.

To answer these items, a scale ranging from (1) strongly disagree, (2) disagree, (3) partially agree, (4) strongly agree should be used.

The survey was available on the institutional platform during the last two weeks of the semester. The students responded voluntarily and anonymously.

3. Results

The results obtained in the Course Design dimension are shown in Figure 2 for each of the courses.

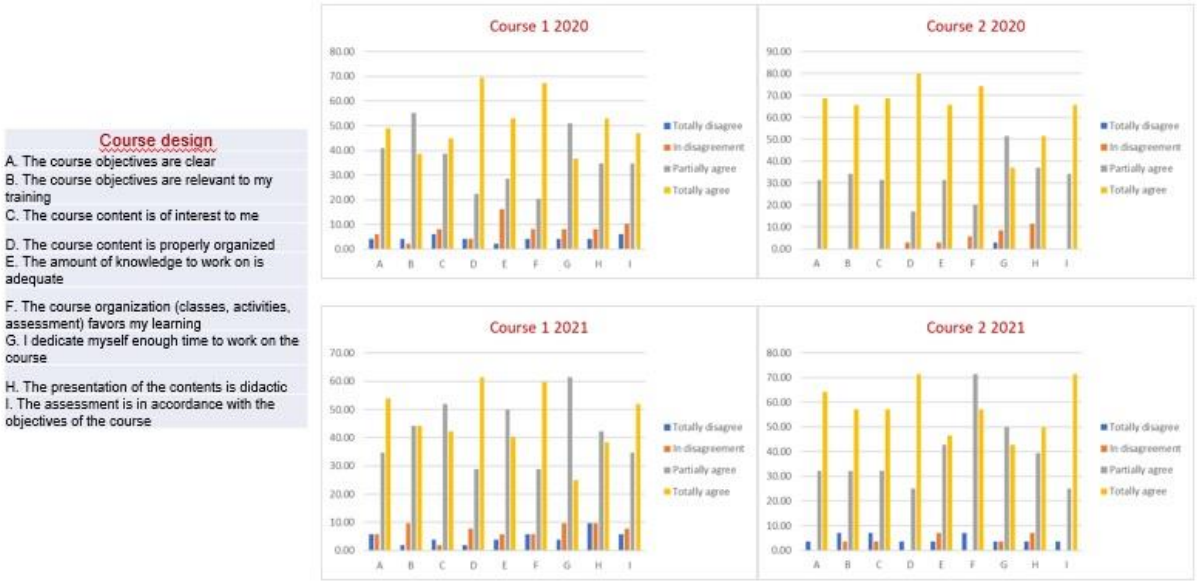

Figure 2. Results in Course Design dimension

In course 1 it is observed that the students value the organization of the course and recognize that it favors their learning. In course 2, these aspects of design are also valued, and, in addition, they highlight their interest in the content of the course and recognize that the objectives are relevant to their training. Figure 3 shows the results for the Course Components dimension.

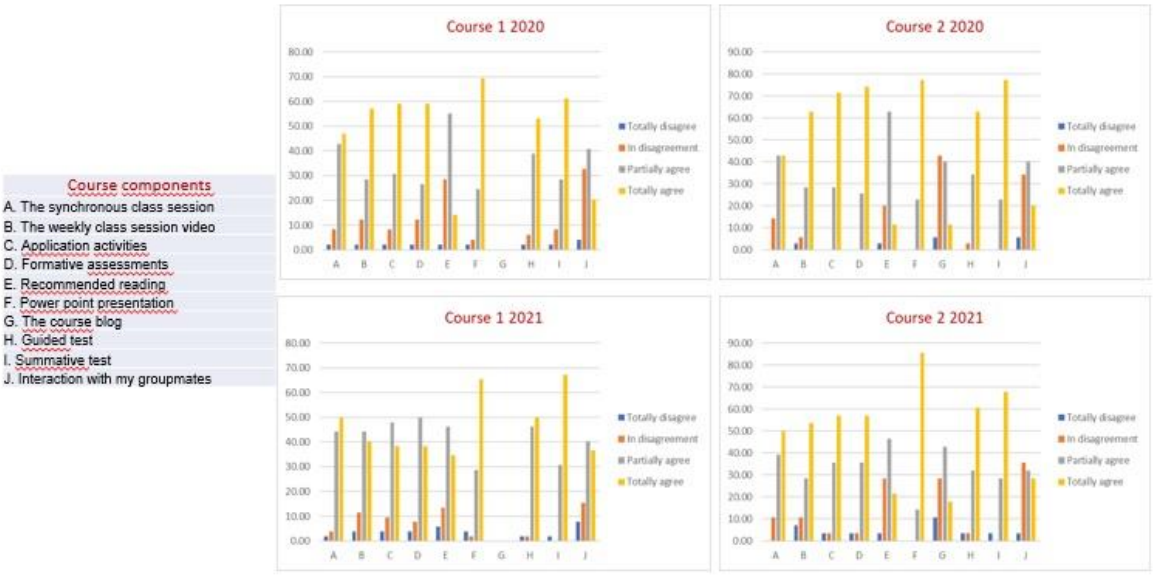

Figure 3. Results in Course Components dimension

The students of both courses consider power point presentations and summative tests very important for their learning process. In the case of course 2, they also recognize the importance of application activities and formative evaluations.
Figure 4 shows the results for the Attitudes and skills of the teacher dimension.

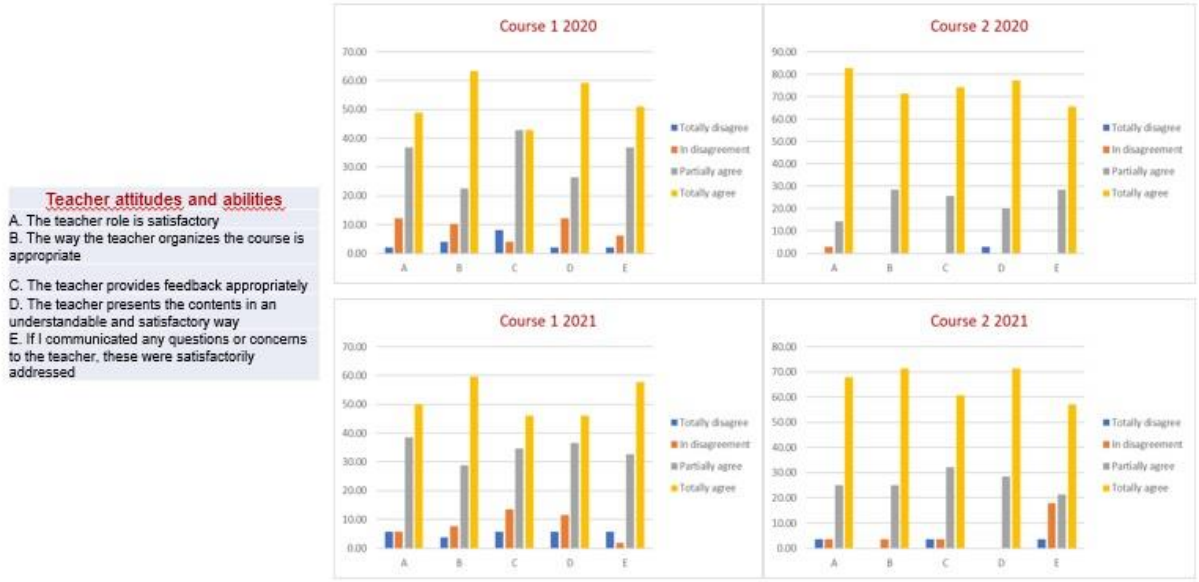

Figure 4. Results in Teacher attitudes and abilities dimension

The students of course 1 value the way the teacher organizes the course and how the content is presented. They also recognize that their feedback is satisfactory. In course 2 they value these same aspects but with greater relevance in content presentation.
Figure 5 shows the results for the student attitudes and skills dimension.

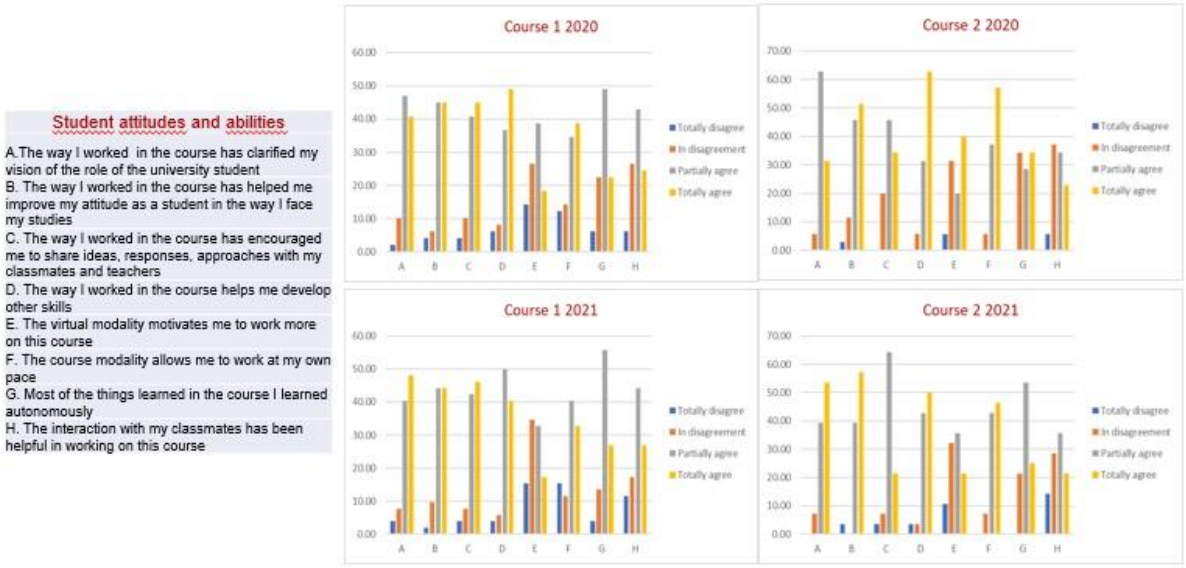

Figure 5. Results in Student attitudes and abilities dimension

Course 1 students recognize that the way they work in the course helps them develop other skills and improve their attitude to face their studies. In addition, they value the interaction with their peers and their teachers. Course 2 students value, in addition to the aspects mentioned, the possibility of working at their own pace.

4. Conclusions

As mentioned above, the incorporation of the use of ICT in pedagogical practice requires the redesign of strategies to promote better student learning. When they can identify the aspects that they consider most relevant to their learning processes, they are able to manage the components and resources of the provided strategy more effectively. In this way, they improve their skills for autonomous learning. As seen in the results, students with a little more maturity can recognize the relationship between the objectives of the course and their training and, consequently, their interest in the contents studied increases. In this study, the dimension of connectivity has not been considered because, in general, it was not a critical factor for the development of the courses.

Although students recognize the relevance of asynchronous work and its influence on the development of other skills, there is still a tendency to give much importance to the teacher's class and power point presentations. This is an aspect that can be worked on gradually to find a better balance in the opportunities and resources considered in the pedagogical design.

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