Improving an Online and Self-instruction Course: Students Expectancy and Auto-regulation

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Abstract

"Advance Education," a continuing studies program at a private university in Chile, caters to working adults aiming to complete or commence an undergraduate degree. This paper presents a detailed examination of an online physics laboratory course within this program, focusing on enhancing course adaptations, evaluating changes in student perceptions and expectations, and assessing students' self-regulatory abilities in the online learning context. Utilizing a pre-post survey design, the study involves 130 students, with data gathered through an adapted Pedagogical Expectancy Violation Assessment and a self-regulation scale administered at the start and conclusion of the course. Results reveal a significant disparity between student expectations and the demands of self-instructional distance learning, highlighting general unpreparedness for and resistance to the self-directed learning format. These insights underscore the need for improved course design that facilitates the development of self-regulatory skills and suggest implementing a pre-course orientation focused on strategies for self-regulated learning. Additionally, the study advocates for enhanced training for instructors in online facilitation techniques to support student learning and engagement better. The findings emphasize the critical role of tailored educational interventions in fostering effective self-directed learning environments in higher education.

Keywords: STEM education, physics education, online learning, self-regulation, student expectations, educational innovation, higher education.

Introduction

The "Advance Education" program offered by a private university in Chile aims to provide an academic pathway for working individuals seeking to pursue a second degree or complete an undergraduate degree. The program primarily features online courses, supplemented by optional synchronous weekly sessions to address student queries. However, the transition to online education, particularly for working individuals, presents challenges related to self-regulation and adaptability [1].

The COVID-19 pandemic has significantly impacted online learning, leading to a shift from traditional face-to-face teaching to emergency remote teaching. This transition has underscored the importance of a thoughtful design and development process in online education to ensure effectiveness [1]. The pandemic has also prompted a rapid shift to online teaching in higher education institutions, emphasizing the need for innovative approaches to maintain the quality of education [2].

Online education has been recognized as a valuable platform for providing educational services, including specialized training and adult retraining programs. Online platforms have particularly benefited individuals with collective learning skills and a predisposition towards online learning [3]. However, the success of online education for working individuals hinges on their ability to

develop self-regulation and adapt to the virtual learning environment [1]. The challenges of online education extend to the scope of assessment, with educators facing difficulties in deterring plagiarism, ensuring student engagement, and reorienting assessment strategies to suit the online format [4]. Moreover, the shift to online learning has raised concerns about student engagement, with many educators finding it intimidating to engage students effectively in the virtual environment [5].

The objective of this study is to present the changes we have made to an online physics course for working students and, observe the shift in students' perception and assess whether their expectations are met regarding an online course, as well as to gauge their understanding of their responsibilities when taking a course online. At the end, a set of recommendations will be presented.

Context

The course is delivered online as part of a continuing education program. The instructional period spans 12 weeks (on a trimester basis), during which students must complete a series of experimental activities. The course is designed in a self-instructional format, with a weekly session dedicated to consultations and problem-solving.

This action research aims to elucidate the impact of the changes made to the course over time, which will be detailed subsequently. Originally created as a fully online course in 2021, it comprised seven experimental activities (four individual and three group-based, each requiring students to submit a report), study materials, and exercise guides. Additionally, there were two individual assessments and a final exam, from which students could be exempted based on their performance. Three key roles exist within the Canvas platform: instructor, tutor, and student. To delineate these roles and the course format, optional courses explain each participant's responsibilities. Furthermore, at the commencement of each offering, a series of announcements are made detailing each role.

During the initial offerings of the course, significant resistance was encountered from students, manifesting in complaints regarding the review process for reports, the quality of study materials, and the number of available exercises. The most common complaint was the perceived lack of support from course instructors, as the original design stipulated that instructors should address queries and assist students as guides and facilitators during synchronous sessions.

Throughout subsequent course iterations, sufficient information was gathered to warrant an intervention (redesign) to address the issues raised. The redesign involved updating the workload assigned to students and altering the assessment format: the number of experimental activities remained the same but shifted entirely to a group-based format, individual assessments were removed, and the final exam became mandatory for all students, administered upon course completion.

Students must form online workgroups using the “Teams” platform, which is provided by the institution of higher education and does not mean an additional cost for the students.

The activities are separated by units: Unit I; measurement and physical laws (measurement and error detection) Unit II: Mathematical tools and physics problems (construction of graphs and their interpretation) Unit III: Mathematical models in physics (obtaining functional relationships between variables and interpretation and construction of the physical model of the contents).

Within this context, it is important to highlight certain characteristics of the course that must be considered: the instructional design of the course, as indicated by a theory of distance learning [6], delineates the minimum components of this learning model, defines the educator's role, identifies learning needs, and places the focus on the student. In this same vein of teaching, emphasis should be placed on the students' perception of the program, the content delivered by the course, their self-management, and their commitment to their own learning. This aligns with addressing the differences among adult students and those in an online program [7].

It is imperative to provide didactic responses tailored to the challenges universities face in developing creative and flexible educational strategies and adopting a new paradigm that accommodates this new profile of students [8]. Another factor to consider is the platform on which the course is hosted (Canvas) and the study materials constructed and housed within this space. These factors can also influence students' perception of the course, as indicated by Wyatt's theory [8].

Methodology

This is a qualitative and action research study. To obtain the results of the interventions in the course, an instrument with 29 Likert-style items was used that consists of two scales: one is an adapted version of the Pedagogical Expectancy Violation Assessment [9, 10], and the second is a scale to measure self-regulation [11]. During the survey, the student responded regarding the frequency of what the statement proposed. The instrument was administered at the beginning and end of the course in two instances to observe if there was a change in the student's perception and thus evaluate any change between the beginning and end of the course.

The study population consists of 130 students from a private university in Chile enrolled in the course during the third trimester of 2024. Of the total student population, 51 responded to the survey in the first instance, and 32 responded in the second, representing 39% and 25%, respectively.

Results

We have divided results from the Likert-type statements and the open-ended-question that we posted along the survey. The survey was divided into categories, and the data will be divided into those categories.

Self-regulation

Figure 1 shows the students’ answers to the item survey that belonged to the self-regulation category. Those items had statements ranging from how students act in academic activities in which they showed individual motivation.

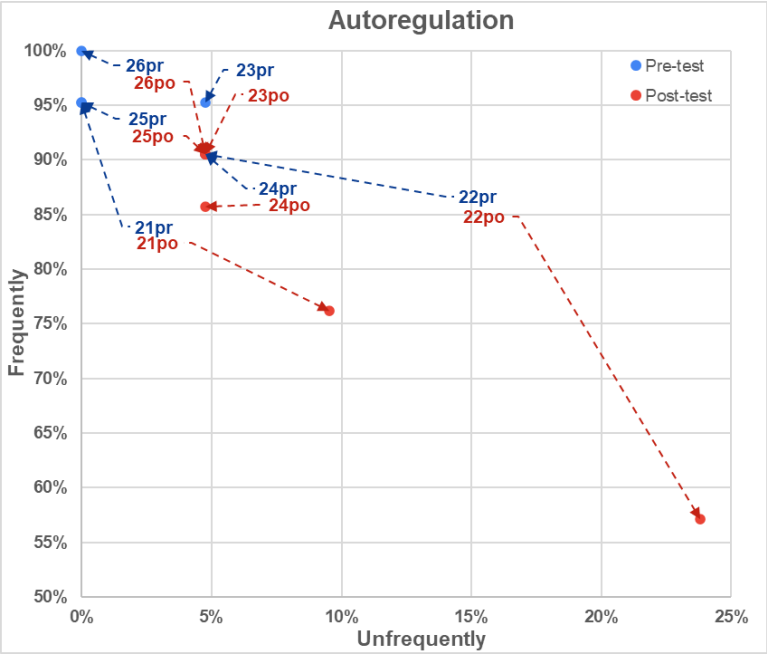

Figure 1. *Results from students' answers to items in the self-regulation category.*

All items showed an unwanted change. Two items decreased in frequency and increased in infrequency in a very significant way. These items were item 21: "I ask myself questions to make sure I know the material I have been studying" and item 22: "I do additional or review exercises, even if it is not my obligation." These items are particularly important because they reflect proactive study behaviors and self-regulated learning strategies, both of which are typically associated with academic success. The fact that there was a significant decrease in the frequency of these behaviors could suggest a decline in students' engagement or motivation toward their studies or, in particular, toward the course.

Although the rest of the items decreased in frequency, these differences were not as significant. These items were item 23: "Even when the study materials are boring and uninteresting, I keep working until I finish," item 24: "Before I start studying, I think about what I need to do to learn," item 25: "When I read, I stop from time to time to review what I have already read," and item 26: "I believe that I can achieve something significant as a professional." These items cover various aspects of study habits, motivation, and self-efficacy. A decreased frequency in these areas could indicate a lack of persistence, strategic planning, or confidence among the students.

The results suggest a decline in proactive study behaviors, self-regulated learning strategies, and overall student motivation. Further investigation of the underlying reasons for these changes and consideration of interventions to support students in improving their study habits and motivation levels would be essential.

Active learning

Figure 2 presents the results of those items categorized as "Active learning," which covers activities in which students participate in their own learning.

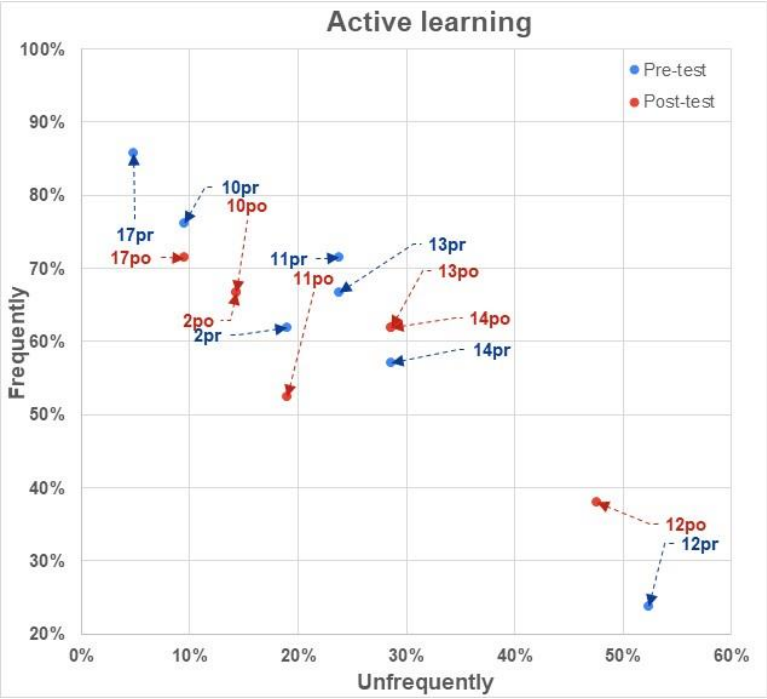

Figure 2*. The results of those items are in the Active Learning category.*

Results in this category were mixed. On the one hand, some items showed positive changes. This included item 2: "Collaborative group discussion," item 12: "Present my work to everyone during class," and item 14: "Discuss my work with my teacher during class." These items indicate an increase in the frequency of engagement in collaborative activities, such as group discussions and presenting work to peers and teachers. This positive change suggests that students may participate more actively in classroom interactions, share their ideas, and work with others.

On the other hand, the rest of the items had a negative change. That is, they decreased in their responses about the frequency of the item. The items included item 10: "Interact with my teacher in synchronous sessions," item 11: "Interact with my classmates in each group activity," item 13: "Discuss my work with classmates in group activities," and item 17: "Have a more proactive attitude about my learning." These items reflect a decrease in the frequency of various forms of interaction, including interactions with teachers and classmates during synchronous sessions and group activities. Additionally, there appears to be a decrease in the frequency of discussions with classmates about course-related work and a decline in proactive attitudes toward learning.

While there are positive changes in certain aspects of collaborative engagement and presentation skills, there are negative changes in interactions with teachers and classmates and proactive learning attitudes. It would be important to explore the reasons behind these changes and consider strategies to encourage active student participation and engagement in various learning activities.

Academic commitment

Figure 3 presents the results on the items belonging to the academic commitment category. The items include activities that show students' commitment to learning such as homework, formative activities, etc.

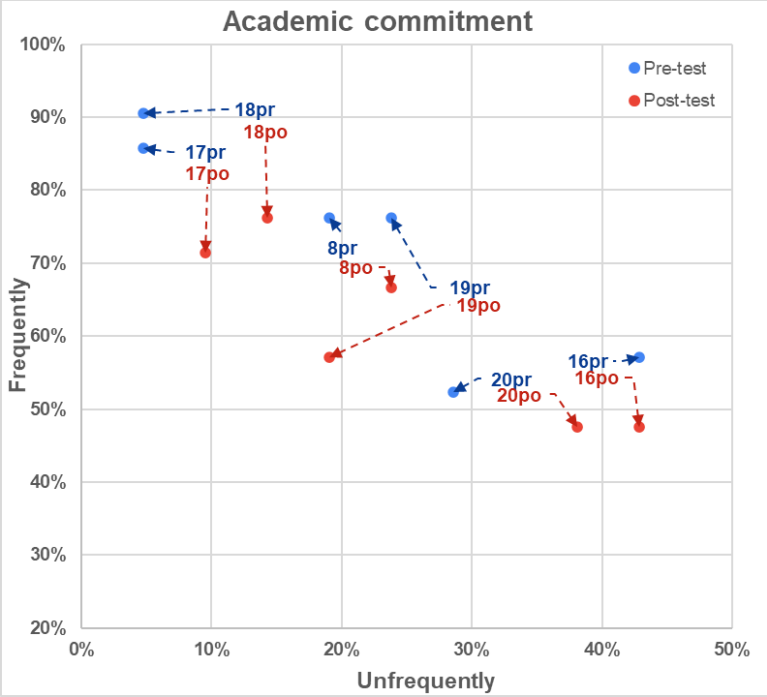

Figure 3*. Results of students' answers in items in the student commitment category.*

In this category (student engagement), although the changes were moderate, the items changed positively. The change is considered positive as the questions show that students perceive greater independence from the instructor as the course progresses, and the results move towards the "Unfrequently" response. These items included item 8: "Not participating in synchronous sessions would affect my learning," item 18: "Not submitting summative activities would affect my learning," item 19: "Not doing the formative activities would negatively affect my learning," and item 20: "Spending too much time on the course outside of class. Overall, these positive changes in student engagement-related items indicate a growing awareness and responsibility among students towards actively participating in the learning process, dedicating sufficient time to their studies, and recognizing the importance of formative and summative assessments. These attitude shifts are encouraging signs of student maturation and commitment to their academic pursuits.

Instructor interaction

Figure 4 presents the results of students' answers to items in the instructor interaction category. This category comprises items related to how the instructor teaches the course and whether there is interaction between students and the instructor.

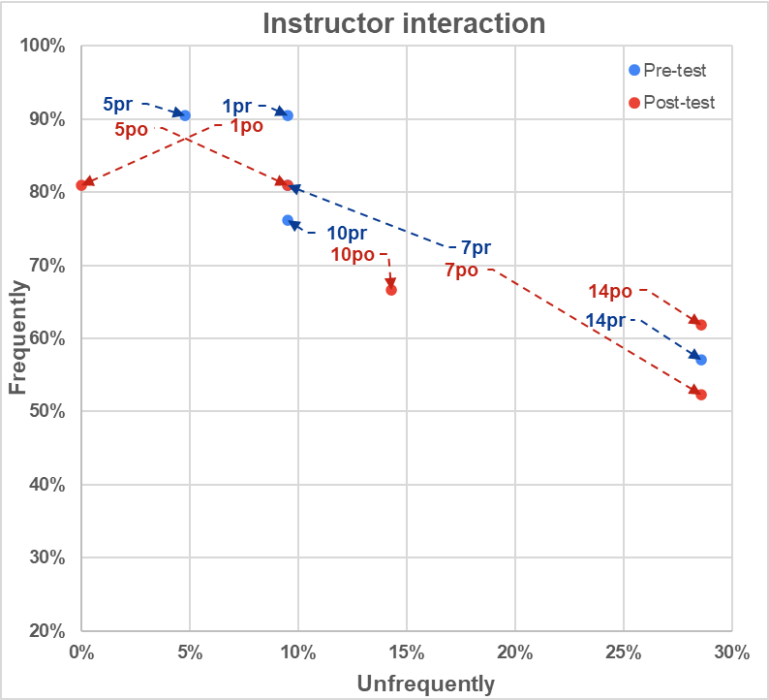

Figure 4. *Results from the students' answers to Likert-style statements in the instructor interaction category.*

Two items had small but positive changes in this category (instructor interaction). The items involved are item 1: "Have classes where the teacher presents most of the time" and item 14: "Discuss my work with my teacher during class." Item 1 suggests that students may notice that classes where the instructor always presents are not how the course was designed. Item 14 suggests an increase in students' willingness or comfort level to engage in discussions with the teacher during class, which can be beneficial for clarifying doubts and deepening understanding.

On the other hand, there were two items with small but negative changes. These were item 5: "Have synchronous sessions, with the teacher as a guide or tutor," and item 10: "Interact with my teacher in synchronous sessions." There was one other item with a larger but negative change: item 7: "Use the forum to ask questions and clarify doubts." These items reflect small to moderate negative changes in student perceptions of instructor interaction. Item 5 and Item 10 suggest a decrease in the frequency or effectiveness of interactions with the teacher during synchronous sessions, which could indicate dissatisfaction with teacher guidance quality or availability during these sessions. Item 7 indicates a larger negative change, suggesting a decrease in students' utilization or satisfaction with using the forum to ask questions and clarify doubts, which could impact their ability to receive timely support outside of class.

While there are some positive changes in student perceptions of certain aspects of instructor interaction, there are also negative changes, particularly in the effectiveness and availability of teacher support during synchronous sessions and through online forums. These results highlight areas where improvements may be needed to enhance students' experiences with instructor interaction and support their learning needs effectively.

Open-ended question

At the end of the survey, there was an open-ended question in which we wanted to ask their opinion on the class they were expecting when they registered for the course. The question focused the attention on the synchronous session that is offered.

Based on the responses provided by the students, it can be inferred that there were various expectations regarding interaction and communication in the synchronous sessions of the course. Some students expected a dynamic and participatory interaction with the teacher and their classmates, focusing on solving doubts and discussing the content. Others expected a more rigid focus on theory and formulas, while some expressed the hope of synthesizing the contents and exercises. Some students expected less invasive communication or more like that of previous courses, as well as those who wanted more individualized communication with the teacher or tutor. In short, expectations ranged from dynamic and participatory to more structured and focused communication with the teacher and peers.

In addition to the varied expectations about the interaction and communication dynamics in synchronous sessions, a mixture of anticipation regarding the course content can also be observed. Some students expected a more practical approach focused on exercises and assessments, while others expected an emphasis on theoretical explanation and doubt resolution. This diversity of expectations suggests that students may have different learning styles and preferences regarding teaching methodology, which highlights the importance of flexibility and adaptation on the part of instructors to meet the needs of all students.
When analyzing the instructors' responses, there are considerable differences in the course delivery format.

Within the questions, the instructors are not aligned with the 100% online format, as evidenced by the response of having classes as presenters most of the time. The answers range from "almost never" to "almost always" (scale between 1 to 7), and since it is a 100% online format, the classes should not be with the instructor as a presenter most of the time.

Within the answers the instructors gave, there is a congruence in the response of expecting communication by messaging and having the students interact in the synchronous sessions. In a general view, the instructors' responses denote a discrepancy between the way of teaching the course, which has repercussions on the results obtained by the students.

Discussion

The survey results reveal a complex picture of student engagement, learning preferences, and perceptions of instructor interaction. A concerning pattern emerges in the self-regulation category, where a significant decrease in proactive study behaviors and self-regulated learning strategies suggests a potential decline in student motivation or engagement. This aligns with negative changes observed in aspects of active learning, notably diminished interactions with teachers and classmates and a decrease in proactive learning attitudes. These are critical areas, as self-regulation, motivation, and interaction are all linked to improved academic outcomes [9-15].

However, some positive trends deserve acknowledgment. In the realm of active learning, increased frequency of collaborative engagement and presentation skills indicates progress in aspects of student participation. Similarly, positive changes in student commitment suggest a growing recognition of the importance of formative and summative assessments, attendance, and time dedicated to the course. This increased sense of responsibility towards learning is an encouraging sign for student development.

Results regarding instructor interaction are mixed. Students noticed that the course fostered less participation from the instructor, and they had a slight increase in the frequency of individual discussions. However, there is also a concerning decrease in perceived effectiveness and frequency of interactions during synchronous sessions and forum use. It emphasizes the need to improve synchronous session quality and to investigate possible issues limiting forum utilization as tools for addressing student questions and uncertainties.

The open-ended question responses highlight student diversity in expectations for learning dynamics and course content focus. Although this emphasizes the importance of adaptable teaching methodologies, providing varying formats for interactions and assessments [16], it reveals students' unawareness that this course consisted of a self-instructional format. Flexibility to offer individual learning styles improves student engagement and success [17], but it is complex in an online course.

Conclusions

Analysis of the study's findings suggests a significant mismatch between student expectations and the demands of a self-instructional, distance-learning course. While students may initially express confidence in their ability to succeed in a self-directed format, their actual behaviors indicate a strong preference for a traditional, instructor-centric learning model. This reliance on the instructor as the primary source of knowledge acquisition highlights a potential lack of preparedness or willingness to adopt the self-regulated learning strategies essential for success in a less structured, distance-learning environment.

Furthermore, the study uncovers inconsistencies among instructors in their understanding and implementation of the self-instructional course format. Instructor responses paint a picture of divergence in the pedagogical approaches adopted within the course. This variation in instructor expectations and delivery methods casts doubt on the course's ability to deliver a cohesive self-instructional experience.

These findings pinpoint a fundamental design flaw within the course, emphasizing the need for a significant overhaul to support students successfully in a self-instructional distance-learning setting. Careful consideration of student preparedness, consistent instructor training, and pedagogical alignment are crucial factors that should be prioritized in future iterations of self-instructional courses. Future models should incorporate a pre-course orientation program, instructor development training sessions, and design refinement to enhance student and instructor outcomes.

Acknowledgments

This publication is a product of a project funded in the Challenge-Based Research Funding Program 2022 project ID # I035 - IFE005 - C1-T3 – E by Tecnologico de Monterrey. The authors also acknowledge the technical and financial support of Writing Lab, Institute for the Future of Education, Tecnologico de Monterrey, Mexico, in producing this work.

In addition, the authors would like to acknowledge the leadership and financial support of the School of Engineering of Universidad Andres Bello, Chile. We also thank the Educational and Academic Innovation Unit (UNIDA) for mentoring and guidance in developing scientific articles in higher education research.

Finally, the authors would like to acknowledge the financial support of Writing Lab, Institute for the Future of Education, Tecnologico de Monterrey, Mexico, in producing this work.

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