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Systematization of experience of an introductory and motivational accompaniment process for the Programming subject.

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Summary. The objective of this work was to recognize strengths, opportunities, difficulties and projections of an introductory and motivational accompaniment process for the programming subject, aimed at first-year students of the Civil Engineering in Computing and Informatics career at the Universidad Católica del Norte. (UCN) Coquimbo Campus. This was done using the Systematization of Experiences method, where the diagnostic process, design, and implementation of academic support actions for students were analyzed. The results reveal as the main strengths and opportunities of the process the articulation of different academic and student units in the design and execution of the actions, derived from the shared recognition that the subject is critical. Another strength corresponds to the design and implementation of a cycle of three workshops relevant to the needs of students and with the use of active methodologies, which achieved high satisfaction of participating students. Difficulties are related to student adherence due to the voluntariness of participation and their academic overload. Inputs are provided for future follow-up actions and impact evaluations of the activities carried out.

Keywords: Programming, Programming Language, Motivation.

1 Introduction

At UCN, since 2019, the Programming subject has maintained an average pass rate of 27% in first-year Engineering courses. Based on these low levels of approval, the General Directorate of Undergraduates was awarded a project to design and implement actions to improve the results of the subject in first-year students and promote academic progression, starting a pilot with Civil Engineering Computing and Informatics (ICCI) since it maintains first-year retention rates below the institutional average.

This work aims to recognize strengths, opportunities and projections of the actions designed and implemented, where the main findings and projections of the work are presented.

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2 Theoretical framework

Programming is a subject considered critical in various higher education institutions, since it implies the development of logical, mathematical, reading comprehension, and writing skills (Brown & Wilson, 2018). Those who are approaching programming for the first time need practice and time to develop the logic behind it, and those who are dedicated to teaching it have to consider the use of active and motivational methodologies (Ivanovna et al., 2019; Hsi-Min et al., 2020; Vázquez et al., 2021).

3 Method

The method used was a Systematization of Experiences (SE) which allowed the reconstruction and analytical reflection of the experience, interpreting what happened to understand it, visualizing what was done, what mistakes could be made and how they are corrected to improve future processes. (Exposito & González, 2017). The systematized experience was the design and implementation of actions to improve programming results in first-year ICCI students.

To reconstruct the process, the evidence and data collected from diagnostic meeting spaces and the design and implementation of accompanying actions were considered, all of which was analyzed through a Content Analysis (Vásquez, 1996).

4 Results

4.1. From shared acknowledgment to collaborative work:

The work began in November 2022, with a diagnostic process that involved meetings with the participation of key agents, such as academic in charge of career, subject coordinators, assistant-tutor students and professionals in the area.

In this diagnostic process, great interest was revealed by everyone, acknowledging that the subject was critical and innovations had to be implemented to improve its results. Based on this shared acknowledgment, a collaborative and coordinated work between the different agents was glimpsed, which is maintained to date.

4.2. Situated needs and actions: Introductory and motivational actions for Programming:

A Likert-style survey was designed to learn about the students' experience who enrolled the programming subject in terms of strengths, difficulties, opportunities, and challenges. Which was answered by 65 students from the 2019 cohort.

Based on the results of the survey and the experience of all the actors collaborating in the process, the lack of an introductory and motivational space for programming for first-year students was recognized as the main need.

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In this way, a cycle of three introductory workshops, was designed for first-year students who will take the subject next academic semester with the aim of strengthening their motivation, delivering the first tools regarding the programming language. The first workshops were linked to job opportunities made possible by programming, through the experience of videogame designers who graduated from the same college program. In the other two workshops, the language and logic of programming were addressed, through the development of circuits with the use of a simulator.

The implementation of the cycle was planned for the month of June, in weekly meetings and voluntary participation for students, in a block without clashing schedules. All the activities were disseminated through emails and WhatsApp messaging to the cohort of 150 students. For the dissemination, we had the support of the academic in charge of the career and career delegates students.

4.2. Difficulties and results of the implementation: Low levels of adherence, but high evaluation by participants of the activities:

The three workshops were implemented according to the initial planning, the first workshop was attended by 37 students, the second 25 and the third, only 17 students. In addition to academic overload, this low level of adherence was associated with the fact that the block where the workshops were held was used by students to prepare tests for subjects they were taking. This could also be due to the month and periodicity in which the experience was implemented.

However, the students who participated in the cycle evaluated the three activities positively. On average, they rated the actions with a 6.8 score, highlighting their motivation to take the subject next semester and highlighting the logical concepts addressed that will allow them more preparation for the programming subject.

5 Discussion

The design and implementation of the actions for the programming subject implied the willingness and collaboration of different actors involved, this led to the design and implementation of relevant actions and attractive methodologies for students as suggested by the literature (Ivanovna et al., 2019; Hsi-Min et al., 2020; Vázquez et al., 2021).

Regarding the low levels of adherence, they would be influenced by the academic overload of students, which would even be a factor to consider when evaluating the results of critical subjects. For this reason, it would be necessary for these types of actions to be developed in the context of a subject, favoring the entire cohort of students.

6 Conclusions

It was possible to recognize the strengths, opportunities and projections of an introductory and motivational process for programming aimed at ICCI first-year students.

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7 Limitations and Future Research

It is recognized as limits not having the academic programming results to verify the effectiveness of the accompaniments, since the subject is taken next semester.

The next semester is expected to evaluate the impacts in the academic results between students who participated in the workshops and who did not. Also, comparing the average results of the last year cohort with the 2023 second semester ones.

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