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Autorregulación y estrategias de aprendizaje en estudiantes trabajadores en estudios continuados

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Abstract

This research aspires to show self-regulation and learning strategies in working students via a sequential mixed research methodology. Through this, the quantitative stage of the Motivated Strategies for Learning Questionnaire and its learning strategies are applied to 65 engineering students who continue their studies. The qualitative stage selects the 16 top-ranked students, where semi-structured interviews are conducted to deepen their learning strategies. In conclusion, strategies related to elaboration and metacognition, organization, and help search are relevant factors in their self-regulatory processes to make work and study compatible. The results also underline the social factor of learning and the applicability of learning to work. It is expected to provide relevant information on the strategies used to guide coherent and dialogic educational processes, attending to the needs of students who reconcile academic and work life.

Keywords: university student, self-learning, lifelong learning, higher education.

Resumen

El propósito de esta investigación es demostrar las estrategias de autorregulación y aprendizaje en estudiantes trabajadores. Se utiliza una metodología de investigación mixta secuencial, en cuya etapa cuantitativa se aplica el

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cuestionario MSLQ en su constructo de estrategias de aprendizaje a 65 estudiantes de ingeniería de un programa de estudios continuados. En la etapa cualitativa, se seleccionan los 16 estudiantes mejor evaluados y se realizan entrevistas semiestructuradas para profundizar en sus estrategias de aprendizaje. Se concluye que las estrategias relacionadas con la elaboración y la metacognición, la organización y la búsqueda de ayuda son factores relevantes en sus procesos de autorregulación para compatibilizar trabajo y estudio. Los resultados también destacan el factor social del aprendizaje y la aplicabilidad del aprendizaje al trabajo. Se espera aportar información importante sobre las estrategias utilizadas para orientar procesos educativos coherentes y dialógicos con las necesidades de los estudiantes que concilian la vida académica y laboral.

Keywords: estudiante universitario, autoaprendizaje, aprendizaje permanente, enseñanza superior.

Introduction

Usually, self-regulated students maintain behaviors and strategies for achieving the expected learning, since they are proactive, aware of their capabilities and limitations, monitor progress, and reflect on it (Rosario *et al.*, 2014). Consequently, from the current perspective, studies alert on the need for students to become autonomous beings who know their cognitive processes, learn to direct their education advances and do not limit to acquiring the knowledge provided by others but manage and build it personally based on their previous experiences. Here, the role of training is to provide the necessary tools and follow-up to facilitate this learning process.

Based on the above, university teaching must focus on the student: it is the starting point, the center, and the end, and implies helping the student to learn and think (Torrano *et al.*, 2017). Thus, knowing students and focusing on their needs is relevant to reorienting educational processes and providing feedback on their academic trajectories, considering their different realities.

In this area, it is particularly interesting to delve into a group of university students' characteristics that is increasingly growing and defined by working students. These often have to reconcile aspects of work, family, and academic life with complexities that differentiate them from a traditional group of university students. Despite the growing number of students who work, and the adjustments made in the teaching methods, there is still a lack of knowledge about their achievements, balance, and learning strategies.

Few studies have addressed this situation, which involves different contexts and often responds to a regional or country reality. However, in some cases, students enter the workforce because there is an early job offer for which a college degree is dispensable (Busso & Pérez, 2015). In other cases, as in Chile, there is a late entry into university education of a group of students who already hold a technical degree and, after a few years of work, seek to complement it with a college degree.

Research on these students, also workers, is currently very scarce, and their educational process is plagued with challenges that differentiate them from a traditional university student. On average over 30 years old, these

own a knowledge of the professional practice that must be articulated with the theory of the educational process; they have knowledge and experience in working with teams, usually leading them; they understand how to perform professionally *in situ* and, above all, they must reconcile various areas of their lives. Therefore, self-regulation processes are critical to organizing their work, and personal and academic life.

These "non-traditional" students are also characterized by presenting a high dropout rate from their educational processes because variables external to the teaching and learning context may more frequently affect them (Sánchez-Gelabert & Elías, 2017). Hence, exploring the strategies used by students with sounder self-regulation and autonomy is indispensable to generate action models, direct classroom management and decision-making, design more flexible systems and conceive a compatible offer from the programmatic or curricular perspective. Moreover, the methodological one.

Among the groups that most select this modality for their studies are engineering students, since they need to constantly update due to the economy's and industry's speed. They often move from a technical training area to a professional one, something highly valued by their employers. In engineering, it seems essential to consider and practice self-regulatory capacities that allow adaptation to changes in the knowledge society (Capote *et al.*, 2023).

Furthermore, students' beliefs about their learning are factors that can affect the performance, as has been shown in other studies (Cabanach *et al.*, 2016). Thus, knowing their perspective on the deployed strategies to achieve academic success is fundamental (Franco-Rojas, 2021) to understand how they approach their studying process in parallel with work and family life. Other studies have observed the relevance of the self-regulation level in procrastination (Barría *et al.*, 2020); therefore, it is interesting to survey what happens with the strategies of the most self-regulated students.

This research aims to investigate how engineering students, who continue with their studies, can self-regulate their academic performance and demonstrate their learning strategies in their educational process. Thus, it is essential to delve deeper from their perspective into the learning

strategies they apply to. These are the intentional, deliberate, planned, and consciously performed activities that conduct the actions to achieve specific goals or objectives (Masso *et al.*, 2021).

The levels of self-regulation by learning in working students of engineering complementary studies will be determined from the perspective of learning strategies; then, the most self-regulated working students will be established to describe the strategies for their academic work.

Methodology

Type of study

Sequential mixed design research was conducted to understand self-regulation and learning strategies in working students, considering instruments and analysis for two stages: quantitative, where the Motivated Strategies for Learning Questionnaire, MSLQ (Pintrich *et al.*, 1993) was applied characterizing the most self-regulated students; a qualitative stage, where these were invited to participate in interviews on the learning strategies construct.

Participants

The sampling was non-probabilistic: the first students to respond participated in the study. A sample of 65 students was obtained, 5% corresponding to engineering students from the Universidad del Aconcagua, Calama campus. Eighteen belong to the civil industrial PCE degree and 47, to the electrical engineering PCE degree. The inclusion criteria for participating were being a student and having a dependent work activity in parallel to be considered a working student.

After obtaining informed consent in the quantitative stage, the MSLQ was applied to the students who agreed to participate. Subsequently, an intentional sampling is carried out, in which the results of the quantitative stage are obtained. Sixteen students with the highest score made up the considered most self-regulated students. Finally, they were invited to participate in the qualitative stage, with the implementation of a personal interview.

Materials and instruments

The quantitative instrument used in Chile is the validated version with a university population for our study. In fact, the MSLQ consists of 81 questions structured in two scales: 31 questions directed to motivation and 50 to learning strategies (Burgos & Sánchez, 2012).

The focus of this research, the learning strategies scale, contains two components: a cognitive and metacognitive, and a resource management component. The first is divided into five subscales: (a) drill; (b) elaboration; (c) organization strategies; (d) critical thinking, and (e) metacognitive self-regulation. The second component

includes four subscales: (a) time management and study environment; (b) effort regulation; (c) peer learning, and (d) help search.

Each one of these items includes a statement to which the student must respond according to the degree of identification with what stands for, choosing one of seven options on a Likert scale. One indicates the lowest agreement and 7 indicates the highest agreement with the proposition. The data collected was analyzed in Excel, mainly in a descriptive manner.

Based on the results of the quantitative stage of the questionnaire, a semi-structured interview plan was held as a qualitative instrument. It consisted of seven questions based on the questionnaire dimensions and was submitted to expert judgment. The interviews aimed to proceed deeper into the study strategies of the working students.

Table 1
Areas of inquiry, questions, and dimensions

Areas of inquiry	Guiding questions	MSLQ subscales
Cognitive and Metacognitive Component	1. There are students whose strategy is the elaboration of summaries for studying, what strategies do you use for studying?	<ul style="list-style-type: none"> • Drill • Elaboration • Organization • Critical thinking • Metacognitive • Self-regulation
	2. What do you do to understand the contents of studies?	
	4. In online or in-person classes, what resources do you use for learning?	
	7. How do you apply your acquired knowledge to solve situations, for example at work?	
Resource Management Component	3. How do you organize your time for studies?	<ul style="list-style-type: none"> • Time management and Study environment • Effort -regulation • Parallel learning • Help search
	5. When you are studying and get distracted, how do you re-concentrate and focus again?	
	6. How do you solve your doubts in lessons or by studying?	

The analysis by categories was accomplished through the Atlas TI software version 9.1.3.0., according to the areas of inquiry previously defined for the questions.

Procedure

With prior authorization of the Ethics Committee of the Universidad del Aconcagua, the students were invited via e-mail to answer the questionnaire for the quantitative study using Google Forms. In its first part, the objective was explained, and the informed consent was presented. Questions related to sociodemographic variables of interest characterize the sample: age, sex, marital status, previous

higher education, and employment situation precede the specific questions of MSLQ.

Only the answers to the learning strategies scale and its components were considered for this study. It consists of nine subscales with specific questions for each, totaling 50 questions that allowed us to tabulate the self-regulation levels of students' strategies arbitrarily, applying a higher average (5.56) than the general one (from 1 to 7). It registered 16 of 65 students with highly satisfactory answers, equivalent to 24.6% of the defined general average.

These students were contacted by e-mail to invite them to participate in an interview for the second part of the study. The interviews were conducted via Meet, helping to reinforce the objective of delving deeper into the strategies used by the most self-regulated working students.

Results

Quantitative results

Only the learning strategies scale is employed in this research, containing two components: a cognitive and metacognitive and a resource management component. The overall application provides a Cronbach's alpha of 8.24 for the scale used and a value above 0.7 for the subscales, therefore, adequate reliability.

Of the 65 students who answered the questionnaire, results were obtained for the first sociodemographic questions found in Table 2:

Table 2
Sociodemographic data

Criteria	Characteristic	Quantity	Percentage
Age	Older than 40 years	21	32%
	31 and 40 years	28	43%
	25 and 30 years	13	20%
	18 and 24 years	3	4.6%
Marital status	Single	23	35%
	Married	24	37%
	In a relationship	14	21.5%
	Divorced	4	6.1%
Employment situation	Working	63	97%
	By task	40	63.4%
	Daytime	23	36.4%
Studies	Not working	2	3%
	Other institution	51	78%
	UAC	14	22%
Sex	Male	61	93.9%
	Female	4	6.1%

Most working students come from other institutions, provided the opportunity offered by the university for continuing studies from a technical to a college degree.

Regarding age and marital status, responsible behavior seems to be relevant since most of them fall into the 30-40 age range. As for marital status, approximately 50% are married or in a couple, and about 94% are men.

Table 3 contains the respondents' statistical data (mean, standard deviation).

Table 3
Average of learning strategies among students

Component	Subscales	Average	Standard deviation	Variance
Cognitive and metacognitive	Drill	5.07	1.56	2.43
	Elaboration	5.45	1.41	1.99
	Organization	5.00	1.74	3.01
	Critical thinking	5.27	1.41	1.98
	Metacognitive self-regulation	5.04	1.63	2.64
Resource management	Time management and study environment	4.82	1.92	3.67
	Effort regulation	5.44	1.56	2.44
	Peer learning	4.48	1.88	3.54
	Help search	4.32	1.90	3.62

As illustrated in Table 3, the first component of the learning strategies scale is divided into five subscales: (a) drill; (b) elaboration; (c) organization strategies; (d) critical thinking, and (e) metacognitive self-regulation. The second component of resource management includes four subscales: (a) time management and study environment; (b) effort regulation; (c) learning with peers, and (d) help search.

Regarding the first variable, cognitive and metacognitive, the elaboration subscale consists of selecting important information, reorganizing and structuring what students intend to learn and obtains the highest mean of students. Mostly, they respond at the highest scale levels, whilst the lowest mean is found in the organization subscale.

The critical thinking subscale questions— the degree to which students report applying prior knowledge to new situations to solve problems— are related to decision-making or critical evaluations on standards of excellence. It ranks as the second scale with the highest mean among participants.

However, concerning metacognitive self-regulation, —namely the self-regulation of cognitive activity that

measures the degree to which students can become aware of their abilities, to modify them according to environmental conditions—, only 30.7% answers with the highest mean, even though this is not the last average of the scale. Both groups exceed the mean established in the elaboration subscale. It should be noted that the means have little margin of difference in the subscales of the first component of the questionnaire.

As for the means of the second component, the highest ones are found in the effort regulation, with more than 1 point of difference regarding the lowest of the same scale: help search.

None of the subscales exceeds the established mean in the students' responses; so, in the subscale of effort regulation, 44.6% obtains answers that do not exceed the established mean. In the peer learning subscale, 35.4% does not exceed the established mean. Under time management and study environment—which measures the degree to which the student plans their study time—, only 23% responds to the five questions without exceeding the established average. In the help search subscale, only 15.4% responds at the highest level, above the general and established mean. This variable brings significantly low results, with the lowest mean below the established mean.

The most remarkable fact is that in elaboration, 18 students obtained an average score (5.99) above the established mean. In critical thinking, 15 students received an average score (5.90). In organization, 11 students obtained an average score (6.11) and in effort regulation, 17 students reached an average score (6.20) above the established average.

If we compare the general results obtained between students who work both by tasks (7x7, 14x14, etc.) and the daytime mode of 45 hours a week, there are no major differences in each of the subscales.

Those 16 students (24%) selected for the second stage obtained higher scores than the rest on the overall scale, even with results above 6 points in 7 of the 9 subscales. This group is the most self-regulated in the study, excelling in the elaboration and critical thinking subscales of the cognitive and metacognitive components, except the help search subscale of the resource management component. Although the overall results of the 16 students are above the usual mean, some do not exceed it in some subscales of the cognitive and metacognitive component, such as drill. Here, five of 16 students are recorded with a result below the average. In the elaboration and critical thinking subscales, the 16 students register a value higher than the overall mean. Regarding the resource management component, in the help search subscale, nine students out of 16 are registered with a score below the overall mean: low for all students.

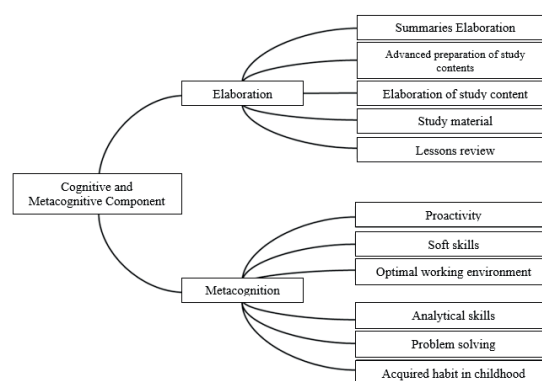
Qualitative results

From the questions in Table 1, two category trees were created to specify the interview responses with the most self-regulated students. These were categorized into the two components of the learning strategies: cognitive and metacognitive component, and resource management component.

Once analyzed, these responses led to the areas of inquiry in the two category trees.

Figure 1

Category tree for the cognitive and metacognitive component



In the category tree (Figure 1), it can be seen that most of the responses indicate subscales of the cognitive and metacognitive component: elaboration and metacognition. The following lines show some textual sentences from the interviewees anticipating the findings. Regarding the categories of this tree, the elaboration plays a key role: responsibility in fulfilling the academic activities of working students is the primary objective to achieve the proposed goal of finishing their degree.

As a worker, the part of my break is 100% to advance study contents, even if the professor is not giving contents, I am already researching information to know what it is about. (M. Vera *et al.*, personal communication, 2024)

About the elaboration of study material and summaries, it seems that these tools are used among working students with higher levels of self-regulation:

Today, my first day off, I spent most of the day doing a fluid mechanics exercise and tomorrow I have to continue because I have the exam. I was summarizing the last study content. Then, when the exam was coming up, I had all the summaries. (M. Vera *et al.*, personal communication, 2024)

The most cognitively self-regulated students show previous experience before facing academic activities when pursuing a degree. There exists a personal motivation and appreciation of the autonomous process that is conducted, considering that they manage their academic present through a sense of responsibility:

As a life experience, I tell you, I was waiting approximately 15–20 years to be able to support myself and pay for a degree. I think you put more effort into it. A lot more effort than a person who gets paid for everything (M. Vera *et al.*, personal communication, 2024)

The most self-regulated working students apply the acquired knowledge to solve problems in their work environment. “I’ve been working as a supervisor for a long time, so I’m going to apply plenty of things I’ve been taught, apart from the things I’ve learned and that are fresh to me” (M. Vera *et al.*, personal communication, 2024). At this point, the elaboration occurs not only in an academic setting but also in its work applicability. Establishing such a meaningful connection makes it possible to retain latent memories, assimilate them, and render them meaningfully in direct application.

The interviewed group developed an interest in complex skills for their studies and work, consistent with the learning methods used. “As I told you, the hallmark of the course we did in the communication part, is the way of expressing yourself. They are important when communicating with others” (M. Vera *et al.*, personal communication, 2024). Skills in social use are more valued, and the relational aspect is considered relevant; thus, socioemotional skills will shape the new professionals (Vera, 2021).

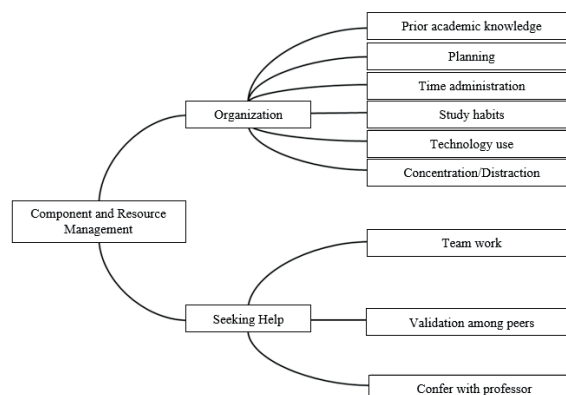
Study habits would be reflected in the most self-regulated students given their life trajectory long before starting their higher studies, as does an interviewee who says he has had these habits since childhood. “I always had a study habit, since elementary school, my mother was always doing a general review of all the study material. In mathematics, it was every day” (M. Vera *et al.*, personal communication, 2024). That means a group of students have already acquired study habits that they use as a tool for their current teaching and learning process.

As for their metacognitive process, the most self-regulated working students use reading analysis and the application of study content, giving importance to reading comprehension as a basis for study. “I try to look for a person who had more reading comprehension ability. To analyze the narrative” (M. Vera *et al.*, personal communication, 2024). Evaluating and reflecting on these aspects to reach beyond the contents is essential to work on their development and use them as a learning tool.

Regarding the second component, the following category tree is presented:

Figure 2

Category tree for the resource management component



In the analysis of category tree two, most of the responses point to the subscales of the resource management component related to organization and help search.

About these categories, the focus of the study would be the group strategy over the individual one. “We are five colleagues who come from the technical careers and the same job. We help each other and to not lose the rhythm of our studies, we continue engineering” (M. Vera *et al.*, personal communication, 2024). Therefore, the social component is a key focus especially in the collaboration of processes to achieve common objectives, acquiring roles for these that allow a subdivision of work in a strategic way to achieve the goals.

When we have to do a job, a report, or a PPT, there is one person who is responsible for the work, then that person is the one who transmits the information to the other three. There was a previous meeting. (M. Vera *et al.*, personal communication, 2024)

It is observed that the students share knowledge and content analysis, fully trusting the permanent work team they form. “The online strategy is the one we use as a team. To organize the times, each one supervises a topic. We do the work in groups, and we distribute each part among ourselves” (M. Vera *et al.*, personal communication, 2024). The organization they implement with their peers allows them to manage and optimize time on long-term tasks.

It is also observed that the most self-regulated students use all the tools, both traditional and virtual, to meet their study needs. “I take advantage of current technology. For example, professors often upload presentations to the system, so I download them to my phone or small tablet” (M. Vera *et al.*, personal communication, 2024).

Concerning their family environment, although, indeed, they do not refer to family support, it would exist, since they would be aware of their responsibility and their

commitment to share with it, as part of the organization at their times. "I try to have discipline. I create a small calendar, so as not to leave my family unattended because they help encourage you to keep studying, to move forward" (M. Vera *et al.*, personal communication, 2024). The family also becomes a motivating ingredient for the student, not only because of the support it provides but because of the example he hopes to give them: "the children see me as I study, so they are also motivated" (M. Vera *et al.*, personal communication, 2024).

Besides, in the concentration v/s distraction category, they seem to cope competently with them. "I stop. And I start again, pause, pour myself a glass of water, and when I concentrate again, I go back a little from the point to resume again" (M. Vera *et al.*, personal communication, 2024). In other words, they can turn to external regulations to organize their time and work properly, being very aware of their environment.

In the category help search, permanent interaction with peers and the professor would also be reflected. "When I went to classes, I would ask the professor about my doubts when the classes were over. I would also consult the professor through WhatsApp" (M. Vera *et al.*, personal communication, 2024). As experience-based workers, the most self-regulated students spontaneously seek support to reinforce their learning.

Before studying together, everyone studies the material on their own, and then we get together to practice it. In math exercises, we get together with a whiteboard to develop the exercise, until we find the logic, understanding why it was solved. (M. Vera *et al.*, personal communication, 2024)

It suggests that the value of teamwork is transversal to both study and work.

Discussion

In terms of the quantitative approach of the study, the reliability of the scores in the subscales is consistent with other studies under similar conditions among the university populations (Ramírez Dorantes *et al.*, 2013; Sabogal *et al.*, 2011). Likewise, the instrument showed adequate psychometric indices that fluctuate between 90 and 70, turning it into a pivotal tool for the study.

The data indicate that engineering students can self-regulate their learning using strategies related to elaboration and critical thinking, while the least used are those related to organization, use of time, and help search. It can be explained because working students mention that they study, especially by reviewing contents, summarizing, or rereading. In this case, like other research (Urquijo *et al.*, 2014), 45% of the surveyed university students uses summarizing as a strategy for content development,

facilitating organization thanks to the requirement of understanding the subject in its synthesis.

On the one hand, critical thinking scores high; it is bonded with abilities they have been developing in their professional life, and since it is a continuity program, they already come with them; it is a group with other training needs. The demands of the labor world require decision-making, feedback on personal and collective performance, creativity, critical thinking, teamwork, and problem-solving, among others (Covarrubias-Apablaza *et al.*, 2019). Precisely, these are aspects that students say they value most in interviews to manage their learning processes. It is interesting how competencies, especially communicative ones, acquire value in their discourse on study contents.

On the other hand, due to their limited time, help search and time to study, both quantitatively and qualitatively, represent some of the most complex aspects for working students. These obtained one of the lowest results in the overall application of the test; however, they are stressed by the interviews as significant. This ambiguity may indicate a crucial turning point between the most and least self-regulated students. The group with the best self-regulation mentions teamwork, division of labor, and constant search for help as strategies that support their work, directing resources to the achievement of the task (Gaeta *et al.*, 2017).

Convening meetings to reinforce or ask for support becomes complex due to the balance between family, work life, and academia. Nevertheless, in the deepening, the most self-regulated students affirm that collaborative work is a strategy to implement and self-manage autonomously, which favors their learning process. Other research coincidentally reports that time management, collaborative work, and the study environment foresee academic performance (Vásquez, 2021).

The most self-regulated students mention the generation of networks as one of the relevant aspects from their perspective. Reports indicate that students perceive family support and academic performance as fundamental, promoting and stimulating academic achievements and reducing dropout and abandonment of their studies (Chong, 2017). These perceptions enable collaborative work because students execute it operationally and have strong achievement motivators.

Finally, developing strategies repeatedly mentioned in the discourses acts transversally as a relevant element. Its applicability acquires different levels, ranging from the mere transcription of study contents through the elaboration of synthesis to the recovery to apply in daily or work experiences. Promoting the elaboration of activities to support students in their learning process seems pertinent, making these practices meaningful and familiar (Núñez *et al.*, 2006).

Conclusions

Considering the survey results, there are no significant differences in the levels of self-regulation of learning among engineering students regarding their work modality—by tasks or in regular regimes. Therefore, these two models would present the same conditions for the groups. In this case, most are between 30 and 40 years old, almost 50% are married or in a relationship, and about 94% are men.

This research shows that the most recurrent strategies used by engineering working students in the overall group are those of elaboration and effort regulation, while the lowest, is help search and organization. Precisely, these last two are the most emphasized by the most self-regulated students who were interviewed.

The analysis of this research indicates that the 16 most self-regulated working students are prepared to face the learning process in their studies. This is because they manifest having already incorporated study habits frequently used to organize their academic work. Generally, the most self-regulated students value skill development, especially communication and reading, as the basis of their learning and, therefore, direct their performance to grow and improve in these areas.

These students cite organizing their environment, managing and self-regulating their performance, staying motivated for learning, and making academic responsibility a goal. Furthermore, this target is often related to their commitment to their families to complete their studies. Some of them also express the importance of their self-worth and self-efficacy, where being responsible with themselves is also an incentive to comply with their academic processes.

Among the strategies, the most self-regulated students highlight the social environment and teamwork, and help search as decisive factors in academic development. This implies the importance of generating groups in activities, and the willingness of professors to answer doubts is predominant in the case of working students due to the social impulse that operates simultaneously as a motivating factor.

Review and elaboration strategies rely not only on technology, but also on peer validation of information and using content in non-academic and work environments to reinforce and review ideas. These actions allow students to strengthen their learning with activities to apply what they have learned to their more immediate work environments.

Finally, the study is limited by the sample size in its quantitative stage, which consists of 65 students. Future research should increase this number and incorporate other university degrees to obtain a broader view of the self-regulation process of university working students,

given that this research focuses on students returning to their studies.

The contribution of this research consists mainly of profiling working students who continue or resume their studies: a context scarcely observed and less related to self-regulation or academic success, and thereby considerable for future reviews. Likewise, it is interesting to delve deeper into work-study balancing strategies for improving understanding of this type of student, whose presence increases in higher education systems.

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Conflicts of interest

The authors declare no conflicts of interest.

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