Self-regulated Learning Strategies and Non-academic Performance in the Context of the COVID-19 Pandemic

Estrategias de aprendizaje autorregulado y el rendimiento no académico en el contexto de la pandemia COVID-19

COVID-19 疫情背景下的自我调节学习策略和非学业表现

Стратегии саморегулируемого обучения и неакадемическая успеваемость в условиях пандемии COVID-19

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Abstract

The COVID-19 pandemic demanded student self-regulation to take advantage of online teaching. The evidence of the use of learning strategies was studied based on non-academic results that allowed quantifying the student's attitude and satisfaction towards teaching in virtual environments in contingent contexts. The purpose was to analyze the influence of the use of self-regulated learning strategies on non-academic performance under the mediation of the context.

The research is qualitative, non-experimental, cross-sectional design, and explanatory scope. The generalized least squares regression method in a sample of 611 university students was done.

The moderation of the context was confirmed in the relationship between self-regulated learning strategies and non-academic performance. A significant positive influence of the context on non-academic performance was also detected.

The importance of teacher induction in student self-regulation in response to the new normal was deduced.

Keywords: University education, learning, educational self management, strategies, non-academic performance.

Resumen

La pandemia COVID-19 demandó la autorregulación del estudiante para aprovechar la enseñanza en línea. La evidencia de ese aprovechamiento a partir del uso de estrategias de aprendizaje, se estudió en base a los resultados no académicos que permitieron cuantificar la actitud y la satisfacción del estudiante hacia la enseñanza en ambientes virtuales en contextos contingentes. El objetivo de esta investigación fue analizar la influencia del uso de estrategias de aprendizaje autorregulado sobre el rendimiento no académico ante la mediación del contexto.

La investigación es de corte cuantitativo, diseño no experimental, transversal y alcance explicativo. Se usó el método de regresión por mínimos cuadrados generalizados en una muestra de 611 universitarios.

Los resultados confirmaron la moderación del contexto en la relación de uso de estrategias de aprendizaje autorregulado-rendimiento no académico, además se detectó influencia positiva significativa del contexto en el rendimiento no académico.

Se dedujo la importancia de la inducción docente en la autorregulación del estudiante en respuesta a la nueva normalidad.

Palabras clave: Educación universitaria, aprendizaje, autorregulación, estrategias, rendimiento no académico.

概要

COVID-19 疫情要求学生自我调节进行在线教学。这种使用学习策略的证据是根据非学术结果进行研究的，这些结果可以量化学生对虚拟环境中的教学的态度和满意度。本研究的目的是分析在情境媒介下使用自我调节学习策略对非学业成绩的影响。

我们采用了定量研究、非实验、横向设计和解释范围。研究采用广义最小二乘回归法对 611 名大学生进行了样本分析。

结果证实了情境在自我调节学习策略的使用与非学业成绩之间的关系中具有调节作用，并且检测到情境对非学业成绩有显着的积极影响。

通过研究可以推断教师诱导在学生应对新常态的自我调节中的重要性。

关键词：大学教育,学习, 自我调节,策略,非学业表现。

Аннотация

Пандемия COVID-19 потребовала от студентов саморегуляции для эффективного освоения онлайн обучения. Подтверждение такого использования стратегий обучения изучалось на основе неакадемических результатов, что позволило количественно оценить настрой и степень удовлетворенности студентов обучением в виртуальных средах в условных контекстах. Целью данного исследования являлся анализ влияния использования стратегий саморегулируемого обучения на неакадемические результаты в условиях контекстного опосредования.

количественное исследование, неэкспериментальный, перекрестный дизайн и объяснительная область. Использовался метод обобщенной регрессии по методу наименьших квадратов на выборке из 611 студентов вузов.

Полученные результаты подтвердили наличие модерации контекста во взаимосвязи между использованием стратегий саморегулируемого обучения и неакадемической успеваемостью, а также было обнаружено значимое положительное влияние контекста на неакадемическую успеваемость.

Сделан вывод о важности преподавательской вводной в саморегуляции студентов в ответ на новую нормальность.

Ключевые слова: Университетское образование, обучение, саморегуляция, стратегии, неакадемическая успеваемость.

Introduction

Due to the health contingency caused by COVID-19, the classroom-based university courses had to change their modality to online education. Teachers had to take training courses in new technologies, students had to develop skills to attend online classes and tutorials, and the university had to provide the necessary resources. Teachers, students, and the educational institution had to adapt to the circumstances using online resources and Internet connection time.

Teachers faced serious difficulties in their adaptation process because of their inexperience in the online teaching methodology (Lovón & Cisneros, 2020), leading to an academic overload in handling virtual classes (Villamonte, 2020). For students, the affectations that online work caused were mainly due to connectivity, which hindered their work and increased anxiety and frustration (Lovón & Cisneros, 2020). In addition, according to Lovón and Cisneros (2020), differences between students with more or less technological resources arose, and the abuse by teachers in the use of forums and readings that students had to solve in a very short period.

For some time now, some responsibility has been demanded from students to improve their university competencies (Fernández et al., 2011). Despite this, the student needed to take responsibility for influencing his/her learning process as postulated by the self-determination theory (Deci & Ryan, 2015). The paradigm includes student commitment. That is, the student assumes his/her own learning, defines his/her own

goals and objectives, and chooses the appropriate means and moment to manage and generalize what they have learned (Lobato, 2006).

In line with the self-determination theory (Deci & Ryan, 2015), self-regulated learning is placed where students are the creators of their academic development because their competencies and resources are adapted to the contextual conditions to enable their governance, focus on continuous learning, the construction of meanings, their socialization, and the evaluation of the process (Lobato, 2006). The path to self-regulation does not neglect the student. It is supported by certain specially designed strategies, such as those related to cognition, whose purpose is to increase higher-order thinking skills (Chica-Cañas, 2010) that facilitate and make the students' academic work more efficient (Hamdan et al., 2021).

Studies of self-regulated learning and learning strategies mostly involve the variable of academic performance, as stated in the survey by Joo et al. (2000). They reported that self-regulated learning is positively related to educational efficiency. Nevertheless, a large group of studies also investigate relationships with non-academic performance. In this regard, through a meta-analysis, Anthonysamy, Koo and Hew (2020) identified a list of self-regulated learning strategies used in mixed learning environments (school-based and online) in higher education institutions. The results revealed that, in general, these strategies correlate positively with non-academic performance. In this sense, non-academic performance was identified in the articles reviewed as students' engagement and interaction, satisfaction, learning outcomes, and performance. That is, academic grade results are not included.

Given the consequences of the pandemic and with these theoretical premises, it is necessary to understand how self-regulated learning is being developed by the students while living in a contingency situation that confine them to continue his professional training at home and how this is influencing his non-academic performance. The concern lies in the importance of self-regulated learning in an environment where the student faces constant distractions, poor bandwidth connection, scarcity of their resources, and even sharing computer equipment with family members.

Based on the position adopted by the student, this work aims to analyze the influence of the use of self-regulated learning strategies on non-academic performance in the mediation of the context. We expect to provide evidence to universities to take the necessary measures that affect the online learning context to increase the development of self-regulated learning.

The work is organized as follows: after the introduction, the conceptualization of self-regulated work, learning strategies, performance, and context; secondly, the methodology used is explained; thirdly, the results of the study are shown; then, a discussion and the conclusions of the study are presented.

Framework

Self-regulated Learning and Learning Strategies

Self-regulated learning is the active process in which students play an important role in mastering their own learning process (Anthonysamy et al., 2020). Students are ac-

tive participants, generating their ways of acting to achieve the learning goals they have set for themselves (Schunk, 1994).

According to Zimmerman (2013), self-regulation in students intends to achieve that they habitually set reasonable learning goals, socialize their available knowledge, choose effective learning strategies, monitor their progress, and adapt to the conditions of the context. Scholars have suggested different theoretical models of self-regulated learning (Winne, 2001; Zimmerman, 2013). In this regard, Pintrich (2000) and Zimmerman (2013) deduced from their study of different models of self-regulated learning that: i) Most of them believe that learners can construct their own goals due to the influence of their environment and their cognitive system; ii) In general, all models enhance the learner's initiative to set learning goals and compare their progress with themselves; iii) Learners develop control capacities concerning cognition, motivation, and behavior; and iv) Learners achieve self-regulation of learning by the impulse of intraindividual and extra-individual factors located in the context.

Autonomous self-regulated learning occurs when the individual sets his/her goals as a consequence of internal stimuli, does not expect something in return and does it only for personal satisfaction that results in a performance itself, not academic. Self-regulated learning can be controlled if students set their goals in response to external stimuli from the context in which they are located (Deci & Ryan, 2015). They can manage their own thinking, feeling, and behavior when acquiring knowledge or developing skills (Winne, 2001). When students feel free to choose their path, the time to learn, and put their skills into practice, they can self-evaluate and reinforce skills and attitudes as an agent of their own development (Porras, 2010), rescuing their independence from the teacher and their classmates.

Combined with its online performance, autonomous self-regulated learning helps students to be equipped with a wide variety of strategies that guide them to obtain a successful outcome and experience during learning (Hamdan et al., 2021). Quesada et al. 2019 found that online education students had a higher level of self-regulation than those enrolled in traditional classroom education. However, success in the virtual learning environment depends on the learner's control of their digital learning process. In this regard, Anthonysamy et al. (2020) recommend that teachers pay more attention to increasing learner control because digital learning presents more challenges and demands greater engagement in self-regulated learning (Zhu et al., 2016).

It is important to consider that while it is true that information technologies potentially underpin learning strategies to lead the student to academic success (García & Tejedor, 2017), it is also mentioned that online learning is not very well accepted by students (Aziz et al., 2014).

The literature presents a diversity of classifications of learning strategies. Still, in itself, all authors synthesize and conclude that learning strategies are conscious, intentional, and organized actions linked to cognition and metacognition aimed at the achievement of a specific learning goal (Beltrán, 2003; Canova & Pecker, 2019; Díaz-Barriga & Hernández, 2007; Gargallo et al., 2012; González et al., 2017; León et al., 2014; Lobato, 2006.)

Performance

Winne (2001) and Zimmerman (2013) make evident that self-regulated learning effort influences academic performance because students use metacognitive skills to learn

to think and act proactively (Ergen & Kanadli, 2017). Álvarez et al. (2020) assert that self-regulated learning influences academic performance and specify how critical it is to corroborate whether the various communication tools provided by universities to students during the COVID-19 pandemic affected their performance. These authors also highlight the role of the teacher in stimulating self-regulated learning and its influence on performance. That is, the self-regulated learning-performance relationship was influenced by the precision of the teachers' instructions so that the student could process and integrate the knowledge received, rehearse information to remember, and develop and maintain positive beliefs about their learning abilities (Álvarez et al., 2020).

Generally, student performance is associated with quantitative measures, such as academic performance that assesses student efficiency through grade point averages, test scores, or final course grades (Vo et al., 2017). To Molsalve (2016), academic performance measures the student's capabilities. It is the evidence of learning during their formative process, and it is expressed in their obtained grades. However, using academic measures alone may give a partial picture of student performance and create an illusion of competence (Soderstrom & Bjork, 2015).

On the other hand, learning or non-academic performance corresponds to a change in the behavior of students' understanding and skills that support the retention and transfer of knowledge in the long term (Soderstrom & Bjork, 2015), and it is measured through non-academic outcomes. These outcomes allow quantification of students' overall attitude toward learning. Subjective measures such as student satisfaction, engagement, and attitude toward learning are generally considered (Vo et al., 2017). So, acquiring self-regulation skills in learning is necessary because students are expected to possess self-management skills to pursue their academic and non-academic goals independently (Anthonysamy et al., 2020). For example, their goals are not necessarily exclusive to academic performance. In this sense, non-academic performance is the permanent change in students' understanding of behavior and skills that support long-term knowledge retention and transfer measured through non-academic outcomes (Ergen & Kanadli, 2017; Soderstrom & Bjork, 2015; Vo et al., 2017; Winne, 2001; Zimmerman, 2013).

Context

Distance education studies reveal that learners can adapt to a context where hypermedia, virtual environments, and asynchronous discussions prevail (Whipp & Chiarelli, 2004). Self-regulated learning, for its part, emphasizes not only the role of the context but also the ability of different external sources (group members, teachers, and others) to socially influence the promotion of individual self-regulation while collaborating (Panadero, 2017). Zimmerman (2013), in his triadic and multilevel models, considered the influence of context as key to the development of self-regulation skills. In this sense, context, in addition to considering a student-teacher interaction environment, considers the environment surrounding the learning situation (Beltrán, 2003).

Besides referring to the formality or informality of an educational system, the context of learning refers to what people do, where they do it, and when they do it. It includes the interaction of participants, affective, cultural, political, economic, social, and family factors that, when combined, have a favorable or unfavorable effect on their learning (Duarte et al., 2011). The environment surrounding everything directly influences the

learning process, such as facilities, infrastructure, and physical spaces equipped with what is necessary to achieve the strategy.

The context is defined as an appropriate and effective physical environment where human relationships of an educational nature take place (Espinoza & Rodríguez, 2017) that promotes respect, solidarity, and democracy (Bolaños & Molina, 2007). It is a space that fosters motivating and permanent learning that includes the school classroom and the interaction of students and teachers (Bolaños & Molina, 2007).

In this line of conceptual review, context refers to the environment that includes geographic space, resource management, and social interaction activities (Beltrán, 2003; Duarte et al., 2011; Gargallo et al., 2012; Sobia et al., 2021; Whipp & Chiarelli, 2004; Zimmerman, 2013).

Due to the health contingency, online learning had to rely on self-regulated learning strategies to achieve task efficiency and somehow overcome the lack of face-to-face interaction with the teacher and fellow students (Sobia et al., 2021). Therefore, the theoretical framework of self-regulated learning is relevantly justified to investigate how autonomous learning strategies influence non-academic performance in the context of online learning during the COVID-19 contingency. With this theoretical conceptualization, a mediation model is posited (Figure 1), and the following hypotheses are proposed:

H_1 - Self-regulated learning strategies positively and significantly influence non-academic performance.

H_2 - The use of self-regulated learning strategies positively and significantly influences the context.

H_3 - Context significantly influences non-academic achievement.

H_4 - The influence of using self-regulated learning strategies on non-academic performance is supported by the mediating effect of context.

Figure 1
Hypothetical model
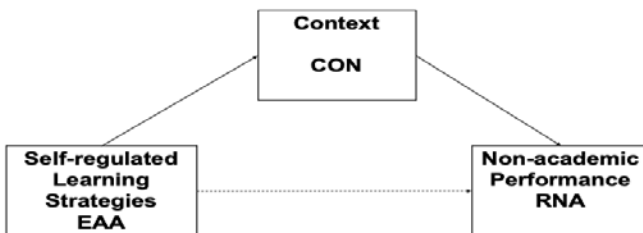
Method

The new academic scenario derived from the health contingency highlights the development of responsibility in students and motivates them to active participation. In this sense, this paper analyzes the use of self-regulated work strategies in 611 students of

the School of Accounting and Administration of a Mexican university. The research was quantitative, non-experimental, cross-sectional, and explanatory in scope.

Data were collected through a questionnaire designed with two sections. The first one collected 4 items of sociodemographic information about the students; the second included 13 items referring to the use of self-regulated learning strategies: use of apps, preparing exams, resolving doubts, sharing information, teamwork, selecting important points, planning tasks, keeping the study up to date, elaboration of schemes-maps-summaries-charts, attending tutoring, exchanging notes-summaries-web addresses, searching and sharing references, expanding the study material. These questions were derived from the works of Beltran (2003); Canova and Pecker (2019); Díaz-Barriga and Hernández (2007); Gargallo et al. (2012); González et al. (2017); León et al. (2014) and Lobato (2006).

Six items on context: having the necessary equipment, connectivity, suitable location, state of mind, adaptation to virtual education, and satisfaction with online classes. The questions were obtained from the contributions of Beltrán (2003); Gargallo et al. (2012); Sobia et al. (2021); Whipp and Chiarelli (2004); Zimmerman (2013).

Finally, six items on non-academic performance: reacting to low grades, learning from mistakes, assimilating, socializing, self-assessing what has been learned, and detecting failures. These items were obtained from the works of Ergen and Kanadli (2017); Soderstrom and Bjork (2015); Vo et al. (2017); Winne (2001); Zimmerman (2013).

The survey was conducted online during February and March 2021. All items were evaluated using a Likert-type scale with five response options (from 1 Never to 5 Always). Experts validated the questionnaire. Subsequently, its validity and statistical reliability were obtained, which allowed for its metric quality.

The generalized least squares regression method was used to analyze predictive influence because it was desired to know the percentage of variance explained by the variable Non-academic performance concerning a set of independent variables. For the Context (Mediator) mediation analysis, a relationship was established between the variable Self-regulated learning strategies (Independent) and Non-academic performance (Dependent) (Figure 1). SPSS software with the Process extension was used (Hayes, 2017).

The data analysis followed the recommendations of Baron and Kenny (1986):

i. Confirm the correlation between dependent and independent variables and dependent with the mediator;

ii. Confirm a significant relationship between the dependent and mediator variables while keeping the effect of the independent variable constant; and

iii. Verify that the relationship between the independent and dependent variables is significantly lower by including the mediator variable.

Results

The sample size was determined by convenience sampling, for which all students were asked to answer the survey. A total of 611 surveys were collected (43% response rate), of which 64% are female, and 36% are male. Forty-one percent have a cumulative

grade point average between 10 and 9 (on a scale of 10); 52% have a cumulative grade point average between 8 and 8.9; the rest have a grade point average of less than 7.9. 69% are in their 5th and 7th semesters, 8% are in their 9th semester and the rest are in their 3rd and 1st semesters.

The data's normality was checked in the three variables for the questionnaire validation using the Kolmogorv-Smirnov test. The result was: Non-academic performance .117**, Self-regulated learning strategies .066**, and Context .062**. The reliability of the questionnaire was determined with Cronbach's Alpha: Self-regulated learning strategies (.872), Context (.758), and Non-academic performance (.728), values above .7, reveal "good" reliability (Nunnally & Bernstein, 1994).

Table 1 refers to the variable Non-academic performance with the highest mean (3.9). This justifies that students give more importance to evaluating their learning from what they did incorrectly to improve the next time, learn from their mistakes, try to use their own words to reproduce knowledge, socialize what they learned and make their self-evaluation from what they know.

Self-regulated learning strategies have a mean of 3.6, representing the second place of importance given by the students to prepare for their exams. They used strategies such as reviewing notes and consulting with classmates, keeping their work up to date, preparing notes, summaries, maps, and synoptic tables, and little focus on expanding the material provided by their teacher (Table 1). The third place is occupied using the variable Context (3.4). Most students have the necessary equipment and Internet connectivity, their work is done in an adequate area, their mood is positive, and they feel good. Still, only some adapt to distance education, and even fewer enjoy online classes (Table 1).

Table 1

Study variables

Variable	Mean
Non-academic Performance.	3.9
Self-regulated Learning Strategies.	3.6
Context.	3.4

Table 2 shows a significant positive correlation between the variables under study, meeting the requirements indicated by Baron and Kenny (1986).

Table 2

Pearson correlation

	Self-regulated Learning Strategies	Context
Non-academic Performance.	.669**	.307**
Self-regulated Learning Strategies.		.328**

Note. N = 611.

The structural model reported:

i. Significant β coefficients for each path between constructs (.265 and .631), according to Falk and Miller (1992), were "desirable" by being greater than .2.

ii. Confidence intervals confirming the significance of the path coefficients by not including the zero value (95% BCa); these intervals were calculated with a bootstrapping sampling of 5,000 observations, a two-tailed test with a significance of 5% (Dijkstra & Henseler, 2015).

iii. The *p*-value in all relationships is < .001. Only the direct effect of CON→RNA is significant at .05. In this regard, Henseler, Ringle and Sarstedt (2015) suggest that the *p*-value should be below the predefined α level (Table 4).

Tables 3 and 4 present the results of the simple linear regressions between the three variables. Self-regulated learning strategies significantly influence Context (β = .3542; *t* = 8.5794; *p* < .001). Although the variance explained is unrepresentative at 10.78% (Table 3). Table 4 presents the significant influence effect of the variable Self-regulated learning strategies on Non-academic performance (β = .5969; *t* = 20.1109; *p* < .001) and Context (β = .0851; *t* = 3.0910; *p* < .05), with an explained variance of R^2 of 45.61%.

Table 5 shows the total effects of the variable Self-regulated learning strategies with Non-academic performance, which was statistically significant (β = .6271; *t* = 22.2107; *p* < .001), where R^2 explains 45.61% of the variance. In the same Table, we see the direct effects of the variable Self-regulated learning strategies (X) and Non-academic performance (Y); the direct effect was statistically significant (β = .5969; *t* = 20.1109; *p* < .001). As for the indirect effects of Self-regulated Learning Strategies (X) on Non-academic Performance (Y), mediated by Context (M) (β = .0301; the associated confidence interval does not include the zero value (.0090 - .0541), which demonstrates a statistically significant effect. Finally, the results show the verification of the four hypotheses posed.

Table 3

Output variable: Context

Model	coeff	se	t	p	LLCI	ULCI
R = .3284 R² = .1078						
Constant	2.1379	.1512	14.1412	.0000	1.8410	2.4348
EAA	.3542	.0413	8.5794	.0000	.2731	.4353

Table 4

Output variable: Non-academic Performance

Modelo	coeff	se	t	p	LLCI	ULCI
R = .6753 R² = .4561						

Modelo	coeff	se	t	p	LLCI	ULCI
Constant	1.4746	.1183	12.4624	.0000	1.2423	1.7070
EAA	.5969	.0297	20.1109	.0000	.5387	.6552
CON	.0851	.0275	3.0910	.0021	.0310	.1391

Table 5

Effects: total, direct and indirect from X on Y

	Effect	se	t	p	LLCI	ULCI	c_ps	c_cs
R = .6690 R² = .4475								
Total effect X on Y	.6271	.0282	22.2107	.0000	.5716	.6825	1.0951	.6690
Direct effect X on Y	.5969	.0297	20.1109	.0000	.5387	.6552	1.0425	.6368
Indirect effect X on Y	**Effect**	**BootSE**	**BootLLCI**	**BootULCI**				
CON	.0301	.0112	.0090	.0541				

Discussion

The results evidenced that using self-regulated learning strategies contributes to non-academic performance. However, it is imperative to emphasize strengthening these strategies to favor self-regulated learning. González et al. (2017) suggest a paradigm shift in the teaching process that reinforces the use of self-regulated learning strategies based on the awareness of teachers and universities through their educational models and curricular designs.

The outcomes of this study invite teachers to guide students in the organization of their time and study material, in how to take and make notes, elaborate summaries, concept maps, and schemes, use databases, improve memorization, and even perform voluntary distractions and relaxation exercises to regain attention (González et al., 2017).

H_1 - The use of self-regulated learning strategies positively and significantly influences non-academic performance was accepted. When the student self-regulates, uses learning strategies, and tends to self-assess, it ensures that the content has been learned (Cabero & Llorente, 2020). In the opposite case, when students perceive themselves with a medium-low level in the degree of development of their self-regulated learning competencies, the need for the teacher to enhance this type of learning is recognized so that students have adequate resources and can respond to the demands of society (Ibarra & Rodríguez, 2011).

Coherence in teachers' performance is demanded (Berridi & Martínez, 2017). In this regard, every teacher, in coordination with the academy, has to organize the teaching-learning process of their subject as an intervention aimed at its development through progressively self-regulated learning (Berridi & Martínez, 2017).

Contrary to the results obtained by Garrote et al. (2016), where the students surveyed showed more attention to elaboration than to self-questioning, the students in the present research have taken into account their self-assessment to focus on the content of the subject. They evaluated their level of understanding and focused on questioning the veracity of what they learned. This supports García and Tejedor (2017) postulate that students use learning strategies to improve the quality of learning. In addition, the processes that facilitate this learning stand out for their efficiency in acquiring and developing skills. It is a good means that helps to plan, organize, and prepare tasks and exams, increase motivation to learn, maximize learning, and improve academic performance (Pegalajar, 2020) and non-academic performance that reflects personal satisfaction.

H_2 - The use of self-regulated learning strategies positively and significantly influences the context is accepted. Similarities were found in the study of Whipp and Chiarelli (2004). They found in their research of graduate students that they not only used self-regulation strategies but also adapted them to the context, for example, the use of hypermedia resources and participation in asynchronous discussions with peers and teachers.

Similar evidence is seen when comparing the profile of Latin American students with the rest of the world. Cabero and Llorente (2020) point out that Latinos are more concerned about technological equipment, Internet connection, communication with classmates and teachers, regular schedule, economic issues, and leaving aside social isolation and fear of the contagion of Covid-19.

H_3 - The context significantly influences non-academic performance is also accepted. It was shown that mood is a relevant aspect. Although León et al. (2014), in their study with students from a Chilean university, mention that this aspect was less valued.

On the other hand, most students had the necessary equipment and connectivity to do online work, which made them feel confident and could carry out their assignments more easily. However, the university must diagnose how equipped its students are to support online learning. Furthermore, how much teaching work fosters self-learning over traditional teacher-centered instructional work (Pegalajar, 2020).

The online learning context generated a climate that supported autonomy and led to better non-academic outcomes (Zheng et al., 2020). Given this situation, the debate is growing in universities about the continuity of this modality, recognizing the critical factors of the context that could contribute to student motivation (Redmond et al., 2018) and thus in its impact on non-academic performance.

Finally, H_4 was also accepted. The influence of the use of self-regulated learning strategies on non-academic performance is supported by the mediating effect of the context. The analysis of the context in which students develop is evident. Although the student may have all the enthusiasm to learn and use learning strategies, the context in which they live significantly influences their non-academic performance. According to Zheng et al. (2020), online learning can make students feel isolated and disconnected, so more self-regulatory behavior is believed to be necessary. Sometimes the scarce

computer resources of students, especially those in rural areas, increase the digital divide, affecting their satisfaction.

Barriers to student adoption of online learning have been detected, such as the uncertainty and psychological distress experienced during the COVID-19 pandemic. This situation merits creating an online learning context that motivates students to sustain or improve their non-academic performance (Sobia et al., 2021). In this sense, learning strategies in a favorable context will incentivize students and enhance their non-academic performance. In this regard, Lovón and Cisneros (2020) reflect on the intense complications in pandemic contexts that inhibit access to quality education.

Consistent with Hamdan et al. (2021), online education needs to be well-established in developing countries. These authors found limited university student readiness and satisfaction with online education during the early stage of the COVID-19 pandemic.

Conclusions

Online learning during the COVID-19 pandemic and self-determination theory applied in the post-pandemic era suggest that students use specially designed strategies to improve their declarative and procedural knowledge.

Self-regulated learning strategies favor knowledge, influence the conditions for solving tasks, learning contents, and achieve their use and adaptation to new situations, such as the one we are currently experiencing.

Under normal conditions, universities provide resources for face-to-face classes. However, these resources are limited for the current environment, a situation attributable to the students surveyed stating that they did not enjoy online education. The use of technology, the necessary materials at hand, the speed of connectivity, and the appropriate environment, which prevail, still mark a gap between students with and without economic resources, which ultimately affects their sensitivity that impacts their non-academic performance.

The contribution of this study addresses higher education and the enrichment of self-determination theory during the transition to online learning. Second, this study empirically defends the benefits of using learning strategies in appropriate contexts for students to improve or sustain their non-academic performance, which has to do with their satisfaction and conducive conditions of connectivity and technology. Thirdly, the study redirects to the role played by the context in which students operate as they are confined to their homes to continue their education. Often their economic resources limit online learning and thus contribute practically to informing institutional and political decision-makers in designing public policies on education and technology.

References

Álvarez, R. A., Estrada, M. A., Anderson, S. M., Mlodzianowska, S., García, V., Villagomez, B. C., & Carvache, F. M. (2020). Multitasking behavior in online classrooms and academic performance: case of university students in Ecuador during COVID-19 outbreak. *Interactive Technology and Smart Education. https*://www.emerald.com/insight/content/doi/10.1108/ITSE-08-2020-0160/full/html

Anthonysamy, L., Koo, A. C., & Hew, S. H. (2020). Self-regulated learning strategies and non-academic outcomes in higher education blended learning environments: A one decade review. *Educ. Inf. Technol*, *25*, 3677–3704. https://doi.org/10.1007/s10639-020-10134-2

Aziz, M., Bloom, D. E., Humair, S., Jimenez, E., Rosenberg, L., & Sathar, Z. (2014). Education system reform in Pakistan: why, when, and how? *IZA Policy Paper*, *76*. http://hdl.handle.net/10419/91762

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173–1182. https://doi.org/10.1037/0022-3514.51.6.1173

Beltrán, L. J. A. (2003). Estrategias de aprendizaje. *Revista de Educación*, *332*, 55-73. http://www.educacionyfp.gob.es/dam/jcr:0bc115bf-2ee5-4894-91f5-7e32e07059d4/re3320411443-pdf.pdf

Berridi, R. R., & Martínez, G. J. (2017). Estrategias de autorregulación en contextos virtuales de aprendizaje. *Perfiles Educativos*, *39*(156). http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0185-26982017000200089

Bolaños, B. G., & Molina, B. Z. (2007). *Introducción al currículo*. 21 Ed. Universidad Estatal a Distancia.

Cabero, A., & Llorente, C. C. (2020). Covid-19: transformación radical de la digitalización en las instituciones universitarias. *Campus Virtuales*, *9*(2), 25-34. http://www.uajournals.com/ojs/index.php/campusvirtuales/article/view/713/410

Canova, B. C., & Pecker, L. (2019). Características del aprendizaje autónomo en estudiantes de kinesiología de una institución de educación superior de Buenos Aires. *Investigación en Enfermería. Imagen y Desarrollo*, *21*(2), 1-9. https://doi.org/10.11144/Javeriana.ie21-2.caae

Chica-Cañas, F. A. (2010). Factores de la enseñanza que favorecen el aprendizaje autónomo en torno a las actividades de aprendizaje. *Reflexiones Teológicas*, *6,* 167-195. https://dialnet.unirioja.es/servlet/articulo?codigo=3709190

Deci, E., & Ryan, R. (2015). *Self-Determination Theory*. International Encyclopedia of the Social & Behavioral Sciences*, 4*, 486.

Díaz-Barriga, F., & Hernández, R. G. (2007). *Estrategias docentes para un aprendizaje significativo una interpretación constructivista*. 2ª Ed. Mc Graw Hill.

Dijkstra, T. K., & Henseler, J. (2015). Consistent partial least squares path modeling. *MIS Quarterly*, *39*(2), 297–316. https://research.utwente.nl/en/publications/consistent-partial-least-squares-path-modeling

Duarte J., Gargiulo C., & Moreno M. (2011). *Infraestructura escolar y aprendizaje en la educación básica latinoamericana: Un análisis a partir del SERCE*. BID. https://publications.iadb.org/publications/spanish/document/Infraestructura_escolar_y_aprendizajes_en_la_educación_básica_latinoamericana_Un_análisis_a_partir_del_SERCE.pdf

Ergen, B., & Kanadli, S. (2017). The effect of self-regulated learning strategies on academic achievement: a Meta-analysis study. *Eurasian Journal of Educational Research, 17*(69), 55-74. 10.14689/ejer.2017.69.4

Espinoza, N. L. A., & Rodríguez, Z. R. (2017). La generación de ambientes de aprendizaje: un análisis de la percepción juvenil. *RIDE Rev. Iberoam. Investig. Desarro Educ*, *7*(14). https://doi.org/10.23913/ride.v7i14.276

Falk, R. F., & Miller, N. B. (1992). *A primer for soft modelling*. 1ª Ed. USA.

Fernández, M. M., González, V., & del Molino, G. (2011). Perfil del alumnado universitario de Educación Infantil. Un estudio descriptivo desde los inicios del Espacio Europeo de Educación Superior hasta los Estudios de Grado (2006-2010). *Revista de Investigación Educativa*, *29*(1), 187-203. http://www.redalyc.org/articulo.oa?id=283322813011

García, V. M. A., & Tejedor, F. J. (2017). Percepción de los estudiantes sobre el valor de las TIC en sus estrategias de aprendizaje y su relación con el rendimiento. *Educación XX1*, *20*(2), 137-159. http://www.redalyc.org/articulo.oa?id=70651145006

Gargallo, B., Almerich, G., Suárez-Rodríguez, J. M., & García-Félix, E. (2012). Estrategias de aprendizaje en estudiantes universitarios excelentes y medios. Su evolución a lo largo del primer año de carrera. *Relieve. Revista Electrónica de Investigación y Evaluación Educativa*, *18* (2), 1-22. http://www.redalyc.org/articulo.oa?id=91625870001

Garrote, R. D., Garrote, R. C., & Jiménez, F. S. (2016). Factores influyentes en motivación y estrategias de aprendizaje en los alumnos de grado. *REICE. Revista Electrónica Iberoamericana sobre Calidad, Eficacia y Cambio en Educación*, *14*(2), 31-44. 10.15366/reice2016.14.2.002

González, C. Y., Vargas, G. M. L., Gómez, del C. M. I., & Méndez, P. A. M. (2017). Estrategias que favorecen el aprendizaje autónomo en estudiantes universitarios. *Caleidoscopio*, *37*, 75-90. https://doi.org/10.33064/37crscsh903

Hamdan, K. M., Al-Bashaireh, A. M., Zahran, Z., Al-Daghestani, A., AL-Habashneh, S., & Shaheen, A. M. (2021). University students' interaction, Internet self-efficacy, self-regulation and satisfaction with online education during pandemic crises of COVID-19 (SARS-CoV-2). *International Journal of Educational Management*, *35*(3), 713-725. https://doi.org/10.1108/IJEM-11-2020-0513

Hayes, F. A. (2017). *Introduction to Mediation, Moderation, and Conditional Process Analysis*. *A Regression-Based Approach*. 2ª Ed. www.guilford.com/p/hayes3

Henseler, J., Ringle, C. M., & Sarstedt, M. A. (2015). A new criterio for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Acad. Mark*. Sci, *43*, 115–135. https://doi.org/10.1007/s11747-014-0403-8

Ibarra, S. M. S., & Rodríguez, G. G. (2011). *Los procedimientos de evaluación*. In G. Rodríguez Gómez & M. S. Ibarra Sáiz (Eds.), *e-Evaluación orientada al e-Aprendizaje estratégico en Educación Superior* (pp. 7-78).Narcea.

Jiménez, C. J. L., Camúñez, R. J. A., De Fuentes, R. P., & González, R. M. R. (2015). Factores determinantes del rendimiento académico universitario en el Espacio Europeo de Educación Superior. *Innovar*, *25*(58), 159-175. https://doi.org/10.15446/innovar.v25n58.52440

Joo, Y. J., Bong, M., & Choi, H. J. (2000). Self-efficacy for self-regulated learning, academic self-efficacy, and internet self-efficacy in web-based instruction. *ETR&D*, *48*, 5-17. https://doi.org/10.1007/BF02313398

León, U. A. P., Risco, V. E., & Alarcón, S. C. (2014). Estrategias de aprendizaje en educación superior en un modelo curricular por competencias. *Revista de la Educación Superior*, *43*(172), 123-144. https://doi.org/10.1016/j.resu.2015.03.012

Lobato, F. C. (2006). *El estudio y trabajo autónomo del estudiante*. In M. Miguel (Dir.), *Métodos y Modalidades de enseñanza centradas en el desarrollo de competencias*. Alianza Universidad.

López, A. M. (2010). Diseño y análisis del Cuestionario de Estrategias de Trabajo Autónomo (CETA) para estudiantes universitarios. *Revista de Psicodidáctica*, *15*(1), 77-99. http://www.redalyc.org/articulo.oa?id=17512968005

Lovón, M., & Cisneros, S. (2020). Repercusiones de las clases virtuales en los estudiantes universitarios en el contexto de la cuarentena por COVID-19: El caso de la PUCP. *Propósitos y Representaciones*, *8* (SPE3), e588. http://hdl.handle.net/10757/653628

Molsalve, C. H. (2016). *Aproximaciones hacia una definición de "Bajo Rendimiento Escolar"*. https://ridum.umanizales.edu.co/xmlui/handle/20.500.12746/2613

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory*. 3ª Ed. McGraw-Hill.

Panadero, E. (2017). A Review of Self-regulated Learning: Six Models and Four Directions for Research. *Frontiers in Psychology*, *8*. 10.3389/fpsyg.2017.00422

Pegalajar, M. C. (2020). Estrategias de Trabajo Autónomo en Estudiantes Universitarios Noveles de Educación Individual. *REICE. Revista Iberoamericana sobre Calidad, Eficacia y Cambio en Educación*, *18*(3), 29-45. https://doi.org/10.15366/reice2020.18.3.002

Pimienta, J. H. (2004). *Constructivismo: estrategias para aprender a aprender*. Pearson Educación.

Pintrich, P. (2000). *The Role of Goal Orientation in Self-Regulated Learning Components of Classroom Academic Performance*. In P. P. Monique Boekaerts & M. Zeidner (eds.), *Handbook of Self-Regulation* (pp. 451-502). Academic Press.

Porras, V. N. R. (2010). La psicología y la educación a distancia: frente al reto de aprender desde la autonomía. *Poiésis*, *19*. https://doi.org/10.21501/16920945.110

Quesada, P. C, Sánchez, M. A., Ciraso, C. A., & Pineda, H. P. (2019). Online vs. Classroom Learning: Examining Motivational and Self-Regulated Learning Strategies Among Vocational Education and Training Students. *Frontiers in Psychology*,*10*(2795), 1-13. https://www.frontiersin.org/articles/10.3389/fpsyg.2019.02795/full

Redmond, P., Heffernan, A., Abawi, L., Brown, A., & Henderson, R. (2018). An online engagement framework for higher education. *Online Learning*, *22*(1), 183-204. https://olj.onlinelearningconsortium.org/index.php/olj/article/view/1175

Schunk, D. H. (1994). *Self-regulation of self-efficacy and attributions inacademic settings.* In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-regulation of learning and performance. Issues and educational applications.* Erlbaum.

Sobia, S. S., Asif, A. S., Farzana, M., Atika, A. K., & Arjumand, S. (2021). Aprendizaje en línea durante la pandemia de COVID-19: aplicación de la teoría de la autodeterminación en la "nueva normalidad". *Revista de Psicodidáctica*, *23.* 10.1016/j.psicod.2020.12.004

Soderstrom, N. C., & Bjork, R. A. (2015). Learning versus performance: An integrative review. *Perspectives on Psychological Science*, *10*(2), 176–199. https://doi.org/10.1177/1745691615569000

Villamonte, R. (2020). *Los retos de la enseñanza virtual*. Abril. http://www.unmsm.edu.pe/noticias/ver/los-retos-de-la-ensenanza-virtual

Vo, H. M., Zhu, C., & Diep, N. A. (2017). The effect of blended learning on student performance at course-level in higher education: A meta-analysis. *Studies in Educational Evaluation*, *53,* 17–28. https://www.academia.edu/32537575/The_effect_of_blended_learning_on_student_performance_at_course_level_in_higher_education_A_meta_analysis

Whipp, J., & Chiarelli, S. (2004). Self-Regulation in a Web- Based Course: A base lated Learning and Academic Achievement: study. *Educational Technology Research and Development*, *52*(4), 5-22. https://eric.ed.gov/?id=EJ732659

Winne, P. H. (2001). Self-Regulated Learning Viewed from Models of Information Processing. In B. Zimmerman & D. Schunk (eds.), *Self-Regulated Learning and Academic Achievement: Theoretical perspectives* (pp.153-190). Lawrence Erlbaum.

Zheng, Y. Y., Ma, Y. T., Zhang, J. Y., & Xie, X. (2020). COVID-19 and the cardiovascular system. *Nat Rev Cardiol*, *17*, 259–260. https://doi.org/10.1038/s41569-020-0360-5

Zhu, Y., Au, W., & Yates, G. (2016). University students' self-control and self-regulated learning in a blended course. *Internet and Higher Education*, *30*, 54–62. https://doi.org/10.1016/j.iheduc.2016.04.001

Zimmerman, B. J. (2013). From cognitive modeling to self-regulation: A social cognitive career path. *Educational Psychologist*, *48*(3), 135-147. https://doi.org/10.1080/00461520.2013.79467

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