Self-regulated learning in university students apply in methodological strategies

[1]Jenny Milagros MelchorCanevaro[2]Cecilia de los Milagros Miranda Jara[3] Ricardo Iván VértizOsores[4] Helen Ibeth CardenasSolis[5] Jacinto Joaquín Vértiz-Osores

[1]*Universidad César Vallejo, PerúORCID:https://orcid.org/0000-0002-5660-0908*
jmelchor@ucv.edu.pe
[2]*Universidad César Vallejo, PerúOrcid: https://orcid.org/0000-0002-2915-5685*
mmirandaj@ucv.edu.pe
[3]*Universidad César Vallejo, PerúOrcid: https://orcid.org/0000-0003-1223-2784*
rivertizv@ucvvirtual.edu.pe
[4]*Universidad César Vallejo, PerúOrcid: https://orcid.org/0000-0002-4011-3662*
hcardenass@ucv.edu.pe
[5]*Universidad Nacional Tecnológica de Lima Sur, Perú*
Orcid: https://orcid.org/0000-0003-2774-1207
jvertiz@untels.edu.pe

Summary

In highereducation, studentsmustfacetheirlearning in anintentional, autonomous and effectiveway; In thissense, theobjectiveofthepresentstudywas to determine theinfluenceoftheapplicationofmethodologicalstrategies in self-regulatedlearning in studentsofthe curricular experienceofphilosophyof a PrivateUniversityof Lima - Peru. Theresearchhad a quantitativeapproach and a pre-experimentaldesign, withtheparticipationof 50 V cyclestudents to whomtheself-regulatedlearninginventory (SRL) wasapplied(Lindner et al., 1996) . According to the descriptive analysis, thestudentspresentedimprovements in self-regulatedlearning after theapplicationofmethodologicalstrategies, goingfrom a verylowlevelof 36% in thepre-test to a highlevelwith 46% in thepost-test. Finally, itwasdeterminedthatmethodologicalstrategiessignificantlyinfluencestudents' self-regulatedlearning; beingsignificantalso in the 'executive, cognitive, motivational and environmental control' dimensions, so itisveryimportant to applythe fundamental processesinvolved in self-regulatedlearningwhenthestudentisstudyingindividually and in virtual contexts.

Keywords: Online learning, Active learning, Educationalstrategies, Universitystudent.

Introduction

Currently, education demands the implementation of strategies that promote self-management of knowledge and 'learning to learn' through which students develop learning autonomously and, in this scenario, self-regulation allows an increase in the possibility of academic success. To do this, the teacher has to provide the conditions by playing the role of facilitator of the educational process so that students take control of the learning process and acquire self-regulatory skills (Zimmerman, 2001) .

At all educational levels in the European Union, learning is encouraged to face challenges of competitiveness throughout life, giving special attention to the self-regulation of learning, as a predictor of academic achievement and important aptitude for education in postmodern societies, where people with self-regulatory skills are academically more outstanding (Diaz et al., 2015) . In Latin

America, Mexico is the country with the highest dropout of university students, finding a lack of motivation to learn, thus relating to self-regulated learning (UNAM, 2006) . In the Venezuelan case, the study of self-regulated learning in extra-academic settings placed greater interest in students focusing on non-academic areas (Lomelli, 2013), a situation that provides an interesting perspective for its approach.

In Peru, higher education students generally apply outdated methods and forms of study to solve their academic problems, which leads to poor learning, lack of self-regulation prioritizing cognitive processes that decreases the possibility of successfully facing their professional training. In this sense, Sternberg & Spear-Swerling (1996) highlighted memory before reasoning, low inability to infer when faced with a problem in university graduates; as well as the absence of logic before any specific question that determines the search for solutions. In addition, a meager reading habit, for which it is difficult for him to express what he understands, using short sentences or literary metaphors and the acceptance of questioning plot contents, without verifying the information provided. For this reason, these same authors mentioned that in the university academic context there is a lack of learning and metacognition strategies, which directs students to subsequent work and personal failure; Observing an educational system that does not promote the necessary scenario to alleviate the deficiencies from regular basic education, the same one that was not so solid in its preparation for higher education and, what is worse, the deficiencies are still accentuated at this level.

Undoubtedly, it is a challenge for university teachers that the student dynamically intervenes in his own learning process, therefore, the educator performs an important task as a metacognitive mediator, making the student feel the protagonist and constructor of his own learning, where he can learn. to think critically (Chaudhary & Dey, 2013; Conrad, 2013) . In the university where the research was carried out, a reality similar to the national educational problem and other Latino contexts (Stein et al., 2019) is shown due to the fact that the students have evident cognitive, metacognitive and affective-motivational deficiencies. With insufficient and inadequate resources to control the academic and social environment; Likewise, a lack of initiative to request support from competent people, which is linked to the self-regulatory process of learning, resulting in a decrease in its efficiency and effectiveness to enhance learning. Undoubtedly, there is a need for teachers to implement methodological strategies that mitigate the little interest in the development of the subjects, especially the philosophy course, through which the practice of reading and self-regulated learning is promoted.

Amongthebackground to thestudyoftheself-regulation variable, Martínez & Gaeta (2018) implemented a virtual supportprogramthroughthe Moodle platformwiththeaimofdevelopingself-regulatedlearning in universitystudentswith a quasi-experimental design in twogroups. Theydeterminedthatthe experimental groupobtainedsignificantimprovements in the cognitive, motivational and resourcemanagementdimensions. Theyemphasizedthatthe use of virtual learningenvironmentsisimportantto promoteself-regulatedlearning. There are worksthathaveevaluatedtheinfluenceonstudentlearningusingPlatformssuch as

Moodle havingencouragingresults(Aikina et al., 2020; De Medio et al., 2020) , althoughthereisevidencethatindicatedtheeffectivenessofothers(Kadirov & Shukurov, 2020; Mpungose, 2019) whichwouldrevealthat in Inreality, therewouldnot be exclusivity in theassignmentof a greaterorlessereffectivenessofsometoolfor self-regulationoflearning, butratheritdepends more ontheway in whichitisapplied(Kadirov & Shukurov, 2020) , in otherwords, itdependsdirectlyonthestrategymethodologicalAlthoughthisreasoningisnot new in theacademy, sincetheyconstitute a set ofmodes/waysofteachingthatbecame more popular evenbeforethe Sars-CoV-2 pandemic(Díaz Agea et al., 2019; Mwandosya et al ., 2019; Safapour et al., 2019) , in Perutheyhavenotbeensufficientlyimplemented, in such a waythatself-regulatedlearningisstillpartofthe set ofstrategies in manycurrent virtual environments, specificallytheresearchproblemwasraised: Whatisthelevelofinfluenceoftheapplicationofmethodologicalstrategies in self-regulatedlearning in studentsofthe curricular experienceofphilosophyof a PrivateUniversityof Lima - Peru? Proposing as anobjective to determine thelevelofinfluenceofthisapplication in thissametypeoflearning.

The research is technically based on the National Educational Project (PEN) to 2021 in Peru in strategic objective 5 (Minedu & CNE, 2007) which made reference that quality Higher Education is a favorable component for progress and national competitiveness, with expected result 3: by 2021 "(…) higher education training centers train professionals with ethical principles and a sense of social responsibility; highly competent in the face of demands in the economic, productive and labor scenario at a national and international level". In addition, they take advantage of and produce new knowledge. This can only be achieved by developing reflective, critical and autonomous thinking, not only in front of their environment but also in front of themselves, capacities and limitations.

In relation to thetheoreticalfoundationofthemethodologicalstrategies variable, itisfoundthattheyprovide alternatives in the different ways of teaching and learning within university life, based on the principle of heterogeneity in learning (Díaz & Hernández, 2002) , that is, that each student has their own way of learning or dispositions to learn with one methodology over another. Another definition of methodological strategies indicates it as the cooperation and competition that must synergize in the application of a strategy (Dixit & Nalebuff, 2010) . According to Mintzberg & Waters (1989) , strategies must be weighted based on criteria such as flexibility, security, surprise factor, conservation of initiative and clarity and viability of objectives.

There is a series of free-use software on the market, among which the Moodle platform stands out, as reported on its website, it involves the creation of courses on websites, based on a social constructivist orientation. According to Castillo et al. (2010) is the most used academic platform to date with presence in 212 countries and with more than 37 million users. For Martínez (2006) it is a virtual tool that comes from the acronym ' *Modular object oriented dynamic learning environment* ' and is used for the field of education in its virtual modality, whose main characteristics are its ease of use and being very intuitive.

In relation to self-regulated learning, Zimmerman (2001) indicated that it is a process where students systematically conduct their thoughts, feelings and actions to achieve their goals. In this regard, Gaeta & Cavazos (2016) defined it as a process where learners individually plan, organize, self-instruct, self-monitor and evaluate in the different phases of their learning process. Zimmerman (2001) dimensioned it in four components: the executive process, as the execution of the metacognitive process that the students carry out intentionally; that implies evaluation and construction strategies, considers the analysis of the task, as well as cognitive monitoring at the moment of learning; the cognitive process, which are mental processes that enable learning, such as reasoning, memory, problem solving or meaning production, being as a habitual or automatic phase that involves the processes of storage and retrieval of information, attention, and realization of the task: the motivational process, which consists of personal beliefs, the learner's perception of his ability to achieve the goal; and lastly, the environment control process, related to the use and control of the environment; the search for support, the management of tasks, the resources of the environment and time.

METHODOLOGY

According to Hernández-Sampieri & Mendoza (2018) , the study was framed in the quantitative approach, experimental design - Pre-experimental, with evaluation of a single group 'before-after'. 50 university students from the Philosophy curricular experience were evaluated, previously complying with theethicalstandardsoftheinstitution.
Theinstrumentused was the self-regulatedlearninginventory

(SRL)designedbyLindner et al. (1996) . Itsreliabilitywashigh (Cronbach's Alpha = 0.897). A baselineevaluation (pre test) wasmade and thenthe program was developed with the methodological strategies: Moodle Platform and case studies, over 10 sessions. After the intervention, the post test was applied to compare descriptive results and test hypotheses.

The interpretation of the results was considering the categories established in the instrument according to detail: Very High (252 – 300); High (204 – 251); Medium (156 – 203); Low (108 – 155) and finally Very Low (60 – 107). It was a 60-item instrument with a Likert scale and four dimensions: a) executive processing; b) cognitive processing; c) motivational and d) environmental control. The data was processed with SPSS® v 25 Software in Spanish. For the inferential analysis: the Wilcoxon signed rank test was applied ($\alpha = 0.05$).

RESULTS

In the descriptive results it was possible to show that in the pre-test, the highestpercentagewaslocated at the 'Very low' level with 36%; however, in the post test the highestlevelwas 'High' with 46%; therefore, itfollows that the methodologicalstrategieswould have positive effects on the levelsofself-regulatedlearningachievement. On the other hand, for the executive dimension in the pre-test, the highestpercentagewas at the 'Very low' level with 40%; however, in the post test the highestlevelwas 'High' with 44%. The cognitive dimensionwasrepresented by 38% (Very low) in the pretest and in the post test with 40% in the 'High' level. Regarding the motivationaldimension, in the pre-test, the highestpercentagewas at the 'Very low' level with 38%; however, in the post test the highestlevelwas 'High'

with 42%. Finally, the environment control dimensionwasrepresented by 38% (Very low) in the pre-test and in the post test with 48% in the highlevel.

Table 1 .

Wilcoxon signedrank test to test theinfluenceofmethodologicalstrategiesonself-regulatedlearning in universitystudentsaccording to ranks and contraststatistics.

Variable and Dimensions (Pretest &Posttest)		very low	Under	Medium	High	Very high	Wilcoxon Test (Sig / Z)	positive ranges
self-regulatedlearning	**pre-test**	18 (36%)	13 (26%)	11 (22%)	5 (10%)	3 (6%)	.000	Four. Five
	post-test	0 (0%)	7 (14%)	8 (16%)	23 (46%)	12 (24%)	-5.979b –	
'Executive' Dimension	**pre-test**	20 (40%)	13 (26%)	11 (22%)	3 (6%)	3 (6%)	.000	38
	post-test	4 (8%)	8 ((16%)	6 (12%)	22 (44%)	10 (20%)	-5,494b –	
'Cognitive' dimension	**pre-test**	19 (38%)	12 (24%)	14 (28%)	2 (4%)	3 (6%)	.000	39
	post-test	3 (6%)	6 (12%)	9 (18%)	20 (40%)	12 (24%)	-5,525b –	
'Motivational' Dimension	**pre-test**	19 (38%)	13 (26%)	10 (20%)	6 (12%)	2 (4%)	.000	43
	post-test	2 (4%)	6 (12%)	9 (18%)	21 (42%)	12 (24%)	-5,811b –	
'Environment control' dimension	**pre-test**	19 (38%)	14 (28%)	8 ((16%)	6 (12%)	3 (6%)	.000	44
	post-test	1 (2%)	7 (14%)	6 (12%)	24 (48%)	12 (24%)	-5.873b –	

b. It is based on negative ranges

A significantcontrastofthehypothesiswasobserved (p=0.000 <0.05), indicatingthatthere are differencesbetweenthe pre- and post-testtestsapplied to thestudents. In accordancewiththepreviouslydescribed descriptive results, itisdeducedthattheeffectofthe use ofmethodologicalstrategieswas positive in self-regulatedlearningbecause 45 studentsmanaged to improvetheirachievementlevels (positive ranges=45 after applyingtheexperiment).

In relation to thespecifichypothesesmade**,**itwasevidencedthat in allofthemtherewas a significanteffectofthesesamestrategiesonthelearningevaluated, beingnotoriousthat in the 'executive' dimensionthe final positive rankswereobserved in 38 students, while in the 'cognitive' dimensiontherewere 39 studentswith a positive post-testrank. Foritspart, forthe 'motivational' dimension, 43 studentswereobservedwith positive ranks after the experimental application, althoughthehighestofallwasthe 'environment control' dimension,

whichhad 44 students in thesame positive condition. Reaffirmingthatthe use ofthesestrategiesissignificantlygood in self-regulatedlearning.

Discussion

From the analysis of the results of applying methodological strategies in self-regulated learning in students, it was established that these strategies significantly influence self-regulated learning in the students evaluated. Similar results were found in the study by Cepeda et al. (2017) who pointed out that the methodological strategy -using virtual classrooms- significantly influenced the teaching-learning process. The results obtained in this investigation and in previous investigations are related to what was stated by Suárez & Fernández (2004) , who define it as a process where learners evaluate the effectiveness of a cognitive strategy based on whether the strategy is helping them. to reach the goal and how much time and effort it takes to implement that strategy.

Likewise, of the specific results of the methodological strategies and how they significantly influence self-regulated learning, in the cognitive dimension of the students in comparison with what was found by Martínez & Gaeta (2018) in their study, they revealed that university students require that the teacher propose scientific learning activities that involve permanent cognitive demands and challenges that motivate them to feel emotionally committed. Although it is important to point out that without any affectation to teachers since they have enough with the abrupt changes caused by the Covid-19 pandemic (Vértiz et al., 2020) , which would lead to evaluating how stressful the implementation of these strategies could be by part of teachers, in the process of seeking effectiveness in student learning. However, this remains to be investigated.

In reference to the specific results of the methodological strategies that significantly influence self-regulated learning, in the cognitive, motivational and environmental control dimensions of the students of the curricular experience of philosophy, it can be affirmed that there are similarities in the results obtained by Martínez . & Gaeta (2018) , where they showed that the students of the experimental group, unlike the control group, obtained significant improvements in the five dimensions studied, among which the cognitive, motivational and resource management dimensions stand out. They emphasized the importance of promoting self-regulated learning in the university through the use of virtual learning environments. On the other hand, in the results of Ventura et al. (2017) the various strategies of motivation, metacognition and time management and study environment were associated at high levels with the patterns of assessment of the task, beliefs of control and self-efficacy of the student body, likewise that the academic training facilitated an integration hierarchy between study strategies. This is interesting because it allows to demonstrate the credibility of the effectiveness in learning within the students themselves, which would facilitate the work of the teacher and, also, would promote the development of future professionals in a framework of improving the management of educational entities. (Guevara et al., 2021; Hernandez et al., 2021) and the rise of entrepreneurship as a philosophy of economic growth for the country (Tito et al., 2020) .

conclusion

It has been determined that methodological strategies significantly influence students' self-regulated learning; being significant also in the

'executive, cognitive, motivational and environmental control' dimensions, so it is very important to apply the fundamental processes involved in self-regulated learning when the student is studying individually and in virtual contexts.

References

Aikina, T., Aikina, T., & Bolsunovskaya, L. (2020). Moodle-Based Learning: Motivating and Demotivating Factors. *International Journal of Emerging Technologies in Learning (IJET)* , *15* (2), 239–248.

Castillo, M., Larios, VM, & Garcia, O. (2010). Teachers' perception of the use of Information and Communication Technologies. *Ibero-American Journal of Education* , *53* (6), 1–10. https://doi.org/10.35362/RIE536171 1

Cepeda, L., Santos, O., Barba, M.A., & De la Calle, L. (2017). Methodological strategy of the use of virtual classrooms in the teaching-learning process in the school of educational psychology of the National University of Chimborazo. *Redipe Bulletin* , *6* (2), 55–66. https://bit.ly/3scCQJO

Chaudhary, S., & Dey, N. (2013). Assessment in Open and Distance Learning System (ODL): A Challenge. *Open Praxis* , *5* (3), 207–216.

Conrad, D. (2013). Assessment challenges in open learning: Way-finding, fork in the road, or end of the line? *Open Praxis* , *5* (1). https://doi.org/10.5944/OPENPRAX IS.V5I1.17

De Medio, C., Limongelli, C., Sciarrone, F., & Temperini, M. (2020). MoodleREC: A recommendation system for creating courses using the moodle e-learning platform. *Computers in Human Behavior* , *104* , 106168. https://doi.org/10.1016/J.CHB.2019. 106168

Díaz Agea, JL, Megías Nicolás, A., García Méndez, JA, Adánez Martínez, M. de G., & Leal Costa, C. (2019). Improving simulation performance through Self-Learning Methodology in Simulated Environments (MAES©). *Nurse Education Today* , *76* , 62–67. https://doi.org/10.1016/J.NEDT.201 9.01.020

Diaz, C., Haapakorpi, A., Särkijärvin-Martinez, A., & Virtanen, P. (2015). *The university in the training of trainers of pedagogical companions for innovation in the classroom* . Pontifical Catholic University of Peru.

Diaz, F., & Hernandez, G. (2002). *Teaching Strategies for Meaningful Learning* (2nd ed.). McGraw Hill.

Dixit, A. K., & Nalebuff, B. J. (2010). *The Art of Strategy: A Game Theorist's Guide to Success in Business and Life* . W. W. Norton & Co.

Gaeta, M.L., & Cavazos, J. (2016). Relationship between study time, self-regulation of learning and academic achievement in university students. *e-CPU. Journal of Educational Research* , *23* , 142–166. https://bit.ly/3s8Vbaz

Guevara, HE, Huarachi, LA, Lozano, GA, & Vertiz-Osores, JJ (2021). Change management in post-pandemic educational organizations. *Venezuelan Journal of Management* , *26* (93), 178–191. https://doi.org/10.52080/rvg93.13

Hernandez-Sampieri, R., & Mendoza, C.P. (2018). *Research methodology:*

The quantitative, qualitative and mixed routes . McGraw Hill Education.

Hernandez, RM, Garay-Argandoña, R., Alberto Núñez Lira, L., Fuster-Guillén, D., Paola Palacios Garay, J., & Ocaña-Fernandez, Y. (2021). Investigating Instructors' and Students' Attitudes towards the Effectiveness of Having Target Cultural Knowledge on Learning English as a Foreign Language. *International Journal of Society, Culture & Language* , *9* (3), 64–72. http://www.ijscl.net/article_246248.html

Kadirov, R.K., & Shukurov, R.S. (2020). The ways of the activization of the independent works of the students in the educational platform moodle. *Asian Journal of Multidimensional Research (AJMR)* , *9* (5), 27. https://doi.org/10.5958/2278-4853.2020.00152.4

Lindner, R.W., Bruce, H., & Wayne, G. (1996). The design and development of the Self-Regulated Learning Inventory: A status report. *American Educational Research Association, Annual Convention* , 27–28.

Lomelli, P. (2013). Self-regulated learning in extra-academic contexts. *Psychology Journal* , *1* (2), 36–45. http://190.169.30.98/ojs/index.php/rev_ps/index

Martinez, C. (2006). The case study method Methodological strategy of scientific research. *Thought & Management* , *20* , 165–193. https://www.redalyc.org/pdf/646/64602005.pdf

Martinez, L., & Gaeta, M. (2018). Use of the Moodle virtual platform for the development of self-regulated learning in university students. *Educate* , *55* (2), 479–498. https://doi.org/10.5565/rev/educar.88

3

Minedu, & CNE. (2007). *National educational project to 2021 The education we want for Peru* (Ministry of Education & National Council of Education (eds.)). Ministry of Education - Peru. http://www.minedu.gob.pe/DeInteres/xtras/PEN-2021.pdf

Mintzberg, H., & Waters, J.A. (1989). Of Strategies, Deliberate and Emergent. *Readings in Strategic Management* , 4–19. https://doi.org/10.1007/978-1-349-20317-8_1

Mpungose, C.B. (2019). Is Moodle or WhatsApp the preferred e-learning platform at a South African university? First-year students' experiences. *Education and Information Technologies 2019 25:2* , *25* (2), 927–941. https://doi.org/10.1007/S10639-019-10005-5

Mwandosya, GI, Montero, CS, Mbise, ER, & Oyelere, SS (2019). Self-regulated learning using Mobile Educational Tool for Innovative Learning in Tanzanian Higher Education: Students' Perceptions. *IEEE AFRICON Conference* , *2019 - September* . https://doi.org/10.1109/AFRICON46755.2019.9133872

Safapour, E., Kermanshachi, S., & Taneja, P. (2019). A Review of Nontraditional Teaching Methods: Flipped Classroom, Gamification, Case Study, Self-Learning, and Social Media. *Education Sciences 2019, Vol. 9, Page 273* , *9* (4), 273. https://doi.org/10.3390/EDUCSCI9040273

Stein, A., Tomforde, S., Diaconescu, A., Hahner, J., & Muller-Schloer, C. (2019). A concept for proactive knowledge construction in self-learning autonomous systems.

Proceedings - 2018 IEEE 3rd International Workshops on Foundations and Applications of Self Systems, FAS*W 2018* , 204–213. https://doi.org/10.1109/FAS-W.2018.00048

Sternberg, R.J., & Spear-Swerling, L. (1996). *Teaching for Thinking* . American PsychologicalAssociation.

Suarez, JM, & Fernandez, AP (2004). *Self-regulated learning: strategic, motivational variables, evaluation and intervention* . UNED notebooks.

Tito, JV, Ogosi, JA, Franco, JL, & Vertiz-Osores, JJ (2020). Management trends as a process in the effectiveness of management action. *Venezuelan Journal of Management* , *25* (91), 1234–1245. https://doi.org/10.37960/rvg.v25i91.33199

UNAM. (2006). Leads the country in university dropout. *National Autonomous University of Mexico* , 1–5. https://bit.ly/3Gllf7r

Ventura, A.C., Cattoni, M.S., & Borgobello, A. (2017). Self-regulated learning at the university level: A study with psychopedagogy students from different academic cycles. *Educare Electronic Journal* , *21* (2), 2. https://doi.org/10.15359/ree.21-2.15

Vertiz, JJ, Cucho, RR, Vertiz-Osores, RI, Vilchez, GL, & Angulo, A. (2020). Virtual university education in the context of the health emergency due to COVID-19: Challenges in the evaluation processes. *International Journal of Early Childhood Special Education* , *12* (1), 467–477. https://doi.org/10.9756/INT-JECSE/V12I1.201027

Zimmerman, B. (2001). Theories of self-regulated learning and academic achievement: An overview and analysis. In BJ Zimmerman & DH Schunk (Eds.), *Self-regulated Learning and Academic Achievement: Theoretical Perspectives* (pp. 1–37). Lawrence Erlbaum.