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RESEARCH ARTICLE

Learning Strategies for the Development of the Autonomy of Secondary School Students

Estrategias de aprendizaje para el desarrollo de la autonomía de los estudiantes de secundaria

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Summary

The objective of this research was to determine the predominant learning strategy that is related to the development of the autonomy of students belonging to the seventh semester from a public educational institution in Lima. It was developed as a substantive research and with a quantitative approach. Its design was non-experimental and cross-sectional-correlational. The population consisted of 171 students, to whom two questionnaires were applied. The results showed that the information coding strategy has more weight on the development of the autonomy of the students in question. Likewise, it is a risk strategy that means that a student who does not manage it, he will always present low levels of autonomous learning.

Keywords: Learning Strategies; Autonomy; Learning, Students.

Resumen

Esta investigación tuvo como objetivo determinar la estrategia de aprendizaje predominante que se relaciona con el desarrollo de la autonomía de los estudiantes del VII ciclo de una institución educativa pública de Lima. Se desarrolló bajo el tipo sustantivo enmarcado y el enfoque cuantitativo. Su diseño fue no experimental y transversal correlacional. La población estuvo conformada por 171 estudiantes, a quienes se les aplicó dos cuestionarios. Los resultados demostraron que la estrategia de codificación de información ejerce mayor peso en el desarrollo de la autonomía de los estudiantes en cuestión. Así también, es una estrategia de riesgo que significa que un estudiante que no la maneje presentará siempre bajos niveles de aprendizaje autónomo.

Palabras clave: Estrategias de aprendizaje; Autonomía; Aprendizaje; Estudiantes.

Introduction

Within the framework of the communications revolutions, the students poorly manage the information. As for the accessibility of the information, the students receive the information without much effort and the level of comprehension of the information they receive is well below the average. For that reason, when the students are evaluated, they present limitations.

When making an analysis of the national education reality, it was found that the level of comprehension of the information management and the use of learning strategies must be the main aspects for students. In this regard, it is a social requirement that they acquire learning skills that allow them to better adapt to the higher education level and to the new labor demands. Students should be able to learn in an autonomous and self-regulated manner.

It is worth mentioning that learning strategies of the student are defined in the decision-making process. The student chooses and actives that knowledge that he needs in order to meet the professional and personal requirements, depending on the conditions of the educational situation.

> Learning strategies are used when the student shows signs that he is continuously adapting to changes and variations that occur during the activity, always in order to 0achieve the objective pursued in the most efficient way possible. (Monereo, 2004, p. 17).

In this way, the student minimizes the number of errors prior to solving the problem, ensuring that his answer is correct after a minimum number of attempts. Thus, it was observed that many students belonging to the last high school years do not manage learning strategies, which generates difficulties in their future process of professional education.

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On the other hand, the diverse manifestations of thought like analyzing, evaluating, reaching conclusions, making judgments, finding and proposing solutions to problems, which are necessary and essential mental operations of the individual, are not stimulated in a large percentage of students. Many of them have not managed to strengthen the diverse manifestations of critical thinking. In addition, they do not study thoroughly the content and do not give well-founded points of views. In view of such problem, it is necessary to cite the research works that have preceded this research to check the results and establish new contributions.

Başbağı and Yilmaz (2015) set the objective to determine to what extent university students are aware of their own learning and strategies. They worked with the quantitative, descriptive-correlational approach with a sample of 117 people (teachers and students). They concluded that it is complicated leave the habits acquired. Learning in high school is different from that in the university, since in the former there is a constant repetition of contents of the courses, but in the latter, the process is more autonomous. Both high school students and university students master an endless number of learning strategies. Despite this, they find it difficult to use them. Applying a strategy to a specific learning activity is one of the biggest problems for students.

Pérez (2013) analyzed the student's perception with respect to the teacher's role in his training and the relationship between the academic performance and the perception of the teacher's role. He used the quantitative, descriptive correlational approach with a sample of 167 students from the Don Bosco University from San Salvador of the Bachelor program in Languages. He concluded that the perception of the students on the teacher's role in the training they receive is traditional, showing evidences of the potential aspects of autonomous learning, so that students are the ones who develop a leading role in the learning process.

Marrugán, Carbonero, León and Galán (2013) did a research on the *Analysis of the use of strategies for information recovery by students with high intellectual capacity according to gender, age, education level and creativity.* Its objective was to determine the relationship between the variables. The research design was cross-sectional and correlational. He evaluated the strategies with ACRA Scales, general intelligence with the "g" Factor Test and the Raven's Progressive Matrices (Raven, 1996) and the creativity with the Abreaction Test. The instruments were applied to a sample of students of high intellectual capacity from Primary and Secondary Education (aged 9-14). They concluded that the variables studied do not show significant relationships.

Tobón (2012) aimed to develop skills for the logical-mathematical thinking in students through didactic strategies. The design used was the quasi-experimental design with a sample of 17 students, to whom validated scales were applied. He concluded that the construction of guides proposed motivates children and develops skills of logical thinking skills (group and arrange in series).

Lastly, Loret de Mola (2011) developed a study aimed at determining the relationship between the variables. He used a sample of 135 students belonging to the sixth semester of the Preschool, Primary Education, Computer Science and Technology Information and Language and Literature specializations. To value the performance, the questionnaire of Learning Styles and the Questionnaire of Learning Strategies (ACRA), in addition to the consolidated records of the academic 2010-II year were used. He concluded that there is a positive significant relationship between the study variables.

Taking into account the contribution of each one of the aforementioned authors, it is also required to delve into the definitions including the study variables.

Learning Strategies

Esteban and Zapata (2016) said that a strategy implies an intentional plan that results in learning. Moreover, the cognitive activity proposed will define the type of strategy; either associative, elaboration or organizational (p. 6).

Learning strategies are decision-making processes (responsible) in which knowledge necessary for the fulfillment of an objective is chosen and recovered in a coordinated manner, according to the characteristics of the education situation where the action takes place.

Cerezo, Casanova, Manuel and De la Villa (2015) said that there were self-regulated learning strategies that are divided into cognitive and metacognitive. The former correspond to activities students perform to achieve learning goals. The latter comprise the mastery and knowledge the student has of the process.

Scales of Information Acquisition Strategies

The first step of acquisition is to pay attention. Therefore, the attentional processes choose, transform and transmit the environment information to the sensorial register (SR). After the repetition processes along with the attentional processes take place, they take the information from the SR to the short-term memory (STM). In the acquisition step, there are two types of strategies: those that govern the attentional processes to deduce the main information and the repetition strategies. The former comprise exploration strategies used when the previous knowledge base is adequate and the learning objectives are not clear. It uses the superficial and interrupted reading as a technique, focusing on what is relevant. Fragmentation strategies are used when the learning objective is clear and materials are organized. Here, techniques such as linear, idiosyncratic and epigraphic underlining can be used. On the other hand, the function of repetition strategies is to transmit the information to the long-term memory. To do that, reviewing loudly, repeatedly and mentally is carried out.

Scales of Information Coding Strategies

Processes consisting in transmitting the information from the short-term memory to the long-term memory. The partial and detailed preparation and the organization link the previous knowledge, which turn them into structures of wider or cognitive knowledge. Types of coding strategies: a) Mnemonics; preparations and organization of information in an increasing level of complexity. b) The second ones give more importance to information.

Mnemonic strategies executes superficial coding: rhymes, keywords, etc. Preparation strategies also have a simple level that executes the intra-material association for learning (relationships, images, metaphors, etc.) and the deep ones such as applications, self-questions and paraphrasing. Finally, the organizational strategies make knowledge more meaningful and manageable by the student, finding here clusters (summaries and others), sequences, concept maps and diagrams (Cartesian matrices, diagrams, etc.).

Scales of Information Recovery Strategies

These recover the stored knowledge. They are of two types: search and answer generation. The former correspond to the organization of information in the memory, as a result of coding strategies. They are divided into search for coding (metaphors, maps, etc.) and clues (keys, sets, etc.).

The latter support the positive adaptation of a behavior and include free association and order. Writing is used in written answer.

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Scales of Support to Information Strategies

They help and strengthen the previous strategies. They increase their performance through motivation, self-esteem, conflict management, etc. They are divided in meta-cognitive, affective and social strategies. The first ones allow the students to learn from the beginning to the end, achieving their objectives, controlling the level of acquisition and the capacity to change it if it is not appropriate. The second ones value how the state of mind of the student may be affecting his learning. Their strategies include: self-instructions, self-control, counter-distractors; they allow controlling anxiety, self-esteem, self-efficacy, etc. The third ones allow the evaluation of how students avoid conflicts, help, etc. Motivational strategies are important in view of the current education deficit, being able to be intrinsic, extrinsic and scape.

Autonomous Learning

Cárcel (2016) defined autonomous learning as a process that comprises activities executed in an independent manner. He also said " it is a process that allows the subject to be the author of his own development, opting for ways, strategies, tools and moments he consider appropriate to independently learn and implement what he has learned" (p. 102).

Peña and Cosi (2017) defined it as the process that allows students to regulate themselves from criticality, in such a way that they identify their strengths and weaknesses in the educational field (p. 2).

For Rué (2009), this learning is reflected in the way of behavior the student has chosen to respond to any learning stimulus:

> It reflects a behavior aimed at meeting demands of knowledge stated by the teacher, choosing contextual conditions (of time, place, tools, etc.) that the student considers appropriate to prepare his response. That is, the autonomy is achieved according to the conditions and not to the result or the product of learning (p. 87).

For Manrique (2004), the autonomy is achieved after the educational process:

> It is the faculty that one has to lead, control, regulate and evaluate his own way to learn in a conscious and intentioned manner, using learning strategies to meet objectives or goals. The ultimate goal of education must be learning how to learn. (p. 4).

According to Monereo (2004), this learning has the ability to make decisions that normalize learning by turning it into a goal, under certain conditions of the learning context. (p. 12).

Martínez (2014) certified that the autonomous learning is the process that allow the student to regulate what he learns and to be aware of his cognitive and socio-affective processes. The pedagogical effort is focused on training individuals with the ability to solve specific aspects of their own learning, that is, guiding the learner to question, review, plan, control and evaluate his own learning action. (p. 55).

For Lobato (2006), the autonomous study and work are learning ways in which the student is responsible for the organization of their work and for the acquisition of competencies according to their pace. In addition, the student assumes the responsibility, control of the process and the decisions, planning, execution as well as the evaluation of learning experiences (p. 45).

Pillars of the Autonomous Learning

According to Aebli (2001), there are three pillars of autonomous learning:

- Knowledge involves knowing the one's own learning and self-observation is necessary. It is about meta-cognition, it is knowing about knowing. It is not about a theoretical knowledge, but a knowledge in relation to us; to know about my ideal and real learning process. (p. 158).
- Knowledge implies learning procedures. The learning objective is the self-orientation. The student knows the process and has the ability of execute it through self-instruction.
- The component "wants to" refers to the fact that the student is convinced of the usefulness of the learning process and that he must want to apply it without anyone asking him to do it and when nobody controls him.

Actions for the Autonomous Learning Development

According to Knowles (1975), the person should take the initiative in his learning process, have a diagnosis of the learning needs with or without the help of third parties, set learning objectives, identify human and material resources that allow the achievement of objectives, selection and implementation of adjusted learning strategies, self-evaluation of the learning effects (p. 78).

According to the author, the result of the foregoing are proactive students that learn more things; highlighting their persistence and motivation. They learn in an effective and profound manner, showing interest and a positive attitude towards the achievement of objectives.

Autonomous learning competencies include: self-management, proactivity, self-learning, responsibility and self-control or self-regulation of the learning process. Self-knowledge is important for the autonomous learning, since it allows one to control the process.

Method

The approach of the research was quantitative as proposed by Hernández, Fernández and Baptista (2014), "it presents sequence and is probationary, where steps are followed and none can be avoided. In addition, it uses data collection, numerical measurement and statistical analysis" (p. 4).

This study was developed under the non-experimental design. Hernández et al. (2014) said that this design was carried out without the intentional management of variables and in which phenomena are exclusively observed in their environment after their analysis. (p. 149). The population of this research was composed of 171 students from a public education institution of the district of Lima.

Data Analysis

The statistical package SPSS 23.0 was used, and a descriptive analysis as well as an inferential analysis was executed. To apply the former, information was placed in the frequencies tables, organizing information that will be useful in the decision-making process. Likewise, figures were used as bar graphs that represent the percentage of the data in the levels considered by variable. For the latter, the statistical processing of correlation quantified with the corresponding process of logistic regression was used to determine the predominance of dimensions and strategies.

Results

Taking into account the results from the application of the instrument and data analysis, the hypothesis testing was carried out.

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Table 1.
Coefficients of the logistic regression of the learning strategies related to the autonomous learning

Indicator	B	Standard error	Sig.	Exp(B)	95% C.I. for EXP(B)	
					Lower	Upper
Information acquisition strategy	-1.267	0.596	.034	0.282	.088	0.906
Information coding strategy	1.343	0.747	.072	3.832	0.886	16.576
Information recovery strategy	-.089	0.610	0.884	0.915	0.277	3.025
Support to processing strategy	0.373	0.601	0.535	1.452	0.447	4.718

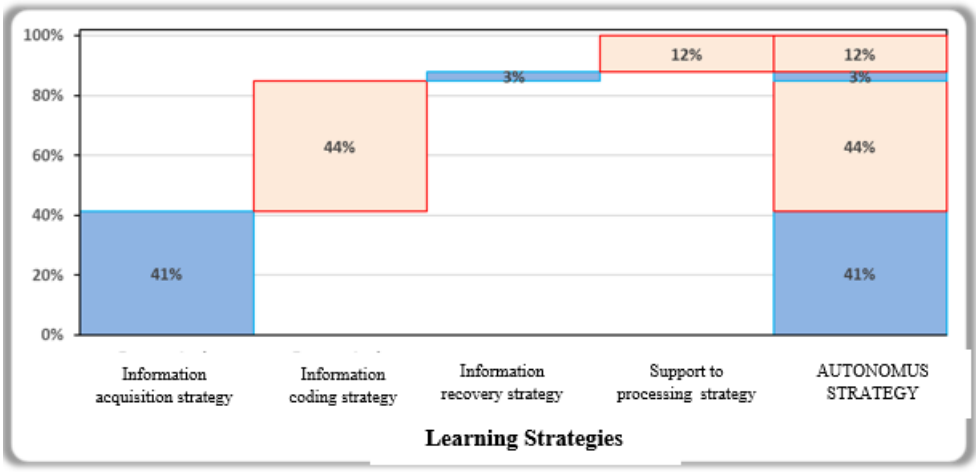

Figure 1. Weights of learning strategies related to autonomous learning in students from a public educational institution of the district of Lima.

Since the observed significance value was lower than the theoretical significance value α=.05, there are differences in learning strategies related to autonomous learning in students.

Information coding strategy (B = 1.343) showed higher coefficient and therefore, has more weight in the autonomous learning in students of such entity. In addition, this strategy presented odds ratio (Exp(B)) = 3.832, which means a risk strategy. This means that the student has 3.832 times of possibility to present low levels of autonomous learning compared to other student with higher levels of autonomous learning due to the information coding strategy.

Table 2.
Coefficients of the logistic regression of the indicators of the information acquisition strategy related to autonomous learning.

Indicator	B	Standard errors	Sig.	Exp(B)	95% C.I. for EXP(B)	
					Lower	Upper
Exploration	-.601	.347	.084	0.548	0.278	1.083
Linear underlining	-.040	.288	.890	0.961	0.547	1.689
Idiosyncratic underlining	.203	.269	.451	1.225	0.723	2.076
Epigraphy	-.074	.335	.826	0.929	0.482	1.792
Review out loud	.266	.349	.446	1.304	0.658	2.586
Mental review	.345	.381	.365	1.412	0.669	2.980
Repeated review	.290	.300	.335	1.336	0.742	2.407

Figure 2. Weights of the indicators of the information acquisition strategy related to the autonomous learning in students.

Since the observed significance value was higher than the theoretical significance value α= .05 in all indicators of the information acquisition strategy, it is concluded that there are no differences in the indicators of the information acquisition strategy related to the autonomous learning of students.

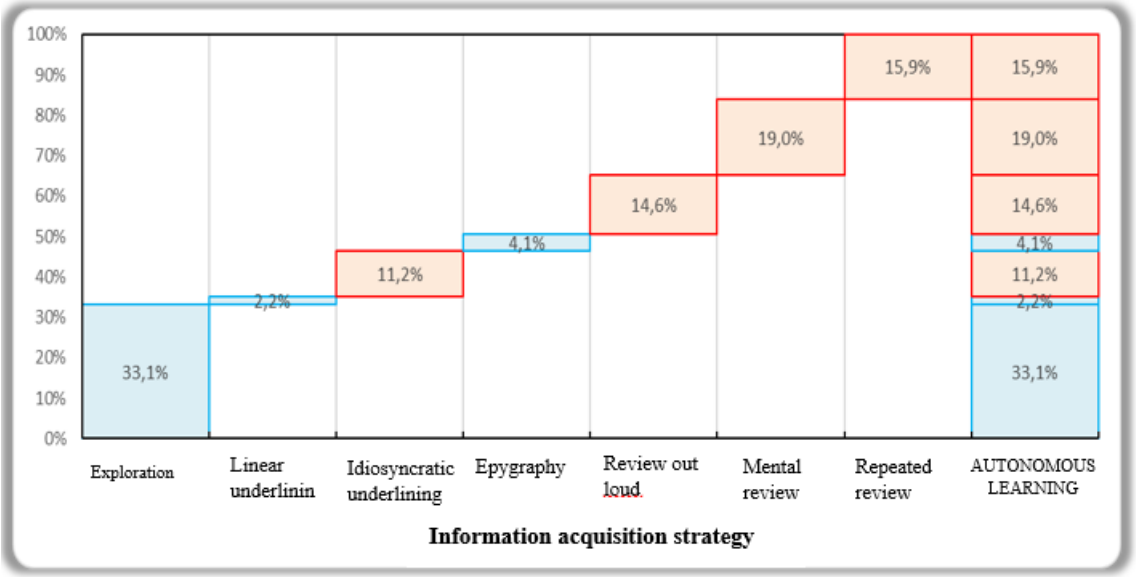

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Table 3
Coefficients of the logistic regression of the indicators of the information coding strategy related to the autonomous learning in students.

Dimension	B	Standard error	Sig.	Exp(B)	95% C.I. for EXP(B)	
					Lower	Upper
Mnemonics	.712	.341	.037	2.039	1.045	3.977
Intracontent relationships	.616	.481	.200	1.852	0.722	4.752
Shared relationships	-.545	.339	.108	0.580	0.298	1.127
Images	-.481	.303	.113	0.618	0.341	1.121
Metaphors	.296	.336	.378	1.345	0.696	2.597
Applications	-.067	.571	,907	0.935	0.306	2.861
Self-questions	-.083	.415	.842	0.921	0.408	2.078
Paraphrase	-.273	.408	.503	0.761	0.342	1.692
Clusters	.054	.431	.900	1.056	0.453	2.459
Sequences	-.591	.381	.121	0.554	0.262	1.169
Concept maps	.405	.359	.259	1.499	0.742	3.028
Diagrams	.385	.416	.355	1.469	0.650	3.318

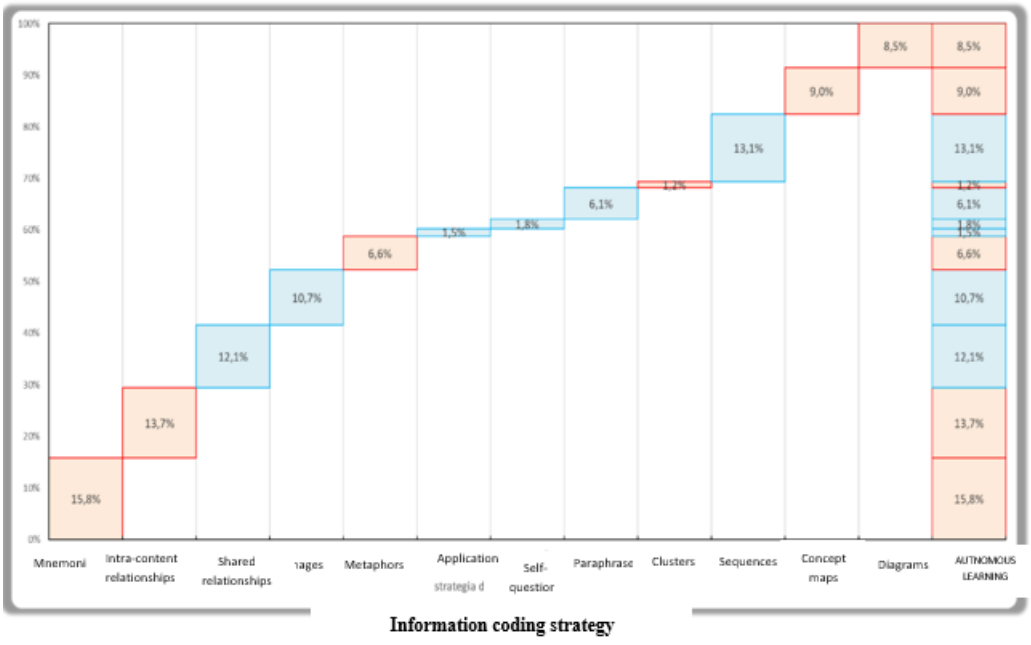

Figure 3. Weights of indicators of the information coding strategy related to the autonomous learning in students.

Since the observed significance value was lower than the theoretical significance value α=.05, there are differences in indicators of the information coding strategy related to the autonomous learning in students.

This strategy presents odds ratio (Exp(B)) = 2.039, which means a risk strategy. That is, a student has 2.039 times of possibility to present low levels of autonomous learning compare to

other students with high levels of autonomous learning due to the information coding strategy called mnemonics.

Table 4.
Coefficient of logistic regression of indicators of the information recovery strategy related to the autonomous learning in students.

Indicator	B	Standard errors	Sig.	Exp(B)	95% C.I. for EXP(B)	
					Lower	Upper
Search for coding	0.389	0.402	0.334	1.476	0.671	3.247
Search for clues	0.645	0.395	0.103	1.906	0.878	4.136
Answer planning	-0.443	0.405	0.274	0.642	0.290	1.421
Written answer	-0.255	0.333	0.444	0.775	0.404	1.488

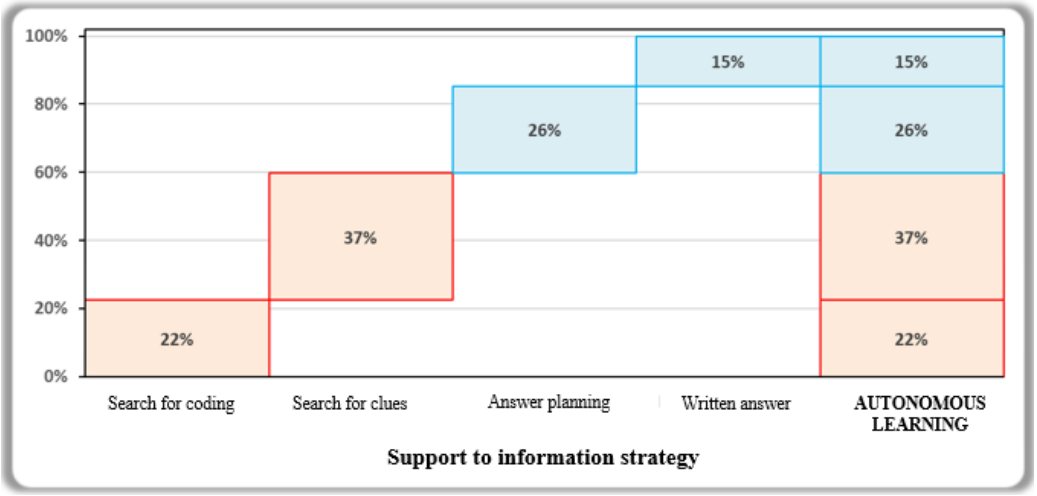

Figure 4. Weights of indicators of the information recovery strategy related to the autonomous strategy in students.

Since the observed significance value was higher than the theoretical significance value α=.05 in one of the strategies, there are no differences in the indicators of the information recovery strategy related to the autonomous learning in the students from the above-mentioned institution.

Table 5.

Coefficient of logistic regression of indicators of the support to processing strategy related to the autonomous learning in students.

Dimension	**B**	**Standard error**	**Sig.**	**Exp(B)**	**95% C.I. for EXP(B)**	
					Lower	**Upper**
Self-knowledge	-.005	.500	.991	0.995	0.373	2.653
Self-management/planning	.417	.403	.300	1.518	0.689	3.342
Self-management /regulation and evaluation	.086	.507	.866	1.090	0.403	2.946
Self-instructions	-.202	.404	.616	0.817	0.370	1.803
Self-control	.046	.216	.833	1.047	0.685	1.600
Counter-distractors	-.262	.300	.382	0.770	0.428	1.385

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Social interactions	-.273	.372	.463	0.761	0.367	1.578
Intrinsic and extrinsic motivation	.736	.385	.056	2.089	0.982	4.440
Escape motivation	-.244	.209	.242	0.783	0.521	1.179

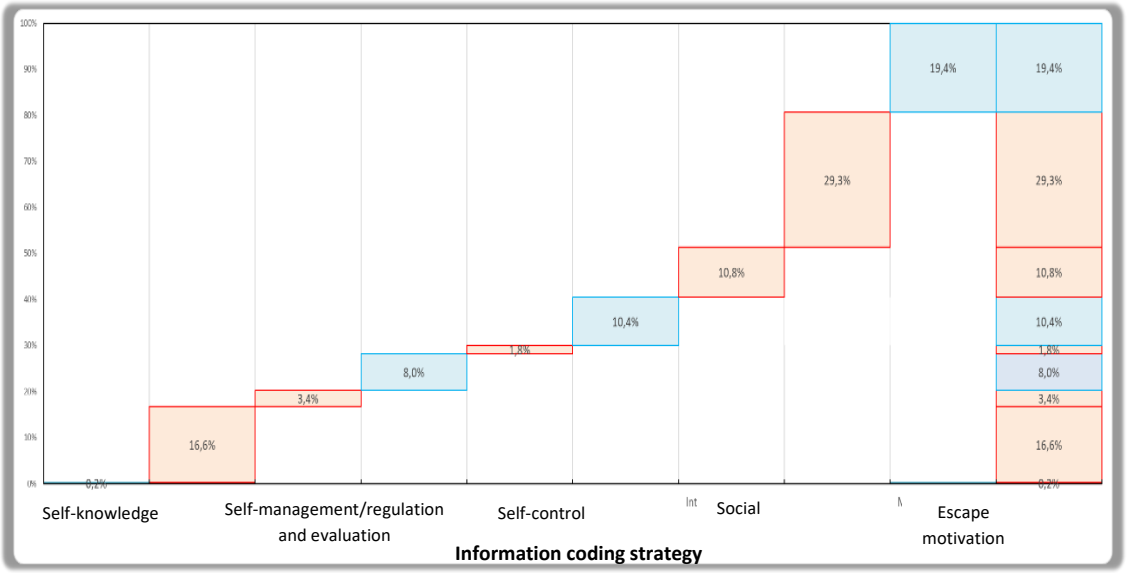

Figure 5. Weights of indicators of the support to processing strategy related to the autonomous learning in students.

Since the observed significance value was lower than the theoretical significance value α =.05 in all the strategies, there are no differences in the indicators of the support to processing strategy related to the autonomous learning in students.

Discussion

Başbağı and Yilmaz (2015) concluded that both secondary students and university student know an endless number of learning strategies, but they are difficult to use. Applying a strategy to a specific learning activity is one of the biggest problems for students. Similar to the foregoing, the results are presented in this study, since the information coding strategy has more weight on the autonomous learning in students. In opposition to this, Marrugán et al. (2013) concluded that general intelligence and the information recovery strategy do not show significant relationships.

On the other hand, it is observed that 64% of students studied present low levels of use of learning strategies, use of information acquisition strategies, information coding strategies, information recovery strategies and 70% of use of support to processing strategies. In opposition to this, Monserrat (2013) found in his research work that students do not practice such strategies. Consequently, there are low levels of reading comprehension and problem solving.

The research work carried out by Pérez (2013), referred to the teacher's role in the autonomous learning, concluded that while students perceive their teachers as traditional, they will show a poor performance. This is corroborated in the research when observing that 68% of the students show fair autonomous skills in all their dimensions such as extension, moral, cognitive, technic, communicative, self-control and evaluation.

Inferential results show that the information acquisition strategy called exploration is more important than the autonomous learning. In support of this, Tobón (2012) showed that the lack of use of pedagogical strategies does not lead and does not improve the development of the

mathematical thinking. Likewise, Loret de Mola (2011) in the study "*Learning Styles and Strategies of in the Academic Performance of Students from the Peruvian University Los Andes de Huancayo"* showed that there is a positive significant relationship between study variables study. That is, the better style and use of strategies, the optimal academic performance.

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