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Learning styles and academic performance in the operational research subject of students of the IV cycle of the Faculty of Administrative Sciences of the National

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ABSTRACT

The objective of the research has been to determine the relationship that exists between learning styles and academic performance in the Operational Research course of students of the IV cycle of FCA-UNAC. In this sense, a questionnaire has been applied to 80 students to determine their learning styles; an exam to measure conceptual performance and another to measure procedural performance; to measure attitudinal performance, a checklist has been applied. Once obtained, the data were organized in a database, which allowed us to describe their behavior and infer the degree of association between the research variables, for which we used the Pearson correlation coefficient, the analysis of variance and Tukey's test. SPSS and Minitab were used for the calculations. The result of the research is that the more orientation towards a learning style the students obtain a higher academic performance and that there are no significant differences in the average performance of the students if we compare each type of performance with the different styles, but this does not occur the same if we make a comparison of academic performance with styles, in which case there is a superiority in visual style.

Keywords: learning styles, academic performance, auditory style, visual style, kinesthetic style**.**

INTRODUCTION

In the Faculty of Administrative Sciences (FCA) of the National University of Callao (UNAC), it has been found that, in the Operational Research course, students register a low academic performance. Such performance would be related to the students' learning styles, since all people have different ways of learning, which is much more marked in students.

For this reason, it would be very important to evaluate the degree of relationship that exists between students' academic performance and learning style, since both study variables are decisive in the teaching-learning process. That is why this form allows you to have a tool that makes it possible to improve their performance. The problem of academic performance is very broad since it encompasses different aspects of the teaching-learning process, where not only students are included but also teachers, the student's environment, the educational institution, the institutional climate, etc. This study tries to address the different aspects in relation to learning styles and academic performance.

In this regard, several investigations have been developed over time, some of which we will discuss.

Garbanzo (2007) considers that academic performance in public higher education in Costa Rica is associated with three groups of factors: personal, social and institutional. Gómez, Oviedo and Martínez (2011) that, in the case of students at the Autonomous University of San Luis Potosí (Mexico), academic performance would be associated with gender, semester, grade point average and satisfaction with the chosen career. Vázquez et al. (2012) in their presentation prepared for the Seventeenth Conference "Investigations in the Faculty" of Economic Sciences and Statistics of the Universidad del Rosario, they conclude that students consider that their performance would be predominantly associated with the lack of practical exercise developed in class, by type of exam questions, the complexity of the subject content and the state of mind before and during the exam. Barahona (2014) considers that the determining factors of the academic performance of the students of the University of Atacama, in addition to verbal and mathematical proficiency and other student-related factors, are study habits, regular class

attendance, and a positive attitude toward college. Chong (2017) considers that the factors that affect the academic performance of the students of the Polytechnic University of the Valley of Toluca are the preparation of the teachers, their desire to improve themselves and their family relationships. Pérez-Correa et al. (2017) concluded that the academic performance of university students in the psychology area of a public university is closely linked to the organizational climate. Medina, Fereira and Marzol (2018) concluded that the personal factors that most influenced the low academic performance of the geometry students of the Faculty of Engineering of the University of Zulia, Maracaibo, Venezuela were personal situations and relationships. Ordaz and García (2018) carry out a balance of the state of knowledge about university academic performance and, after reviewing various national and international studies, they find that the research carried out manages to find variables that influence or are associated with academic performance, but that cannot generalized because they are limited to particular cases, in addition they do not provide instruments to improve student performance.

Guzmán (2012) set out to explain and predict the academic performance of

university students, in their different professional careers at Tecnológico de Monterrey, concluding that the factors that affect the academic performance of students in professional careers are different and to varying degrees, so there is a different model for each of them. Murillo (2013), in his research determined that the methodology, the evaluation system and the training of teachers are the factors that affect the academic performance of ninth-grade students in the Basic Education Centers of the city of Tela, Atlántida, at the Francisco Morazán National Pedagogical University of Honduras.

As we have seen, in none of the antecedents reviewed so far is learning style considered as a variable associated with academic performance. Let's look at some background that emphasizes this relationship. Rettis (2016) found, using the Kolb test, that the predominant learning styles of the students of the National Engineering University of the general chemistry course I are convergent and assimilating, which generated higher academic performance on average. Colonio (2017) concluded, using the Honey-Alonso questionnaire, that the learning styles of the students of the courses in the construction area of the DAC-FIC-UNI are not related to academic performance. Bernardo (2016), in

his thesis determined that there is a significant relationship between the learning styles and the academic performance of the students of the second year of the Nursing Degree, Regular Modality, in the Drug Pharmacology and Solutions Subject, Polytechnic University of Nicaragua, Managua, II semester 2015.

Although with different words, there is agreement on the definition of learning styles. Thus for Alonso, Gallego and Honey (2007, p. 48) "they are cognitive, affective and physiological traits, which serve as relatively stable indicators of how students perceive, interact and respond to their learning environments". Coloma, Villavicencio, Revilla and Tafur (2008, p. 7) consider that "Whatever the way of understanding learning, learning obeys preferred styles of making use of one's abilities, that is, particular styles of learning". Díaz, Escanero and Mora (2011, p. 18) refer to the learning style as "the fact that each person uses their own method or strategy when learning". Salas (2008) considers that learning styles not only establish the way each of us has to capture information, but also the way we process and use it. And Woolfolk (2010, p. 121) argues that "In general, a learning style is defined as the methods that a person uses to learn and study." In any case, we have taken

the proposal of Grinder and Bandler (2006) who maintain that there are three systems to mentally represent information, the visual, the auditory and the kinesthetic, called visual-auditory-kinesthetic (VAK).

Regarding academic performance, Camarena, Chávez and Gómez (1985) consider that the idea of performance was taken from economics to refer to production per unit of input used, so it was referring to productivity, based on which valued a resource. Transferred to the educational field, Gómez, Oviedo and Martínez (2011) consider that academic performance "is a result of the learning process generated by the educational activity of the teacher and produced in the student, although it is clear that not all learning is the product of the teaching action" (p. 91). González, Caso, Díaz and López (2008) argue that the use of the term performance "refers to the overall result of the student, which he obtains through a numerical assessment commonly assigned by the teacher" (p. 53). But this global result is obtained from assessing different aspects of academic performance, which, in general, refer to specific types of content (conceptual, procedural and attitudinal) necessary for the development of competencies (Morales, García, Campos and Astroza, 2013).

So the purpose of the research has been to determine if there is a significant relationship between learning styles and academic performance of Operational Research students of the Faculty of Administrative Sciences of the National University of Callao.

En nuestro país, es una prioridad la reducción de los índices de anemia infantil, para el 2015 se ha logrado una disminución mínima llegando a afectar al 43.5% de los niños y niñas entre 6 y 35 meses. (Unicef, 2016) En este caso también se evidencian las profundas inequidades entre diversas regiones geográficas del país. Por ejemplo, 35 de cada 100 niños en Lima Metropolitana padecen de anemia; en el resto de la costa ocurre lo propio con 39; en la sierra con 53 y en la selva con 48. (Unicef, 2016) Para el año 2017 en la provincia de Angaraes el 42% de todos los niños tamizados presentó un cuadro de anemia (Angaraes, 2017), y su reducción constituye un verdadero reto para la salud pública. Existe políticas con el objetivo de contribuir a la reducción de la anemia infantil (MINSA, 2017) donde se detalla acciones para el abordaje de este problema, las cuales son de poco impacto que no se ven reflejados en una disminución de estos porcentajes de anemia, lo cual es preocupante, en la media que los decisores

desarrollen una gestión en base a la mejor evidencia posible el impacto sería la mejora en los indicadores de salud (Vasquez, 2018), se debe de realizar investigaciones para determinar las razones del porque los índices altos de anemia persisten, todas las políticas y programas necesitan identificar intervenciones efectivas que tengan base científica (Vasquez, 2018), asimismo plantear acciones y/o estrategias de intervención para cada ámbito territorial, plasmándolas en guías, protocolos o planes de intervención.

En esta investigación se detalla la actitud definido como un estado de disposición mental y nerviosa (Ubillus, 2019), y practica como un nexo de formas de actividad que se despliegan en el tiempo y en el espacio (Ariztia, 2017), teniendo como objetivo analizar la relación entre la actitud y práctica en el manejo de anemia en madres de niños menores de 5 años del distrito de Lircay y como hipótesis la existencia de relación entre estas dos variables, finalmente se concluye que la mayoría de la muestra presentó una actitud positiva. En relación a la práctica se evidenció que más de la mitad presentó entre malas y muy malas prácticas frente al manejo de anemia, por lo que se afirma que una buena actitud de la madre no significa

que tenga buenas prácticas en el manejo de anemia.

Finalmente se pone a su disposición el presente artículo con la finalidad de que sirva como evidencia científica para la incorporación de los resultados y conclusiones dentro de las políticas, planes o estrategias de intervención destinadas al abordaje de la anemia infantil, asimismo sirva como base para la generación de nuevas investigaciones en el marco de la mejora de la salud pública.

METHODOLOGY

To identify the learning style, the survey technique has been used and the questionnaire as an instrument. Here the students were classified, in one or another style, according to the highest number of favorable responses to each of them since no student had a single style when answering. To measure conceptual and procedural performance, the performance test technique has been used and the exam as an instrument and to measure attitudinal performance an adaptation of the checklist of Arenas (2016) has been used.

The object of study of the research were the students of the Operational Research subject of the FCA of the UNAC. The data correspond to the second semester of the

academic year 2018. The sample was made up of 80 students.

With the data obtained, a database was created in SPSS Version 25, which allowed us to describe the data and do hypothesis testing. To test the relationship between the variables, we used Pearson's correlation test. Tukey's test was used to test the means difference in student performance.

RESULTS

Descriptive results

Table 1 presents the results of the survey to identify learning styles. According to them, most would be visual, followed by kinesthetic and auditory.

Table 1
Answer about their learning styles

Styles	Students	
	Number	Percentage
Auditory	16	20.00
Visual	34	42.50
Kinesthetic	30	37.50
Total	80	100

Source: Survey

In table 2 we present the results of the measurement of academic performance, according to its dimensions. According to them, the lowest performances are in attitudinal and conceptual performance, although when considering their academic performance, it can be observed that it has a normal distribution.

Table 2
Results of the measurement of academic performance

| Classes | Performance | | | | | | | |
| | Attitudinal | | Procedural | | Conceptual | | Academic | |
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Less than or equal to 7	30	37.50	0	0.00	4	5.00	3	3.75
From 8 to 10	24	30.00	12	15.00	10	12.50	18	22.50
From 11 to 13	12	15.00	24	30.00	36	45.00	38	47.50
From 14 to 16	8	10.00	34	42.50	25	31.25	18	22.50
From 17 to more	6	7.50	10	12.50	5	6.25	3	3.75
Total	80	100.00	80	100.00	80	100.00	80	100.00

Source: Performance tests and checklist

Inferential results

Let's first test whether there is a relationship between auditory learning style and academic performance. The hypotheses would be:

H_0: The auditory learning style of the students, enrolled during the second semester of 2018, is not significantly related to their academic performance in the Operational Research course of the IV cycle of the FCA of the UNAC.

H_1: The auditory learning style of students, enrolled during the second semester of 2018, is significantly related to their academic performance in the Operational Research course of the IV cycle of the FCA of UNAC.

Table 3 presents the academic performance of the Operative Research students of the IV cycle of the FCA of the UNAC, enrolled during the 2018-B semester, who had the highest number of favorable responses to the auditory style.

Table 3
Data on auditory style and academic performance

| ID | Favorable responses | Performance | | | |
		Attitudinal	Procedural	Conceptual	Academic
14	16	7	11	11	10
25	15	9	9	8	9
28	18	15	15	14	15
34	18	19	14	11	15
37	19	10	19	13	14
40	21	10	13	13	12
44	17	7	13	12	11
54	17	7	12	11	10
58	17	9	14	13	12
70	21	10	12	15	12
72	17	6	13	11	10
74	16	9	13	12	11
75	16	5	13	11	10
78	16	6	14	12	11
79	20	12	16	16	15
80	15	6	10	6	7

Source: Results of the survey, tests and checklist

From the data in Table 3, we have applied the Pearson's correlation test, using the SPSS software. The results are shown in Table 4.

Table 4
Pearson's correlation between auditory learning style and academic performance

| Statistics | Auditory style | Performance | | | |
		Attitudinal	Procedural	Conceptual	Academic
Pearson's correlation	1	0.458	0.496	,772	,665
Sig. (bilateral)		0.075	0.051	0.000	0.005
N	16	16	16	16	16

Table 4 shows that the relationship is significant for a significance level of one percent, therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. Additionally, the table shows that the auditory learning style also has a significant relationship with conceptual performance, but not with attitudinal or procedural performance.

Second, we are going to test whether there is a relationship between visual learning style and academic performance. The hypotheses would be:

H$_0$: The visual learning style of the students, enrolled during the second semester of 2018, is not significantly related to their academic performance in the Operational Research course of the IV cycle of the FCA of the UNAC.

H$_1$: The visual learning style of the students, enrolled during the second semester of 2018, is significantly related to their academic performance in the Operational Research subject of the IV cycle of the FCA of the UNAC.

Table 5 presents the academic performance of the Operative Research students of the IV cycle of the FCA of the UNAC, enrolled during the 2018-B semester, who had the highest number of favorable responses to the visual style.

Table 5
Data on visual style and academic performance

ID	Favorable responses	Performance			
		Attitudinal	Procedural	Conceptual	Academic
1	17	15	9	11	12
2	21	15	16	11	14
3	18	13	12	11	12
6	18	6	14	11	10
8	18	8	16	8	11
9	18	5	15	8	9
10	18	15	11	14	13
11	18	12	14	16	14
13	18	12	16	15	14
16	22	8	16	16	13
17	18	11	16	12	13
18	18	5	17	11	11
19	21	15	17	20	17
22	19	6	17	11	11
26	17	5	10	14	10
30	19	9	15	20	15
32	17	7	11	10	9
35	25	19	19	15	18
36	21	18	15	16	16
38	21	8	15	14	12
39	19	8	14	20	14
41	18	9	15	15	13
42	18	7	15	16	13
46	16	18	10	6	11
47	17	5	9	13	9
49	21	9	17	10	12
50	15	7	9	7	8
55	18	20	12	13	15
61	17	7	12	16	12
64	23	20	17	16	18
67	19	6	16	20	14
71	19	15	16	11	14
76	21	15	14	20	16
77	17	8	12	13	11

Source: Results of the survey, tests and checklist

From the data in Table 5, we have applied the Pearson's correlation test, using the SPSS software. The results are shown in table 6.

Tabla 6
Pearson's correlation between visual learning style and academic performance

Statistics	Visual style	Performance			
		Attitudinal	Procedural	Conceptual	Academic
Pearson's correlation	1	,431	,730	,434	,745
Sig. (bilateral)		0.011	0.000	0.010	0.000
N	34	34	34	34	34

Table 6 shows that the relationship is significant at a significance level of one percent, therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. Additionally, the table shows that auditory learning style also has a significant relationship with procedural performance at one percent and with attitudinal and

conceptual performance at five percent. That is to say, that, in all cases, it is significant to at least five percent significance.

Third, we will test whether there is a relationship between the kinesthetic learning style and academic performance. The hypotheses would be:

H_0: The kinesthetic learning style of the students, enrolled during the second semester of 2018, is not significantly related to their academic performance in the Operational Research course of the IV cycle of the FCA of the UNAC.

H_1: The kinesthetic learning style of the students, enrolled during the second semester of 2018, is significantly related to their academic performance in the Operational Research course of the IV cycle of the FCA of the UNAC.

Table 7 presents the academic performance of the Operational Research students of the IV cycle of the FCA of the UNAC, enrolled during the 2018-B semester, who had the highest number of favorable responses to the kinesthetic style.

Table 7
Data on kinesthetic style and academic performance

ID	Favorable responses	Performance			
		Attitudinal	Procedural	Conceptual	Academic
4	19	6	15	11	11
5	17	8	14	13	12
7	16	5	9	8	7
12	20	12	17	16	15
15	15	5	15	8	9
20	18	9	12	15	12
21	18	8	16	7	10
23	20	12	16	14	14
24	18	7	9	15	10
27	21	13	16	11	13
29	20	10	15	12	12
31	20	12	15	15	14
33	20	12	13	14	13
43	19	6	12	11	10
45	18	6	13	16	12
48	16	5	9	8	7
51	21	12	11	12	12
52	21	15	17	16	16
53	17	8	16	14	13
56	17	8	15	11	11
57	17	9	14	13	12
59	19	7	17	11	12
60	16	5	9	12	9
62	16	6	11	10	9
63	16	8	10	11	10
65	17	9	13	12	11
66	17	9	14	14	12
68	20	11	13	11	12
69	16	7	11	10	9
73	17	5	13	11	10

Source: Results of the survey, tests and checklist

From the data in Table 7, we have applied the Pearson's correlation test, using the SPSS software. The results are shown in Table 8.

Tabla 8
Pearson's correlation between kinesthetic learning style and academic performance

Statistics	Kinesthetic style	Performance			
		Attitudinal	Procedural	Conceptual	Academic
Pearson's correlation	1	,801	,488	,458	,713
Sig. (bilateral)		0.000	0.006	0.011	0.000
N	30	30	30	30	30

Table 8 shows that the relationship is significant at a significance level of one percent, therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. Additionally, the table shows that kinesthetic learning style also has a significant relationship with attitudinal and procedural performance at one percent and with conceptual performance at five

percent. That is to say, that, in all cases, it is significant to at least five percent significance.

Fourth, we are going to test whether there is a relationship between learning styles and academic performance. The hypotheses would be:

H_0: The learning styles of the students, enrolled during the second semester of 2018, are not significantly related to their academic performance in the Operational Research course of the IV cycle of the FCA of the UNAC.

H_1: The learning styles of students, enrolled during the second semester of 2018, are significantly related to their academic performance in the Operational Research course of the IV cycle of the FCA of the UNAC.

Table 9 presents the academic performance and learning styles of the Operational Research students of the IV cycle of the FCA of the UNAC, enrolled during the 2018-B semester.

Table 9

Data on Learning Styles and Academic Performance

ID	Style	RF	RA	ID	Style	RF	RA	ID	Style	RF	RA	ID	Style	RF	RA
14	A	16	10	8	V	18	11	47	V	17	9	29	C	20	12
25	A	15	9	9	V	18	9	49	V	21	12	31	C	20	14
28	A	18	15	10	V	18	13	50	V	15	8	33	C	20	13
34	A	18	15	11	V	18	14	55	V	18	15	43	C	19	10
37	A	19	14	13	V	18	14	61	V	17	12	45	C	18	12
40	A	21	12	16	V	22	13	64	V	23	18	48	C	16	7
44	A	17	11	17	V	18	13	67	V	19	14	51	C	21	12
54	A	17	10	18	V	18	11	71	V	19	14	52	C	21	16
58	A	17	12	19	V	21	17	76	V	21	16	53	C	17	13
70	A	21	12	22	V	19	11	77	V	17	11	56	C	17	11
72	A	17	10	26	V	17	10	4	C	19	11	57	C	17	12
74	A	16	11	30	V	19	15	5	C	17	12	59	C	19	12
75	A	16	10	32	V	17	9	7	C	16	7	60	C	16	9
78	A	16	11	35	V	25	18	12	C	20	15	62	C	16	9
79	A	20	15	36	V	21	16	15	C	15	9	63	C	16	12
80	A	15	7	38	V	21	12	20	C	18	12	65	C	17	11
1	V	17	12	39	V	19	14	21	C	18	10	66	C	17	9
2	V	21	14	41	V	18	13	23	C	20	14	68	C	20	12
3	V	18	12	42	V	18	13	24	C	18	10	69	C	16	11
6	V	18	13	46	V	16	11	27	C	21	13	73	C	17	10

Source: Results of the survey, the tests and the checklist. A: auditory, V: visual, C: kinesthetic, RF: Favorable responses, RA: Academic performance

From the data in Table 9, we have applied the Pearson's correlation test, using the SPSS software. The results are shown in Table 10.

Table 10

Pearson's correlation between learning styles and academic performance

Statistics	Learning styles	Academic performance
Pearson's correlation	1	,731
Sig. (bilateral)		0.000
N	80	80

Table 10 shows that the relationship is significant at a significance level of one percent, therefore, the null hypothesis is rejected and the alternative hypothesis is accepted.

DISCUSSION

The inferential tests developed show that there is a significant relationship between the predominance of a style and academic performance. The reference to predominance is due to the fact that there is not a single student who has responded by marking the 40 responses that correspond to

their style, but rather that one style predominates, but there are responses that correspond to the other styles, in all cases. For that reason, we decided to quantify the responses, which allowed us to establish that the relationship between the different learning styles and academic performance are linearly and positively related, using the Pearson correlation coefficient, otherwise we would have had to stay with a non-parametric relationship, having to use the chi square test to test the independence or dependence of the variables, without being able to determine the sign of the relationship.

Although it is true that it is proven that a better definition of the learning style according to the students is reflected in higher performance, what has not been proven is whether there is a significant difference between the average performance of the students with different learning styles. That is, if the fact of having a certain style makes the performance of a student superior to another who has a different style. In this sense, we have added to the investigation a test of difference of means of academic performance of the different styles and the Tukey test.

The hypotheses to be tested are:
H_0: All means are equal

H_1: Not all means are the same

In table 11 of the analysis of variance, it can be seen that, in all cases, the p-value is greater than 0.05, which leads us to accept the null hypothesis that, regardless of the learning style, there are no significant differences in mean academic performance.

Table 11
ANOVA of the difference of means of attitudinal performance

Source	df	SC Ajust.	MC Ajust.	F value	p value
Style	2	84.56	42.28	2.73	0.071
Error	77	1191.97	15.48		
Total	79	1276.53			

ANOVA of the difference of means of procedural performance

Source	df	SC Ajust.	MC Ajust.	F valaue	p value
Style	2	12.91	6.455	0.96	0.387
Error	77	517.84	6.725		
Total	79	530.75			

ANOVA of the difference of means of the conceptual performance

Source	df	SC Ajust.	MC Ajust.	F value	p value
Style	2	47.71	23.856	2.43	0.095
Error	77	756.77	9.828		
Total	79	804.49			

Table 12, using the Tukey test, confirms what was found with the ANOVA

Tabla 12
Comparación del rendimiento actitudinal en parejas de Tukey

Estilo	N	Media	Agrupación
Visual	34	10.757	A
Auditivo	16	9.188	A
Cinestésico	30	8.5	A

Comparación del rendimiento procedimental en parejas de Tukey

Estilo	N	Media	Agrupación
Visual	34	14.088	A
Cinestésico	30	13.333	A
Auditivo	16	13.188	A

Comparación del rendimiento conceptual en parejas de Tukey

Estilo	N	Media	Agrupación
Visual	34	13.529	A
Cinestésico	30	12.067	A
Auditivo	16	11.813	A

Las medias que no comparten una letra son significativamente diferentes.

In table 13 of the analysis of variance, it can be seen that, in the case of academic

performance, the p-value is less than 0.05, which leads us to reject the null hypothesis that there are no significant differences in the mean academic performance and, therefore, accept the alternative hypothesis, which there are.

Table 13

ANOVA of the difference in means of academic performance

Source	dl	SC Ajust.	MC Ajust.	F value	p value
Style	2	46.4	23.199	4.44	0.015
Error	77	402.46	5.227		
Total	79	448.86			

Table 14, using the Tukey test, confirms what was found with the ANOVA.

Table 14

Comparison of academic performance in Tukey pairs

Style	N	Media	Agrupación	
Visual	34	12.88	A	
Auditory	16	11.396	A	B
Kinesthetic	30	11.311		B

Means that do not share a letter are significantly different.

The research results are consistent with those indicated by Tineo (2015) who concluded that there are significant relationships between the factors of academic performance and learning of the General Chemistry I course, in students of the National University of Engineering, in the year 2013.

However, they differ with those of Rettis (2016), because, although he used the Kolb Test to establish learning styles, he concluded that there are significant differences between learning styles to achieve better academic performance.

They also differ with those of Colonio (2017), who concludes that there is no relationship between the Learning Styles and the Academic Performance of the students under study, in the academic year, 2017.

There is agreement with Guzman (2012), who does not consider in his research that learning styles are a factor that affects academic performance.

In addition, it must be taken into account that in the case of Murillo (2013) his results are similar to those of Guzman (2012), who also does not find that learning styles constitute a factor that influences the Academic Performance of students.

And, regarding the results obtained by Bernardo (2016), there is a marked difference with his conclusions because he considers that there is no strong relationship between academic performance and learning styles.

Finally, according to the results of the research carried out, we can conclude the following:

There is a significant relationship between each learning style and the academic performance of the Operational Research subject of the students of the IV cycle of the Faculty of Administrative Sciences of the National University of Callao enrolled during the 2018-B semester, so that the better defined the style, the higher the performance.

CONCLUSIONS

There is a significant relationship between learning styles and academic performance in the Operational Research course of students of the IV cycle of the Faculty of Administrative Sciences of the National University of Callao enrolled during the 2018-B semester.

It has not been established, however, whether the academic performance of students with one style is higher than that of students with a different style. Indeed, if we make the comparison performance by performance there is no significant difference, however, when we make the comparison of academic performance, in general, differences are observed in favor of visual style, so, in this case, the result does not is conclusive.

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