Artículos

Influence of Admission Tests on Academic Excellence in Military Sciences Career

Influencia de las pruebas de admisión en la excelencia académica en la carrera de Ciencias Militares

Muñoz Gualán, German; Muñoz Gualán, Erik; Muñoz Gualán, Alberth

German Muñoz Gualán
gergeomunoz1988@gmail.com
Universidad de Fuerzas Armadas, ESP, Ecuador

Erik Muñoz Gualán erikda2008@gmail.com
Universidad Técnica Particular de Loja, UTPL, Ecuador

Alberth Muñoz Gualán albmu93@gmail.com
Peoples' Friendship University of Russia, Rusia

Runae
Universidad Nacional de Educación, Ecuador
ISSN: 2550-6846
ISSN-e: 2550-6854
Periodicidad: Semestral
núm. 8, 2023
runae@unae.edu.ec

Recepción: 25/09/22
Aprobación: 05/12/22

URL: http://portal.amelica.org/ameli/journal/676/6763666011/

Resumen: El objetivo planteado en este estudio fue establecer qué resultados de las pruebas de ingreso predicen un excelente rendimiento académico o el abandono de un estudiante de la carrera de Tecnología en Ciencias Militares. Por lo cual, esta investigación presenta un enfoque cuantitativo, con diseño no experimental, de tipo transversal y un alcance correlacional. Se utilizaron los promedios de las pruebas de ingreso y rendimiento académico por períodos académicos, se tomó esta información del archivo y base de datos de la Escuela de Formación de Soldados. Con la finalidad analizar esta información, se utilizó una matriz de Excel que se analizó en el programa SPSS. Se llega a la conclusión de que existe una correlación significativamente baja entre las pruebas académicas y físicas de ingreso con el rendimiento académico de excelencia, pero esta correlación representa la mejor predicción de rendimiento académico de excelencia de los estudiantes.

Palabras clave: rendimiento académico, estudiantes, pruebas de ingreso, ejército, ciencias militares.

Abstract: The objective of this study was to establish which admission tests results predict an excellent student academic performance or desertion at Tecnología en Ciencias Militares career. Therefore, this research presents a quantitative approach with a non-experimental, cross-sectional design and a correlational scope. Admission tests and academic performance were taken by academic periods. This information was taken from Escuela de Formación de Soldados' archives and databases. In order to analyze this information an Excel matrix was used, and then the program SPSS. Conclusions show that there is a weak significative correlation between academic and physical admission tests, and excellent academic performance. However, this correlation represents the best prediction of excellent academic performance.

Keywords: academic performance, student, admission tests, army, military sciences.

Introduction

Academic performance is considered the indicator of the learning level that students have reached at the end of an educational process (Hernández Pina & Maquilón Sánchez, 2011), which constitutes the reference point to assess the effectiveness degree of the learning process (Santos Álvarez & Vallelado, 2013).

Likewise, education is considered the fundamental basis for the development of humanity (Batallas González, 2014), and the university is one of the most important places in which education takes place. In this sense, the university aims to ensure that students can effectively function when facing particular problems upon completing their curricular plans, and accurately participate in society's growth and development.

At the same time, in our region, there is no single structure of academic performance common determinants among countries (Fernández, 2004). Therefore, each region and university must seek to identify the determinants of their student's academic performance to develop educational policies according to their characteristics.

Academic performance is defined as the reached goals in a subject, which represent the final product of the application of a university's efforts. The activities, traits, and some correct perceptions about knowledge provided establish these efforts. Among some factors that influence academic performance, we can describe: (a) individual factors, which the student cannot modify, (b) factors that belong to the student, which can be changed, and (c) factors linked to educational context. Therefore, they go beyond student's influence sphere and affect everyone in the group in the same way (Santos Álvarez & Vallelado, 2013).

Besides, it is widely known that multiple factors influence the academic performance of university students. Among them, the most important are socioeconomic factors such as sex, parental level of education, economic level, access to technology, secondary school studies, and study dedication hours (Borja Naranjo *et al*., 2021; García Gil & Fajardo Bullón, 2021). However, resilience is also decisive for students in the educational field since it allows them to develop even when they face unfavorable external factors like social, familiar, and economic problems. Thus, the capacity for resilience is an essential factor that allows students to increase their probability of academic success (Gómez Esquivel *et al.*, 2021).

In our particular context, there needs to be a consensus when establishing factors associated with academic performance. Therefore, for this work development, we focus on tests admission as determinants to develop educational policies according to the particular characteristics of our population (García de Fanelli, 2014; Soza Mora, 2021).

In the military field, considering the determining factors for excellent academic performance in students is vital due to all the logistical resources required to develop education in the army context. These resources are considered from selection to admission to training institutes—including the training and examination of them—for reasons such as financial cost of accommodation (it is an internship regimen) and other expenses related to using military weapons. In addition, there is always a risk for civilian population related

to using dangerous weapons (Castro Solano & Casullo, 2002; Castro Solano & Fernández, 2004; Teneda Garcés *et al.*, 2018).

It is necessary to mention that military training schools differ from regular university educational institutes due to the characteristics of military education, in which young people have to perform two combined tasks during their training. First, intense military training, which brings with it a constant physical challenge, and at the same time, a university academic routine that implies effort, dedication, and hours of study, whose final result is the achievement of a third-level degree, and a military degree (Castro & Fernández, 2005; Gutiérrez Alban *et al.*, 2019).

According to many authors, among all existing determinants, the grade obtained in university admission tests and academic performance prior to attending is the most important predictor of a student's academic performance (Garbanzo, 2007). In such a case, if the student characterization is rigorous and objectively measurable, the selection is limited to ordering students in descending order, and establishing a breaking point for admission as soon as the established quota has been met (Rodríguez Fontes et al., 2000).

The admission process generally consists of evaluating student's prior knowledge using instruments that assess verbal, logical, mathematical, and writing skills (Zwick, 2012; López Altamirano *et al.*, 2020). In Ecuador, selection process for university admission is determined by the score developed in a standardized national evaluation called ENES test (Examen Nacional para la Educación Superior, in Spanish) and the offer established by each university (Zapata Villacis, 2017; López Altamirano *et al.*, 2020). However, for admission to military training schools, as it is a risk education that requires maximum academic, physical, and mental demands, it is necessary to complement this process with an evaluation of physical skills, and medical, and psychological aptitude (Muñoz, 2020; Muñoz & Zambrano, 2020; Pacheco Cabrera *et al.*, 2021).

The entry profile of Tecnología en Ciencias Militares career is a set of specific attitudes and aptitudes that the aspiring soldier must bring with him. Among the main ones, we can mention: (a) commitment to practice principles and values, (b) vocation towards life and military service, (c) fitness and physical suitability, (d) medical conditions favorable to the career, (e) psycho-emotional stability and control, and (f) skills and abilities to work as a team (Universidad de Fuerzas Armadas-ESPE, 2017; Muñoz, 2020; Muñoz & Zambrano, 2020).

Thus, admission tests for military training schools are determined in four well-differentiated groups, which seek to select the best applicants who meet both the admission profile and the pre-established quota, according to details: (a) psychological test, (b) academic tests, (c) physical tests, and (d) medical tests (Muñoz, 2020).

Likewise, academic performance of Tecnología en Ciencias Militares' students is a set of indicators of academic subjects, physical performance, behavior, and military qualities that the student present within Escuela de Formación de Soldados del Ejército "Vencedores del Cenepa" during the development of the career, since the product that is intended to be delivered to the army and society is a disciplined individual, prepared academically, military, and physically

according to the established standards, it is also necessary to complement this training by instilling a life professional and ethical military.

The curricular design in Escuela de Formación de Soldados del Ejército "Vencedores del Cenepa" follows the guidelines of Ecuador's Ley Orgánica de Educación Superior, Land Force, and Universidad de Fuerzas Armadas-ESPE, in which the primary characteristic is to present a dual educational model, where both practical and theoretical learning is developed as superior technologists in military sciences by the Universidad de Fuerzas Armadas-ESPE, as well as the training of skills and abilities as army soldiers of Ecuador's ground force. This curriculum is planned in five academic periods, with an annual characterization, where the first year is training and the second year is specialized (Universidad de Fuerzas Armadas-ESPE, 2017).

The planned general objective of this research work is to establish what results of admission tests predict excellent academic performance and desertion of students of Tecnología en Ciencias Militares, class 2020-2022, of Escuela de Formación de Soldados del Ejército "Vencedores del Cenepa." For which, it is essential to meet the following specific objectives: (a) detail the results of the psychological, academic, and physical admission tests presented by students; (b) describe the results of academic performance, and student desertion by academic periods and correlate them with the psychological, academic, and physical admission tests presented by students; (c) find the optimal psychological, academic, and physical admission tests that predict excellent academic performance and desertion.

The hypothesis proposed by this work was considered as follows: the results of the admission tests to military training schools are directly related to academic performance and desertion of Tecnología en Ciencias Militares student's—2020-2022 class—of Escuela de Formación de Soldados del Ejército "Vencedores del Cenepa." With this, the knowledge of admission tests involved in academic performance would allow identifying variables that determine the success and failure of Tecnología en Ciencias Militares students.

For the reasons mentioned above, the scientific problem has been described as this question: What are the admission tests that predict excellent academic performance and desertion in Tecnología en Ciencias Militares students, 2020-2022 class, of Escuela de Formación de Soldados del Ejército "Vencedores del Cenepa?"

Materials and Methods

The present work is an analytical study that presents a quantitative approach with a non-experimental, cross-sectional design, and a correlational scope.

This study's universe is represented by 1700 Tecnología en Ciencias Militares students of Escuela de Formación de Soldados del Ejército "Vencedores del Cenepa." Therefore, the sample is represented by the total number of second-year military applicants (n = 676), considered a 3% margin of error and greater than 95% confidence level.

The purpose of this research is to know the psychological, academic, and physical admission tests that predict excellent academic performance and

desertion of the mentioned career students, 2020-2022 class, of the mentioned school. Which was developed in phases, as follow:

The first phase seeks to detail the results of psychological, academic, and physical admission tests presented by Tecnología en Ciencias Militares students, 2020-2022 class, by collecting information from army school's Academic Department, according to detail:

a) Psychological test:
   -Mental capacity: (A) recommended; (B1) not recommended, first possibility of being considered; (B2) not recommended, second possibility of being considered; (B3) not recommended, third possibility of being considered; and (C) not recommended.
   -Personality test: (A) recommended; (B1) not recommended, first possibility of being considered; (B2) not recommended, second possibility of being considered; (B3) not recommended, third possibility of being considered; and (C) not recommended,
b) Academic tests include quantitative assessment: 20-19 points are excellent, 18.99-18 are very good, 17.99-16 are good, 15.99-14 are average <, and 13.9 are poor.
c) Physical tests are quantitatively valued out of 20 points, according to a pre-established table of scales: elbow push-ups = 45 push-ups in 1.30 minutes; abdominal push-ups = 50 sit-ups in 1.30 minutes; trot = distance of 2 miles in 12.57 minutes; swimming = 200 meters in 5.13 minutes; decision jump = from the plank 5 meters high.

Likewise, academic performance results are stated by academic periods of Tecnología en Ciencias Militares students, as well as student desertion level. In this study, the variables used are academic and physical performance, military behavior, and qualities. In addition, students were grouped according to academic performance values at the end of each academic period in academic excellence (average of 19 to 20 points), and normal performance (<18 points).

Finally, in the last phase, it is intended to find the admission test that predicts excellent academic performance and desertion of Tecnología en Ciencias Militares career, 2020-2022 class.

The collection of information on the variables is carried out with a search in the academic department of the army school database, it is carried out in a previously developed matrix in Excel, and then the variables are analyzed, and statistically correlated using the statistical program SPSS version 26. Finally, the variables are expressed as mean ± SD, which were statistically compared using Pearson's correlation, and prediction based on linear regression model.

In our research work, admission tests are considered an independent variable. However, this can also be considered a limitation because different factors affect academic performance, such as demographic, socioeconomic, academic, and motivational factors.

Results and Discussion

In the present study, 676 Tecnología en Ciencias Militares career students participated, with an average age of 19.25 years old. It was evidenced that the

average physical admission test was 17.19 points (SD: 2.57), an academic test of 783.13 points (SD: 51.24), a mental capacity of B2, and a personality test of B2.

Likewise, it was evidenced that, in the first academic period, average general academic performance was 18.47 points, where best scores were observed in physical performance (19.63 points), and behavior (19.98 points). In the second academic period, the average general academic performance was 18.37 points, where best scores were observed in physical performance (19.42 points), and behavior (19.86 points). In the third academic period, average general academic performance was 18.36 points, where best scores were observed in physical performance (19.26 points), behavior (19.79 points), and military qualities (19.04 points). Finally, in the fourth academic period, average general academic performance was 18.49 points, where best scores were observed in physical performance (19.08 points), and behavior (19.89 points).

Table 1

Statistics of the Admission Tests in the Good Academic Performance

Variable			P_T	A_T	M_C	Per_T	PA	PP	C	MQ	GPA
GP		Mean	17.19	783.13	B2	B2					
		SD	2.57	51.24	0.89	0.51					
	AP1	Mean					17.75	19.63	19.98	18.50	18.47
		SD					0.47	0.67	0.06	0.02	0.32
	AP2	Mean					17.65	19.42	19.86	18.61	18.37
		SD					0.49	0.77	0.23	0.11	0.34
	AP3	Mean					17.65	19.26	19.79	19.04	18.36
		SD					0.45	0.80	0.30	0.35	0.33
	AP4	Mean					17.90	19.08	19.89	18.71	18.49
		SD					0.32	0.80	0.18	0.18	0.28
GAP_AP1		N 18									
		Mean	18.46	842.44	B1	B2	18.64	19.97	19.99	18.50	19.06
		SD	1.50	61.83	0.94	0.59	0.09	0.06	0.02	0.00	0.05
GAP_AP2		N 18									
		Mean	18.27	839.27	B2	B2	18.66	19.83	19.97	18.71	19.06
		SD	2.19	65.78	0.57	0.81	0.11	0.19	0.08	0.14	0.04
GAP_AP3		N 14									
		Mean	18.92	858.71	B2	B2	18.71	19.82	19.90	19.31	19.12
		SD	1.52	62.74	0.99	0.51	0.15	0.24	0.23	0.44	0.08
GAP_AP4		N 29									
		Mean	17.85	829.65	B1	B2	18.54	19.73	19.95	18.84	19.08
		SD	2.66	59.11	0.96	0.49	0.13	0.28	0.06	0.14	0.08

Source: self-made

GP: general population, GAP: good academic performance, AP: academic period, SD: standard deviation, P_T: physical test, A_T: academic test, MC_: mental capacity, Per_T: personality test, PA: performance academic, PP: physical performance, C: conduct, MQ: military qualities, GPA: grade point average.

In addition, excellent academic performance was evidenced in 18 (2.70%) students in the first academic period and 18 students, 14 students, and 29 students in the second, third, and fourth academic periods, respectively. In students with good academic performance in the first period, a general average of 19.06 points was observed, which obtained an average of 18.46 points for physical admission tests, academic tests of 842.44 points, and mental capacity of B1 and B2 personality tests. In students with good academic performance in the second period, a general average of 19.06 points was observed, which obtained an average for physical admission tests of 18.27 points, academic tests of 839.27

points, and mental capacity of B2 and B2 personality tests. In students with good academic performance in the third period, a general average of 19.12 points was observed, which obtained an average for physical admission tests of 18.92 points, academic tests of 858.71 points, and mental capacity of B2 and B2 personality tests. Finally, in students with good academic performance in the third period, a general average of 19.08 points was observed, who obtained an average of physical admission tests of 17.85 points, academic test 829.65 points, capacity B1 mental test, and B2 personality test.

Table 2
Correlation of Admission Tests with Academic Performance

Variable	P_T		p	A_T	p	M_C	p	Per_T	p
AP1	GAP	0.082	0.017	0.193	0.000	-0.045	0.121	0.000	0.495
	PA	0.025	0.525	0.022	0.563	0.057	0.140	-0.650	0.094
	PP	-0.010	0.792	0.056	0.149	-0.046	0.234	0.028	0.472
	C	-0.040	0.306	0.007	0.856	-0.046	0.238	-0.029	0.460
	MQ	-0.047	0.229	0.021	0.593	-0.016	0.686	0.003	0.934
	GPA	0.017	0.669	0.039	0.316	0.033	0.400	-0.048	0.216
AP2	GAP	0.065	0.046	0.179	0.000	0.007	0.433	0.044	0.128
	PA	0.060	0.121	0.033	0.395	0.050	0.199	-0.064	0.097
	PP	0.026	0.507	0.096	0.013	0.002	0.949	0.015	0.691
	C	-0.043	0.262	0.002	0.968	-0.037	0.341	0.009	0.808
	MQ	-0.041	0.295	0.043	0.271	0.065	0.091	0.023	0.553
	GPA	0.054	0.161	0.063	0.102	0.041	0.284	-0.048	0.215
AP3	GAP	0.098	0.005	0.216	0.000	0.008	0.418	0.069	0.038
	PA	0.021	0.581	0.032	0.406	0.034	0.377	-0.018	0.641
	PP	0.028	0.465	0.044	0.254	0.052	0.183	0.073	0.060
	C	-0.017	0.661	0.032	0.409	-0.024	0.532	0.006	0.869
	MQ	-0.027	0.478	-0.030	0.446	-0.076	0.049	-0.080	0.039
	GPA	0.023	0.558	0.044	0.252	0.037	0.335	0.007	0.864
AP4	GAP	0.055	0.079	0.193	0.000	-0.022	0.288	0.020	0.305
	PA	-0.005	0.907	0.038	0.322	-0.010	0.805	-0.007	0.855
	PP	0.003	0.937	0.038	0.332	-0.041	0.288	0.018	0.643
	C	-0.016	0.684	0.041	0.294	-0.014	0.719	0.024	0.532
	MQ	-0.002	0.950	0.006	0.886	-0.074	0.056	-0.045	0.245
	GPA	-0.007	0.867	0.059	0.127	-0.032	0.417	-0.001	0.979

Source: self-made
AP: academic period, GAP: good academic performance, PA: performance academic, PP: physical performance, C: conduct, MQ: military qualities, GPA: grade point average, p: significance, P_T: physical test, A_T: academic test, MC_: mental capacity, Per_T: personality test.

When performing correlations analysis, it was observed that in the first academic period, students with excellent academic performance have a statistically significant low correlation with physical tests (0.082, p: 0.017), and academic tests (0.193, p: 0.000). In the second academic period, students with excellent academic performance have a statistically significant low correlation with physical tests (0.065, p: 0.046), and academic tests (0.179, p: 0.000). In the third academic period, students with excellent academic performance have a statistically significant low correlation with physical tests (0.098, p: 0.005), academic tests (0.216, p: 0.000), and personality tests (0.069, p: 0.038). Finally, in the fourth academic period, students with an excellent academic performance show a statistically significant low correlation with academic tests (0.193, p: 0.000).

Table 3

Analysis of Linear Regression Models of Admission Tests as Predictors of Academic Performance

Model		Non-standardized Coefficient		Standardized Coefficient		
		B	DE	Beta	t	Sig.
1	Constant	-0.470	0.108		-4.360	0.000
	P_T	0.004	0.002	0.068	1.781	0.075
	A_T	0.001	0.000	0.185	4.850	0.000
	M_C	-0.008	0.007	-0.042	-1.110	0.268
	Per_T	-0.004	0.012	-0.011	-0.296	0.767
2	Constant	-0.482	0.105		-4.576	0.000
	P_T	0.003	0.002	0.047	1.215	0.225
	A_T	0.001	0.000	0.173	4.524	0.000
	M_C	0.002	0.007	0.011	0.280	0.780
	Per_T	0.011	0.012	0.034	0.894	0.372
3	Constant	-0.562	0.095		-5.934	0.000
	P_T	0.004	0.002	0.076	1.988	0.047
	A_T	0.001	0.000	0.207	5.455	0.000
	M_C	0.002	0.006	0.012	0.316	0.752
	Per_T	0.016	0.011	0.056	1.480	0.139
4	Constant	-0.597	0.136		-4.394	0.000
	P_T	0.003	0.003	0.038	0.980	0.328
	A_T	0.001	0.000	0.189	4.936	0.000
	M_C	-0.004	0.009	-0.017	-0.436	0.663
	Per_T	0.004	0.015	0.100	0.255	0.798

Source: self-made

P_T: physical test, A_T: academic test, MC_: mental capacity, Per_T: personality test, Model 1: GAP 1, Model 2: GAP 2, Model 3: GAP 3, Model 4: GAP 4, DE: deviation error, GAP: good academic performance.

It is necessary to mention that general student performance in each academic period present a statistically significant low correlation in: academic tests (0.096, p: 0.013) with the physical performance in the second academic period, mental capacity (- 0.076, p: 0.049), and personality test (-0.080, p: 0.039) with the military quality in the third academic period, and mental capacity (-0.074, p: 0.056) with the military quality in the fourth academic period.

In the model of the prediction of an excellent academic performance by academic periods, the following was evidenced: in the first academic period, the academic test (p: 0.000) is statistically significant, and also in the second (p: 0.000) and fourth (p: 0.000) academic period respectively, however, in the third academic period the physical test (p: 0.047) and the academic test (p: 0.000) are statistically significant. Therefore, in order of importance, the predictive admission test for excellent academic performance in students of Tecnología en Ciencias Militares career is the academic test and the physical test in the four academic periods.

Table 4
Desert student

		%	P_T	A_T	M_C	Per_T	Non-standardized Coefficient		Standardized Coefficient		
							B	DE	Beta	t	Sig.
Desert	N	32 (4.60)									
	Mean		15.86	786.46	B2	B3					
	ED		3.51	63.73	0.93	0.56					
	SS		0.62	11.26	0.16	0.10					
Pearson's Correlation			-0.10	0.01	-0.01	0.06					
Sig.			0.00	0.36	0.37	0.03					
Model 1	Constant						0.03	0.13		0.24	0.80
	P_T						-0.00	0.00	-0.11	-2.90	0.00
	A_T						8.21	0.00	0.02	0.54	0.59
	M_C						-0.00	0.00	-0.00	-0.10	0.91
	Per_T						0.03	0.01	0.07	1.93	0.05

Source: self-made
P_T: physical test, A_T: academic test, MC_: mental capacity, Per_T: personality test, DE: deviation error, N: number, SS: standard student, Model 1: student desert.

Regarding to student desertion, it is evident that there were 32 (4.60%) desertions, 28 of which were in the first academic period as voluntary withdrawal, 3 in the second academic period, 2 in the fourth academic period as academic leave, and 1 in the fourth academic period as medical leave. Likewise, average physical test gets 15.86 points, academic test 786.46 points, mental capacities test gets B2, and personality test B3. In addition, it is also observed that statistically significant admission tests are: physical test and personality test, which have a low correlation with student dropout. Finally, it is evident that physical test (coef.: -0.110, p: 0.004), and the personality test (coef.: 0.073, p: 0.053) predict student dropout, although poorly.

Information on the relationship between admission tests and academic performance in military educational institutions is scarce. Therefore, this analysis was carried out with greater emphasis on pairs of regular university educational institutions.

Averages academic, physical, and psychological admission tests (17.19 points, 783.13 points, B2 and B2, respectively) in this study, as well as those obtained by students with excellent academic performance (18.38 points, 842.52 points, B1 and B2, respectively) are higher than what was evidenced in a similar study with 648 aspiring soldiers in an Ecuadorian military training institute, where an average academic test of 10.03 points is recorded (equivalence 515/1000 points), followed by 14.5 points in the physical test, and in the psychological test: an average of B2 in mental capacity, and B2 in the personality test (Muñoz & Zambrano, 2020). However, averages are similar to those observed in a study of 130 students from Universidad del Azuay medical school, located in Ecuador, who presented an average admission test score of 79.20/100 points (equivalent to 792/1000 points) (Alvear Escandón, 2014).

The opposite is observed in a study of 116 medical students from a university in northern Mexico, where the average academic admission test is 50.8/100 points

(equivalence of 508/1000 points) (Gómez López *et al.*, 2012). A similar situation was observed in 572 Finanzas y Contabilidad students at Universidad de Sevilla, in Spain, where the mean admission score was 5.8/10 points (equivalence of 580/1000 points) (Jiménez Caballero *et al.*, 2015).

Average general academic student performance in different academic periods (18.42 points), as well as average student excellent academic performance (19.08 points) is higher than what was observed in a study in an Ecuadorian military training institute in the first military year, where they obtained 17.81/20 points, and in the second year, when the obtained 18.29/20 points, likewise, to what was observed in a study in medical students of Universidad del Azuay, in Ecuador, which was found at 18.23/20 points (Muñoz & Zambrano, 2020; Alvear Escandón, 2014).

Likewise, a higher average was obtained in comparison to Universidad Veracruzana de México students, where an average of 77.24/100 points (equivalence of 15.45/20 points) was observed (Chain Revuelta *et al.*, 2003; Jiménez Caballero *et al.*, 2015).

The correlation of academic admission tests with excellent academic performance of Tecnología en Ciencias Militares career in the first academic period (F: 0.193, p: 0.000), second academic period (F: 0.179, p: 0.000), third academic period (F: 0.216, p: 0.000), and fourth academic period (F: 0.193, p: 0.000) show a low direct statistically significant correlation. Likewise, the correlation of physical admission tests with an excellent academic performance of students in the first academic period (F: 0.082, p: 0.017), second academic period (F: 0.065, p: 0.046), and third academic period (F: 0.098, p: 0.005) evidence a low statistically significant direct correlation.

The situation differs from what was observed in a study of aspiring soldiers of an Ecuadorian military training institute, where academic admission tests are moderately correlated with academic performance in the first military year (F: 0.539, p: <0.05), and a low direct correlation with the second military year (F: 0.0397, p: <0.05) (Muñoz & Zambrano, 2020). Likewise, a similar correlation was observed in Finanzas y Contabilidad students at Universidad de Sevilla, in Spain (F: 0.439) (Jiménez Caballero et al., 2015). Finally and in contrast, a low correlation (R: 0.13 and R: 0,21) was observed in a study at Universidad Técnica de Ambato, in Ecuador (López et al., 2016).

Besides, it is shown that the physical tests have a low statistically significant direct correlation with Tecnología en Ciencias Militares students' excellent academic performance. On the other hand, this situation does not happen with psychological tests (mental capacity and personality test), which are not statistically significant and have a null correlation index with academic performance. In other words, psychological tests do not fulfill the function of admitting the best students for their training in military sciences.

Thus, admission tests that predict Tecnología en Ciencias Militares students' academic performance are academic tests (coef.: from 0.185 in the first academic period, p: 0.000, to coef.: 0.207 in the third academic period, p: 0.000), in addition, it is evident that physical tests only present a statistically significant relationship in the third academic period (coef.: 0.076, p: 0.000). Likewise, psychological tests are excluded from the results, which present a null linear regression coefficient.

A similar situation is evidenced in a study of aspiring soldiers of an Ecuadorian military training institute where, in the first academic period, this is explained by academic and physical admission tests (R2: 0.435, p:<0.05), in the second academic period (R2: 0,560, p:<0,05), in the third academic period (R2: 0.560, p:<0.05), in the fourth academic period (R2: 0.560, p:<0.05) (Muñoz & Zambrano, 2020).

Also, regarding student desertion in our study, it is evident that there was 4.60% of desertion. A similar situation was evidenced in an Ecuadorian military training institute, where the percentage of student desertion is 4.5%, in comparison to that existing in other regular university centers, with up to 88.2% of student desertion in the Arquitectura y Diseño Gráfico career of a university of Guatemala, and what is observed in medical students of Universidad del Azuay, in Ecuador, which presents a student withdrawal rate of 30.76% (Muñoz & Zambrano, 2020; Alvear Escandón, 2014; Rabe Rendón, 2019).

Likewise, they presented an average 15.86 points for physical test, and of 786,46 points (15,72/20 points) for academic test, mental abilities got B2, and personality test B3 averages higher than the average of admission tests presented by aspiring soldiers of an Ecuadorian military training institute (academic test: 9.53/20 points, physical test: 12.35/20 points and psychological test: B2) (Muñoz & Zambrano, 2020).

A noteworthy fact is a minimum and maximum gap in admission exams for the withdrawal students, thus having physical tests (min: 6.523 points, max: 20.00 points), academic tests (min: 702.00 points, max: 910.00 points), and psychological tests (C_M: min: A, max: B3, and Per_T: min: B2, max: C) significant student heterogeneity is evident.

Likewise, it is observed that the statistically significant admission tests are the physical and personality tests, which present a low correlation with student desertion. However, it is not consistent with what was evidenced in aspiring soldiers of an Ecuadorian military training institute, where the only test that correlates in an indirect, moderate and significant way is mental capacity of psychological admission test (F: -0.468, p:< 0,05) (Muñoz & Zambrano, 2020).

Besides, it is evident that the tests that predict student desertion, although in a low way, are the physical test (coef.: -0,110, p: 0,004) and the personality test (coef.: 0,073, p: 0,053), opposite fact to what was observed in the aspiring soldiers of an Ecuadorian military training institute, where the mental test explains student desertion (R2: 0,219 and p: <0,05) (Muñoz & Zambrano, 2020).

It is worth mentioning that the lack of previous studies in the military educational context regarding admission tests, and their relationship with academic performance reveal an evident limitation in the development of this research work, which serves as an opportunity to identify new gaps in educational literature, and consequently new research in the military context.

Finally, it is necessary to denote that the present research work allowed us to demonstrate that admission tests carried out by students of the military courses in compliance with the entrance profile do not satisfactorily influence academic performance, as it was expected. This fact can be explained by considering that many other determinants are involved in academic performance, including socioeconomic, academic, and motivational factors. In this sense, Rodríguez Hernández *et al*. (2020) stated in a systematic review of 42 studies that

there is a positive but weak influence between socioeconomic factors, and academic performance in higher education. However, it was also observed that previous academic achievements, university experience, and employment status are strongly related to academic performance (Rodríguez Hernández *et al*., 2020).

Conclusion

Therefore, it is concluded that selection process for Tecnología en Ciencias Militares career is a primary effort of the Ecuadorian army, which aims to choose the best students who guarantee subsequent academic, and professional success. However, admission tests applied in admission period do not present a strong prediction of excellent academic performance of Tecnología en Ciencias Militares students. This implies proposing the formulation of new admission tests with quality standards by the current context, which allows the admission of students with optimal knowledge, and skills that meet military academic demands of training as a professional, and as somebody can face new challenges in the future security and defense of the country.

The results of admission tests of Tecnología en Ciencias Militares students who were admitted show that they are predisposed to have a student population with heterogeneous previous knowledge and skills, which makes it challenging to adapt to the military academy, and attitudinal demands of a third level student in military sciences. This opens the opportunity to motivate development of a propaedeutic proposal to have a student group with homogeneous knowledge and skills, which allows students quality, as well as later academically, physically, and mentally better-prepared professionals.

In Ecuador, three institutes offer a career in military sciences belonging to the Army, Escuela Militar Superior "Eloy Alfaro", Escuela de Formación de Soldados del Ejército "Vencedores del Cenepa", and Escuela de IWIAS del Ejército "Crnl. Gonzalo Barragán", which has a different mission and vision, framed in the requirements of particular competencies that this military institution wants for its military personnel. The situation allows replicating the present investigative work in order to know the reality of the prediction of admission tests, as well as to investigate other determinants of academic performance in students of the military sciences career.

References

Alvear Escandón, C. (2014). *Asociación entre indicadores de rendimiento académico y la aprobación del primer año en la Facultad de Medicina* [Bachelor's thesis]. Universidad del Azuay. https://dspace.uazuay.edu.ec/bitstream/datos/4032/1/10631.pdf

Batallas González, D. (2014). Análisis de los factores que determinan el rendimiento académico de los estudiantes universitarios. *Revista científica sinapsis, 1*(4). https://doi.org/10.37117/s.v1i4.34

Borja Naranjo, G.; Martínez Benítez, J.; Barrero Freire, S. & Haro Jácome, O. (2021). Factores asociados al rendimiento académico: Un Estudio de caso. *Revista Educare, 25*(3), 54-77. https://doi.org/10.46498/reduipb.v25i3.1509

Castro Solano, A. & Casullo, M. (2002). Predictores del rendimiento académico y militar de cadetes argentinos. *Anales de Psicología/Annals of Psychology, 18*(2), 247-259. https://revistas.um.es/analesps/article/view/28451

Castro Solano, A. & Fernández Liporace, M. (2005). Predictores Para la Selección de Cadetes en Instituciones Militares. *Revista Psykhe, 14*(1), 17-30. http://dx.doi.org/10.4067/S0718-22282005000100002

Chain Revuelta, R.; Cruz Ramírez, N.; Martínez Morales, M. & Jácome Ávila, N. (2003). Examen de selección y probabilidad de éxito escolar en estudios superiores: Estudio en una universidad pública estatal mexicana. *Revista electrónica de investigación educativa, 5*(1), 1-17. https://redie.uabc.mx/redie/article/view/72

Fernández, T. (2004). Clima organizacional en las escuelas: Un enfoque comparativo para México y Uruguay. *Revista Iberoamericana sobre Calidad, Eficacia y Cambio en Educación, 2*(2), 43-68. https://www.redalyc.org/articulo.oa?id=55120205

Garbanzo, G. (2007). Factores asociados al rendimiento académico en estudiantes universitarios desde el nivel socioeconómico: Un estudio en la Universidad de Costa Rica. *Revista Electrónica Educare, 17*(03), 57-87. http://www.scielo.sa.cr/scielo.php?script=sci_arttext&pid=S1409-42582013000300004&lng=en&tlng=es.

García Gil, M. & Fajardo Bullón, F. (2021). Análisis de la relación que existe entre las variables socioeconómicas familiares y el rendimiento académico de alumnos de educación secundaria obligatoria y bachillerato. *Revista INFAD de Psicología. International Journal of Developmental and Educational Psychology, 2*(1), 337-348. https://doi.org/10.17060/ijodaep.2021.n1.v2.2116

García de Fanelli, A. (2014). Rendimiento académico y abandono universitario: Modelos, resultados y alcances de la producción académica en la Argentina. *RAES Revista Argentina de Educación Superior, 6*(8), 9-38. http://www.revistaraes.net/numeros.php?revista=revista8.inc

Gómez Esquivel, D.; Delgado Sánchez, U.; Martínez Flores, F.; Ortiz Rodríguez, M. & Avilés Reyes, R. (2021). Resiliencia, género y rendimiento académico en jóvenes universitarios del Estado de Morelos. *Revista ConCiencia EPG, 6*(1), 36-51. https://www.redalyc.org/articulo.oa?id=80164345004

Gómez López, V.; Rosales Gracia, S.; Marín Solórzano, G.; García Galaviz, J. & Guzmán Acuña, J. (2012). Correlación entre el examen de selección y el rendimiento académico al término de la carrera de Medicina. *Revista Educación Médica Superior, 26*(4), 502-513. http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0864-21412012000400003&lng=es&tlng=es.

Gutiérrez Alban, L.; Teneda Garcés, V. & Narváez Rios, M. (2019). La formación militar desde el enfoque por competencias: caso tecnología superior en ciencias militares. *Revista de Ciencias de Seguridad y Defensa, 4*(8), 107-114. http://geo1.espe.edu.ec/wp-content/uploads/2019/06/6.pdf

Hernández Pina, F. & Maquilón Sánchez, J. (2011). Las creencias y las concepciones. Perspectivas complementarias. *Revista electrónica interuniversitaria de formación del profesorado, 14*(1), 165-175. https://www.redalyc.org/articulo.oa?id=21701719201 3

Jiménez Caballero, J.; Camúñez Ruiz, J.; González Rodríguez, M. & De Fuentes Ruiz, P. (2015). Factores determinantes del rendimiento académico universitario en el Espacio Europeo de Educación Superior. *Revista Innovar, 25*(58), 159-176. https://www.redalyc.org/pdf/818/81841166012.pdf

López, C. (2016). *Factores demográficos, socioeconómicos e institucionales que influyen en el rendimiento académico de los estudiantes universitarios* [Masters thesis]. Universidad Nacional de Córdoba. https://rdu.unc.edu.ar/handle/11086/4561

López Altamirano, D.; Gómez Morales, M.; Mayorga Alvarado, F.; Paredes Ojeda, M. & Martínez Pérez, S. (2020). La puntuación del examen Ser Bachiller como predictor del rendimiento académico universitario. *Revista Polo del Conocimiento, 5*(3):69-91. http://dx.doi.org/10.23857/pc.v5i3.1323.

Muñoz, G. (2020). El Sistema Educativo Militar del Ecuador: un modelo innovador. *Revista Cognosis, 5*(3), 45-56. https://revistas.utm.edu.ec/index.php/Cognosis/article/view/2448

Muñoz, G. & Zambrano, E. (2020). Pruebas de ingreso como predictores del rendimiento académico en los aspirantes a soldados del Ejército. *Revista de Estudios en Seguridad Internacional, 6*(2), 117-136. http://dx.doi.org/10.18847/1.12.7

Pacheco Cabrera, J.; Acurio Armas, E. & Trujillo Jaramillo, J. (2021). La Formación Militar en la Escuela Técnica de la Fuerza Aérea Ecuatoriana desde el enfoque de la Modalidad Dual: Caso Tecnología Superior en Ciencias Militares Aeronáuticas. *Revista de Ciencias de Seguridad y Defensa, 6*(1), 69-86. https://journal.espe.edu.ec/ojs/index.php/revista-seguridad-defensa/article/download/2178/1939?inline=1

Rabe Rendón, B. (2019). *Las pruebas de ingreso a la Facultad de Arquitectura y su relación con el rendimiento académico. Primera parte: fundamentos y resultados para la carrera de Arquitectura*. Repositorio del Sistema Bibliotecario de la Universidad de San Carlos de Guatemala. http://www.repositorio.usac.edu.gt/13006/

Rodríguez Fontes, R.; Díaz Rodríguez, P.; Moreno Lazo, M. & Bacallao Gallestey, J. (2000). Capacidad Predictiva de varios Indicadores de Selección para el Ingreso a la Carrera de Medicina. *Rev cubana Educ Med Super, 14*(2), 128-35. http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0864-21412000000200002&lng=es&tlng=es.

Rodríguez Hernández, C.; Cascallar, E. & Kyndt, E. (2020). Socio-economic status and academic performance in higher education: A systematic review. *Educational Research Review, p. 29*, 100305. https://www.sciencedirect.com/science/article/abs/pii/S1747938X18302744

Santos Álvarez, M. & Vallelado, E. (2013). Algunas dimensiones relacionadas con el rendimiento académico de estudiantes de Administración y Dirección de Empresas. *Universitas psychologica, 12*(3), 739-752. https://www.redalyc.org/articulo.oa?id=64730275008

Soza Mora, S. (2021). Factores asociados a la calidad del rendimiento académico de estudiantes en la educación superior. *Revista Ciencias de la Salud y Educación Médica, 3*(3), 36-43. https://revistacienciasmedicas.unan.edu.ni/index.php/rcsem/article/view/79

Teneda Garcés, V.; Enrique Villareal, J. & Núñez González, M. (2018). Las competencias profesionales pedagógicas: reto del sistema de educación y doctrina militar, en el consejo de educación superior ecuatoriano. *Revista Atlante: Cuadernos de Educación y Desarrollo*. https://www.eumed.net/rev/atlante/2018/02/educacion-superior-ecuador.html

Zapata Villacis, L. (2017). Modelo de ingreso a la Universidad Central del Ecuador y rendimiento académico. *Revista Científica Retos de la Ciencia, 1*(2), 71-79. https://retosdelacienciaec.com/Revistas/index.php/retos/article/view/115

Zwick, R. (2012). The role of admissions test scores, socio-economic status, and high school grades in predicting college achievement. *Pensamiento Educativo. Revista de Investigación Educacional Latinoamericana, 49*(2), 23-30. https://redib.org/Record/oai_articulo3695310-role-admissions-test-scores-socioeconomic-status-high-school-grades-predicting-college-achievement

Universidad de Fuerzas Armadas-ESPE. (2017). *Proyecto de Rediseño Curricular de la Carrera de Tecnología Superior en Ciencias Militares*. http://esforse.mil.ec/intranet/index.php?option=com_content&view=article&id=82