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Emotional competencies, learning styles and academic performance in university students

Raúl Delgado-Arenas, Universidad César Vallejo, Science Education, Lima, Perú,
Antonio Aurelio Delgado-Llerena, Universidad César Vallejo, Science Education, Lima, Perú,
Johnny Félix Farfán-Pimentel[1], Universidad César Vallejo, Science Education, Lima, Perú,
Nilda Shirley Delgado-Corazao, Universidad César Vallejo, Science Education, Lima, Perú,
Nilda Corazao-Marroquin, Universidad César Vallejo, Science Education, Lima, Perú,
Rommel Lizandro-Crispín, Universidad César Vallejo, Science Education, Lima, Perú

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Abstract
The present study had the motivation to identify the relationship between emotional competences and learning styles with the academic performance of students of the general chemistry curricular experience at the Professional School of Environmental Engineering. Methodologically, it was framed in the basic type, descriptive-correlational level, with a non-experimental design. The applied method was the hypothetical-deductive method. The data collection technique was the survey and the instruments were the respective tests for the study of each variable. The results of the research were obtained through the descriptive analysis of the variables and the inferential analysis to determine the level of correlation by means of Pearson's test. It was concluded that there is an average positive correlation of 0.853 points between the variables emotional competence and academic performance and 0.608 points between the variables learning style and academic performance.

Keywords: Emotional competencies, learning styles, academic performance, attitudes, university students.

[1] ADDRESS OF CORRESPONDENCE: Johnny Félix Farfán-Pimentel, Universidad César Vallejo, Science Education, Lima, Peru.
Email address: felix13200@hotmail.com

1. Introducción

In our country, there is a vertiginous growth of higher educational institutions, which has led to an increase in the supply of various professional careers, thus generating a critical and natural questioning in the analysis of this situation not only by the student in choosing the best training centre, but also by the academic-scientific community, since this growth in some cases does not go hand in hand with the educational quality provided and with the expected positive reinforcement of personal and scientific attitudes; especially, the keen eye of the academic-scientific community, since this growth in some cases does not go hand in hand with the quality of education provided and with the expected positive reinforcement of personal and academic attitudes of students, truly ignoring the teaching staff that the institution has and rather being influenced only by the economic aspect, infrastructure, distance and other aspects. Likewise, the teachers who impart their knowledge should be professional specialists with training that is at the forefront of science and technology as well as ethical principles. This leads us to take into account the new trends in education, which increasingly pay more attention to the learning processes of students in response to the social demand to train people with skills to learn effectively. Thus, research in recent years has shown the existence of important individual differences in student learning, recognising that learning styles can facilitate or interfere with cognitive processes, which is reflected in students' academic performance.

Thus, learning styles can be constituted as a set of similar strategies of how a student learns, perceives, interacts with others and responds to the learning environment. Certain learning styles may be predominant and with certain tendencies depending on the interest of the students and the nature of the subjects. Learning styles change over time and are potentiated according to the specialisations in a given professional career. Alonso et al. (1994) agree with Kolb (1984) when they express that we all have differences in learning styles, however, these are not immutable because they evolve at the pace of our chronological age and the students' experience.

De Natale (1990) and Capella and Coloma (2003) point out that good academic performance requires students' self-knowledge of their strengths and weaknesses; personal differences by methods, structure of the study environment encompassed in their learning styles and if the emotional and social dimension is reinforced, together with the cognitive, in the learning process of students, because emotions have a strong influence on motivation, help to generate an ideal climate for learning in the classroom context, and are essential for conflict management and school coexistence (Acosta Mesas, 2008; Bisquerra, 2008; Fernandez-Berrocal & Extremera, 2002; Palomera, 2008; Vallés & Vallés, 2003). All this, from a preventive perspective that allows one to enhance the teaching action aimed at improving social relations within the framework of an emotional education oriented to students acquiring knowledge about emotions, and that, according to their evolutionary development, they are able to value their own emotions and those of others, and acquire a certain degree of competence in their regulation.

1.1. Theoretical framework

Currently, emotional competencies are basic for an adequate development in the context of university students in which they spend a good part of their time in academic activities. In this sense, Jiménez-Bellasmil (2018) pointed out that, there are multiple investigations that have been carried out in the field of emotional competencies and academic performance in students; since, it is a determining factor due to the fact that it provides stability in the conduction of their personality in

the socio-educational environment. According to Goleman (1995), emotional competencies are structured in two groups: (i) personal competencies, which are associated with self-awareness, self-regulation and motivation; and (ii) social competencies, which are related to empathy and social skills. Likewise, Perpiñà et al. (2021) indicated that emotional competencies define the efficient, psychological and emotional performance of human beings.

That is why, educational institutions are in search of raising the educational quality in those terms it is necessary to enhance the capabilities of students for a better knowledge of cognitive skills and emotional resources being able to regulate them in their learning process in various real contexts (Gaeta-González & López-García, 2013). More precisely, emotional competencies refer to knowledge, abilities, skills and attitudes for the regulation of emotional phenomena in the person (Bisquerra & Pérez, 2007).

In this sense, the potential of emotions plays a critical role in the development of students' capabilities, having a direct impact on cognitive and behavioural processes, but also on control and motivation as an axis for strengthening their academic performance and preparing them for work performance in contexts of collaborative work, decision making and interdependence (Mórtigo-Rubio & Rincón Caballero, 2018). Meanwhile, emotional competence enables the transit of emotional potential to both the work environment and personal performance, respectively (Goleman, 1998). Therefore, for a person to achieve success this lies in the need to introduce emotional intelligence as a set of knowledge that supports the development of emotional competencies (Fragoso, 2015).

It is important that in the educational context the need to strengthen the development of skills in university students is fixed, since they are close to becoming part of the working population; being necessary to deepen the learning styles (Castillo Meza, 2019). In relation to learning styles, Cañizares and Guillen (2013) pointed out that, it is a set of strategies or techniques adequately structured and whose purpose is the acquisition of knowledge in an effective and efficient way achieving to facilitate learning. Likewise, Arenas-Loera (2017) indicated that learning styles have generated great interest in the scientific community due to the existence of motivational components that influence learning. In the same line, Rocha and Baez (2011) pointed out that, during the academic development of students, skills and abilities are acquired that allow them to face the various learning situations adequately.

In this regard, multiple cognitive research studies demonstrate the existence of different ways how students access information, processing, storage and retrieval of information; so much so that, learning styles have led to the confirmation of a variety of ways that improve the learning process, optimising the interaction between the teacher, the students and the contents of study (Colonio, 2017). In such sense, learning styles show the particular way in which students face their learning processes responding to the learning demand; being useful and maximising their human capabilities (Arellano-Bustos, 2019).

However, students have different ways of concretising their learning that make it possible to find ways that facilitate and learn more effectively; taking into consideration that people have certain features of cognitive, affective and physiological nature that is associated with the formation of conceptual, symbolic aspects and employ means for its representativeness; that is, the learning style in which a person can retain new concepts and sifting what to learn (Tocci, 2013). In the life of the human being in the stages of development a set of skills is acquired for the acquisition of learning some of them are predominant as the styles: visual, auditory and kinesthetic (González-Clavero, 2011).

According to research, there is evidence from scientific studies and they speak of a relationship between learning styles and academic performance; this is associated with factors such as the type of assessments applied, cognitive characteristics, level of self-efficacy, motivation towards study, social skills and learning skills (Sepúlveda et al., 2011). Likewise, teachers must be prepared to establish an optimal relationship with their students by encouraging them to feel and express their emotions and creating an environment conducive to the realisation of learning activities, maintaining a healthy emotional balance for students (Mohammad et al., 2022).

Therefore, emotional competence is constituted by a set of knowledge, skills, abilities, aptitudes and attitudes that are put in place for the establishment of the relationship of the person with him/herself and with his/her social environment emphasising learning and development. Likewise, the purpose of emotional education is the development of emotional competence considering psycho-pedagogical aspects of the teaching-learning process (Pedrera-Rodríguez, 2017).

1.2. Related research

In the academic field, several studies point out that emotions are a determining factor in the learning process of students and are even considered as a basis for learning (Pekrun & Linnenbrick-García, 2014). Emotions have a direct impact on the learning process; likewise, three essential reasons are verified that have an impact on the quality of learning, the climate of well-being in students and social skills (Mustafina et al., 2020). According to research, there is a theoretical framework that provides support on the relationship between emotional competencies and academic performance (Boyatzis, 2006; Brotheridge & Lee, 2003; Murga & Ortega, 2003). In this sense, Nias (1996) indicated that emotions are the basis of the teaching-learning process, which is why much attention should be paid when interacting with students. The emotional component plays an essential role increasing the possibilities of acquiring new knowledge (Cejudo & López-Delgado, 2017). Camana and Torres (2018) indicated that the theory of learning styles opened the way in the understanding and analysis of the phenomenon of learning; so they are also based on a combination of complex nature of strengths, skills, abilities, aptitudes and attitudes in the human being.

1.3. Purpose of the study

The objective is to analyse the relationship between emotional competencies, learning styles and academic performance of students in the general chemistry curricular experience.

2. Method and Material

2.1 Research Model

Research has a quantitative approach, since it is a process in the search for knowledge of reality in order to understand, analyse and interpret it with the purpose of expanding the frontier of knowledge (Monje, 2011). The purpose of quantitative research is to seek an explanation of the phenomena under study in which regularities are established, i.e. to find general laws that can explain social behaviour; whereas, knowledge is based on real facts in an objective and concrete manner (Bonilla & Rodríguez, 1997). Quantitative research is used to identify a specific factor in a given population and study sample (Astalini et al., 2021; Creswell, 2014). A questionnaire was used as an instrument in the research. In this sense, García (2003) pointed out that the questionnaire is a procedure used in the field of social sciences for the collection and recording of data, it is elaborated on facts and aspects that are of interest in the research.

The research was located in the non-experimental, cross-sectional and correlational design. It was non-experimental because no independent variable was manipulated to see its effects on the dependent variable, as Kerlinger (1988) pointed out, what we do in non-experimental research is to observe phenomena as they occur in their natural context, and then analyse them. It is cross-sectional, because data have been collected in a single measurement and it was correlational, because the level, degree or relationship between variables has been measured as alluded to by Hernández et al. (2014) these designs establish relationships between variables without specifying a sense of causality or pretending to establish causal relationships.

2.2 Participants

The study population consisted of university students of environmental engineering. According to Arias-Gómez et al. (2016), the study population is constituted by a set of elements that are characterised by having common characteristics and will serve as a reference for the determination of the study sample. The study sample was obtained through the non-probabilistic and intentional sampling technique (Marzal et al., 2021). The research was carried out with 110 students of the environmental engineering professional career.

2.3 Data Collection tools

Emotional competencies are an important aspect of active, effective and responsible citizenship. Among the aspects that are favoured by emotional competencies are: (i) emotional awareness; (ii) emotional regulation; (iii) emotional autonomy; (iv) Social competence; and (v) life skills and well-being. The technique used was the survey and the instrument, the Questionnaire of Emotional Development-A, which consists of 48 items.

Learning styles are cognitive, affective and physiological traits that serve as indicators of how students interact and respond to academic activities as a product of the teaching-learning process. Among these we have: (i) active style; (ii) reflective style; (iii) theoretical style; and (iv) pragmatic style. The technique used was the survey and the instrument was the CHAEA, which consists of 80 brief items, structured in 4 sections of 20 items corresponding to the 4 learning styles, which are randomly distributed throughout the questionnaire as a single set.

For academic performance, it was considered as the expression of a quantitative rating in numerical and qualitative terms in levels such as: (i) low level; (ii) medium level; and (iii) high level. The technique to be used is inspection-observation and the instrument is a data collection observation form.

2.4 Data collection process

To carry out the data collection process, authorisation was requested from the Professional School of Environmental Engineering, which, after analysing the purpose of the research through a meeting with the academic authorities and the ethics committee, provided the pertinent support and backing to carry out the study. Likewise, the environmental engineering students were given informed consent for the application of the data collection instruments. The study sample consisted of 110 students from the Professional School of Environmental Engineering, who showed interest in the research and gave their support.

2.5. Data Analysis

The research used statistical methods to better understand the phenomenon under study,

descriptive statistics were used to obtain statistical frequency distribution tables and establish the levels reached by the variables analysed in the research. In addition, inferential statistics were used through Pearson's model to determine the correlations between the variables studied.

3. Results

The results obtained for the reliability of the variables emotional competence and learning styles can be seen in Table 1.

Table 1

Reliability Statistics

Variable	Cronbach´s Alpha	N of items
Emotional competences	0.838	48
Learning styles	0.942	80

Source: Own elaboration.

The Cronbach's Alpha value for the emotional competencies variable was 0.838 is considered as very good and for the learning styles variable was 0.942 and is considered as very good (Tuapanta-Dacto et al., 2017).

The results achieved for the emotional competence variable, can be seen in Table 2.

Table 2

Analysis of the Frequencies of the Emotional Competence Variable

	Level	Frequency	Percentage	Percentage
Valid	Low	13	11.8	11.8
	Medium	71	64.6	76.4
	High	26	23.6	100.0
	Total	110	100.0	

Source: Own elaboration.

From Table 2, it can be deduced that, out of 110 valid cases, 23.6% (26) are at a high level and 64.6% are (71) at a medium level, which allows us to affirm that 88.2% have an acceptable rating for emotional competence, which means that they have the ability to maintain emotional control and skills to interact constructively with other people.

The results achieved for the learning style variable can be seen in Table 3.

Table 3

Frequency Analysis of the Learning Styles Variable

	Level	Frequency	Percentage	Percentage
Valid	Low	12	10.9	10.9
	Medium	39	35.5	46.4
	High	59	53.6	100.0
	Total	110	100.0	

Source: Own elaboration.

From Table 3, it can be deduced that, out of 110 valid cases, 53.6% (59) are in a high level and 35.5% are (39) in a medium level, which allows us to affirm that 89.1% are aware of the existence of learning styles, which means that they have the ability to manage learning styles to further enhance their cognitive abilities, so that they can achieve more meaningful, useful and simple learning for their personal benefit.

The results achieved for the academic performance variable can be seen in Table 4.

Table 4

Analysis of the Frequencies of the Variable Academic Performance

	Level	Frequency	Percentage	Percentage
Valid	Low	6	5.4	5.4
	Medium	40	36.4	41.8
	High	64	58.2	100.0
	Total	110	100.0	

Source: Own elaboration.

Table 4 shows that out of 110 valid cases, 58.2% (64) are in a high level and 36.4% (40) in a medium level, which allows us to affirm that 94.6% present an acceptable qualification of their academic performance, which indicates that the students show an aptitude to be able to face chemistry exams, demonstrating their capacity and understanding of a subject and having different factors that can influence positively or negatively, such as the subject that they are taking.

Table 5

Correlations in the Research Variables

		Academic performance	Emotional competencies	Learning styles
Pearson's correlation	Academic performance	1.000	0.853	0.608
	Emotional competencies	0.853	1.000	0.745
	Learning styles	0.608	0.745	1.000
Sig. (one-sided)	Academic performance	-	0.000	0.000
	Emotional competencies	0.000	-	0.000
	Learning styles	0.000	0.000	-
N	Academic performance	110	110	110
	Emotional competencies	110	110	110
	Learning styles	110	110	110

Source: Own elaboration.

From Table 5, it is observed that the values of Pearson's correlation for the variables under study are: (i) emotional competencies and academic performance (r = 0.853 and p = 0.000 < 0.05); (ii) for learning styles and academic performance (r = 0.608 and p = 0.000 < 0.05); (iii) for emotional competencies and learning styles (r = 0.745 and p = 0.000 < 0.05). This shows that there is a positive and significant correlation. The values obtained for emotional competence and academic performance is p = 0.000; for learning styles and academic performance is p = 0.000 and for emotional

competences is p = 0.000 all less than 0.05 which allows us to affirm that the alternative hypotheses have been corroborated and the null hypotheses have been rejected.

4. Discussion

The purpose of this research was to determine the relationship between emotional competencies and learning styles with the academic performance of students in the general chemistry curricular experience. Above all, it was intended to examine the set of non-cognitive competencies, components of the socio-emotional development area, which allow the student to develop in a harmonious and balanced way. Since it is a priority objective of education, since it must be able to recognise the emotional dimension of every human being, educate it and take it into account in the complex world of interactions that occur in the classroom, but it must also be understood that the educational role is tinged with different emotions and the task of educating is developed in an emotional context.

In relation to Villavicencio-Olvera's (2020) research, he sustained the need to know the learning styles of students in virtue of the development of ICT competencies obtaining as results for learning styles: (i) active style with 23.73%; (ii) theoretical style with 16.95%; (iii) reflective style with 10.17%; and (iv) pragmatic style with 49.15%. The bivariate correlations between ICT use and active style (Tau-b Kendall = 0.899 and p = 0.003 < 0.05); theoretical style (Tau-b Kendall = 0.355 and p = 0.018 < 0.05); reflective style (Tau-b Kendall = 0.465 and p = 0.005 < 0.05); and pragmatic style (Tau-b Kendall = 0.702 and p = 0.015 < 0.05). The existence of correlation between learning styles and their incidence with ICT competencies is evidenced.

Similarly, Balda-Pérez's (2019) research pointed out that emotional competencies have a positive effect that help the improvement of academic performance and emotional autonomy of students, these have notable repercussions at the formative, labour and social level of learners. The results obtained are: (i) emotional competencies (M = 6.22; SD = 1.05 and p = 0.000); (ii) emotional awareness (M = 6.80; SD = 1.23 and p = 0.000); (iii) emotional regulation (M = 6.09; SD = 1.19 and p = 0.000); (iv) emotional autonomy (M = 5.01; SD = 1.74 and p = 0.000); (v) social competence (M = 5.84; SD = 1.76 and p = 0.000); and (vi) life competencies (M = 6.91; SD = 1.17 and p = 0.000). Likewise, the bivariate correlations of academic performance with emotional competencies: (i) emotional awareness (r = 0.230 and p = 0.104); (ii) emotional regulation (r = 0.248 and p = 0.079); (iii) emotional autonomy (r = 0.162 and p = 0.256); (iv) social competencies (r = 0.113 and p = 0.430); (v) life competencies (r = 0.389 and p = 0.005); and (vi) emotional competencies (r = 0.299 and p = 0.033), thus evidencing that emotional competencies, have a positive and significant correlation with students' academic performance.

Likewise, Estrada-García (2018) stated in his research that learning styles have significantly impacted the learning process of students making it possible to understand that each human being learns in different ways; likewise, academic performance is a crucial aspect in the teaching-learning process since it makes it possible to identify whether students are managing to achieve the expected learning under the learning standards established in the curriculum of the educational system. Based on the Learning Styles Test of Alonso and Honey (1995), the results of the research allowed obtaining the scopes of the population studied: 19.57% of the learning styles are active; 42.30% are reflective; 17.12% are theoretical and 21.01% are pragmatic. Likewise, in terms of academic performance, students with an active style achieved an average of grades between 7.00 and 7.50; with a reflective style they achieved an average between 7.34 and 7.86; with a theoretical style they achieved an

average between 6.50 and 7.00; with a pragmatic style they obtained an average of grades between 5.85 and 6.60.

Similarly, Serra-Olivares et al. (2017) specified that, university students analyse and structure information in different ways for the development of learning; in that sense, learning styles have presented a predominant interest in scientific research, the different learning styles are associated with other factors such as student expectation, personal environment, social skills or self-concept, these have an intimate relationship with academic performance. Therefore, learning styles can be defined as those mechanisms through which the human mind processes and assimilates information influenced by perceptions during the acquisition of cognitive structures. The results showed that there is a preference for active style (21%), reflective style (10%), theoretical style (13%), pragmatic style (4%) and combined style (56%). Students with predominance in the active style showed significantly lower academic performance than the pragmatic ($F = 9.517$ and $p = 0.011$) and combined style ($F = 14.625$ and $p = 0.013$), no significant differences were observed in academic performance when comparing with predominance in an active and reflective style ($F = 1.524$ and $p = 0.400$) active and theoretical ($F = 1.967$ and $p = 0.157$). In that sense, Ruiz-Ruiz et al. (2006) pointed out that in relation to the behaviour of the variable learning styles it can be stated that the mean for the active style was 12.51, for the reflective 14.04, for the theoretical it was 12.79 and for the pragmatic 13.62. The standard deviation for the four styles was between 2.4 and 3.1. Results are very similar to those found in the present research study.

Also, in his research work, Quinallata-Valencia (2010) pointed out that academic achievement is the result of the influence of several factors associated with the family nucleus, socioeconomic and cultural characteristics, didactic practices, educational materials, social skills, motivational aspects, among others. It is also essential to identify the learning styles of the students, since this will have an impact on the teaching work and will guide the application of teaching strategies, thus making it possible to increase the level of academic performance of the students. The results obtained were that the active style reached 41.2% in the low level, 41.2% in the average level and 17.6% in the high level. The reflective style reached 18.3% at the low level, 31.2% at the average level and 48.6% at the high level. The theoretical style reached 27% at the low level, 39.9% at the average level and 33.1% at the high level. The pragmatic style reached 28.3% at the low level, 41.3% at the average level and 30.4% at the high level. Likewise, the levels reached in academic performance were that 6.70% were at a low level; 56.0% at a medium level and 37.3% at a high level. Finally, according to the correlations between learning styles and academic performance according to Pearson's coefficient: reflective style ($r = 0.239$ and $p = 0.01 < 0.05$); active style ($r = 0.035$ and $p > 0.05$); pragmatic style ($r = 0.127$ and $p > 0.05$) and theoretical style ($r = 0.187$ and $p = 0.00 < 0.05$).

5. Conclusion

Emotional competencies constitute a set of factors that underlie in students and are vital for the adequate development of intellectual potential, it is constituted by a set of knowledge, skills, aptitudes and attitudes that are put in place for the establishment of the relationship of the person with himself and with his social environment emphasising learning and development. Likewise, learning styles generate great interest in the scientific community due to the existence of motivational components that influence learning. Therefore, during the academic development of students, they acquire skills and abilities that allow them to face different learning situations adequately. In this

sense, there is sufficient evidence to indicate that emotional competences and learning styles present a positive and very significant relationship with the academic performance of students in the general chemistry curricular experience.

In relation to the variable emotional competences, it was observed that 23.6% (26) are in a high level and 64.6% (71) in a medium level, which allows us to affirm that 88.2% have an acceptable qualification for the emotional competence. With respect to the variable learning styles, it was observed that 53.6% (59) are at a high level and 35.5% (39) at a medium level, which allows us to affirm that 89.1% are aware of the existence of learning styles. With respect to the academic performance variable, it was observed that 58.2% (64) are at a high level and 36.4% (40) at a medium level, which allows us to affirm that 94.6% present an acceptable qualification of their academic performance, which indicates that the students show an aptitude to be able to face chemistry exams. It was concluded that, there is a highly significant relationship ($r = 0.853$; $p = 0.000 < 0.05$) between the emotional competences and the academic performance of the students of the general chemistry curricular experience. Likewise, there is a significant relationship ($r = 0.608$; $p = 0.000 < 0.05$) between learning styles and academic performance of the students of the general chemistry curricular experience.

6. Recommendations

This research will be enriched if the study sample is expanded, which will provide a better picture of the phenomenon under study; it would also be complemented by working with data obtained from interviews. It is also recommended for future studies the application of research with an experimental design.

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