**Research Article**

# Personality Traits and Learning Styles in Undergraduate Students

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| ARTICLE INFO | ABSTRACT |
|---|---|
| | This study aimed to determine the association between personality traits and learning styles in university students. For this purpose, a non-experimental, cross-sectional, correlational methodological design was used, where the sample consisted of 379 undergraduate students from four study programs: psychology, business administration, systems engineering, and environmental engineering, from a public university in Lima. Non-probabilistic, self-selected, and convenience sampling was used. For data collection, the subjects were surveyed using a virtual form and the instruments used were the BFI-15 and Kolb's Learning Styles Inventory. When the statistical analysis was performed, it was found that there was no association between the variables examined, so it was concluded that the probability of presenting certain personality traits was not associated with the learning styles of the participants.<br><br>**Keywords:** Personality, learning, style, student, university |

## INTRODUCTION

Personality traits are stable personal and behavioral attributes that reveal themselves in different circumstances. (Feldman, 2010) It was mainly Robert McCrae and Paul Costa who defended that personality is made up of five fundamental traits, also called the *big five*: extroversion, neuroticism, openness, agreeableness and rectitude. This classification will be characterized as follows, according to: ( Cloninger , 2003) Feist et al. (2014)

A high extroversion describes people who are talkative, jovial, expressive and sociable; while people with low extroversion are quiet, reserved, solitary and not very expressive. A high value in neuroticism translates into anxiety, impulsivity, restlessness and vulnerability; conversely, people with low neuroticism present tranquility, self-satisfaction, strength, and stability. The high score in openness describes people who are creative, curious, liberal and with a preference for variety; on the other hand, when the value of openness is low, people will be practical, uncreative, conservative and with a taste for routine. A high kindness characterizes people as being friendly, trusting, generous, and accommodating; on the other hand, a low level of kindness will describe people who are suspicious, hostile, irritable, and cruel. A high level of righteousness shows people who are organized, hardworking, diligent, and persevering; otherwise, low righteousness is characterized by negligence, laziness, disorganization, and poor perseverance.

On the other hand, learning styles are intellectual, emotional, and physiological attributes that indicate how each person conceives, relates, and reacts to the learning environment (Keefe & Thompson, 1987, as cited in . There are several theoretical models that have supported research related to this topic: Kolb's experiential learning in 1976, Honey and Munford's approach in 1986, Felder and Silverman's 1988 approach, and Neil Fleming's VARK model (2001, as cited in . Rojas-Palacio et al., 2022) (Silva, 2018) Li et al., 2018)

The work presented here is based on the proposal that every learning process must involve experience through the following stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 1993, as cited in And provides four learning styles, as they state: The convergent person is skilled at making

decisions, solving problems and with practical application, performing well in the face of problems with a single solution. Divergent is the person who is characterized by imagination, by observing a certain situation from different perspectives, performing well by applying brainstorming. Assimilator is the person who is distinguished by inductive thought; He is skilled at creating theoretical models, and prefers to focus on ideas and concepts rather than people. An usher is the intuitive person; He learns through direct experience and risk-taking, showing flexibility and a taste for working with other people. Sánchez & Alejos, 2019) . Tapia-Jara et al. (2020)

When analyzing how personality and learning styles are connected, we find different authors of theories of personality traits that propose this link. For example, Jung (1923, as cited in 1923), proposed that personality and learning preference are related to two binary capacities: sensitive/intuitive and rational/emotional; thus posing the premise of the paradigm that forms the basis of Kolb's model, where it is stated that learning is achieved through application, rehearsal, and discovery through the senses. For his part, he uses the expression "learning styles" in his theory of personality with the name of "cognitive styles". In the same vein, he proposes that the dimensions of personality (neuroticism and extraversion) are closely related to the different forms of learning. Pantoja et al., 2013) Allport (1937) Eysenck (1978)

In recent research with university students, they found the association between the trait of openness and active-reflective styles; the trait of consciousness and the sensitive-intuitive styles; the trait of kindness and the active, reflective, visual and sequential styles; and the extraversion trait with all styles. They also pointed out the negative relationship between the trait of agreeableness and sensory, intuitive, verbal and global styles; and between neuroticism with all styles, stating that, when these are in accordance with personality traits, students will have better academic performance. Siddiquei and Khalid (2018)

On the other hand, they demonstrated that the trait of conscientiousness is associated with the reading style, while affability and openness are associated with the kinesthetic style, formulating that knowledge of this association would be useful to optimize the development and efficiency of the students. In turn, they found that each of the traits was associated with all styles, revealing the important influence of personality traits on preferences for learning in virtual environments (e-learning). The relationship between the openness trait and visual and kinesthetic styles, and between the conscientiousness trait and the reading style, was also identified, suggesting that this knowledge would allow university professors to plan different teaching strategies and methods. Seyal et al. (2019) Kamal and Radhakrishnan (2019) ( Abouzeid et al., 2021)

Therefore, thanks to all this research, it is known that a relationship has been found between the variables proposed in this work; however, diversity is also identified in the results of the aforementioned studies, observing that the relationship between certain traits and styles found in one research is not necessarily replicated in the others. Likewise, no recent precedents have been found in the Latin American context that have explored this field with a university population. This suggests the importance of applying different assessment instruments or using independent longitudinal and cross-cultural variables in different geographical locations in research with these study variables to reduce the gap in this line of research and achieve extrapolable results. ( Seyal et al., 2019)

This research will seek to identify how personality traits and learning styles are related in subjects who begin the university stage, using instruments that are based on the theory of the big five traits proposed by McCrae and Costa, and on the learning approach supported by Kolb. According to what is intended to be demonstrated, personality traits contribute to the prognosis of learning styles; thus encouraging students, teachers and university institutions to improve their learning strategies, teaching strategies and methodologies, and to make adjustments or adaptations in the curricula (; ; , which is relevant in a context in which university institutions in Latin America seek to prevent dropout and place themselves with good results in quality evaluations. Hoffman et al., 2017 Mendoza et al., 2022 Villacís et al., 2020) (Villacís et al., 2020)

## METHODOLOGY

### Design

The design was non-experimental because none of the variables used were intentionally manipulated, being limited to the observation of the phenomenon in its natural manifestation; Correlational cross-sectional because it defines the relationship between two or more variables by collecting the data at a single and specific time. (Hernández et al., 2014)

**Sample**

The sample consisted of 379 students of the first cycle, 2023, from four study programs (Psychology, business administration, systems engineering, and environmental engineering) of a public university in Lima. Non-probabilistic sampling was applied because the sample selection was based on someone's will and not chance; of a self-chosen type, since the subjects were not selected, but they were asked to participate voluntarily in the study, being the ones who decided to participate or not. Likewise, the non-probabilistic sampling carried out can also be considered convenience sampling, because the sample was selected for the availability and proximity of the subjects ( Bologna , 2016) (Méndez, 2001) .

**Table 1**
*Frequencies and percentages of the sample*

| Syllabus | Student Frequency | Percentage of students |
|---|---|---|
| Business Administration | 94 | 24.8% |
| Environmental Engineering | 78 | 20.6% |
| Systems Engineering | 85 | 22.4% |
| Psychology | 122 | 32.2% |
| Total | 379 | 100% |

**Technique and instruments**

The technique used for data compilation was the survey; because this would allow us to know in a direct and systematic way the measurements provided by the participants on the concepts to be investigated, and that are carried out through measurement instruments that are applied following a protocol. The application of this technique was carried out through the following instruments:  (López-Roldán & Fachelli, 2015)

**Big Five-15p inventory** to   Dominguez-Lara and Merino-Soto (2018)  measure personality traits. It is composed of 15 items that group and evaluate the 5 major traits (neuroticism, extraversion, openness, kindness and responsibility). The questions are closed with an assessment scale from 1 to 5 according to the respective multiple alternatives: "Strongly disagree", "slightly disagree", "neither agree nor disagree", "slightly agree", "strongly agree". Each group of items corresponding to the traits must obtain a minimum sum of 3 points and a maximum sum of 15 points; it is understood that, the higher the score, the greater the predominance of the dimension.

**Kolb's Inventory of Learning Styles, version "E".** This version is the adaptation made by in Peru.   Escurra (1992) It is made up of 9 items that group 4 terms, thus containing a total of 36 words where 24 of them are linked to the 4 phases of learning: concrete experience, reflective observation, abstract conceptualization and active experimentation; while 12 function as distracting sentences to moderate social desirability. Likewise, each sentence should be scored hierarchically from 1 to 4 according to the degree to which the term describes your learning style, following the criteria from "not at all characteristic" to "most characteristic". The sum of the score given to the words that describe the forms of learning results in the total score per area (between 6 and 24 points). Then, each pair of contrary learnings is subtracted (CA-EC; EA-OR) and the scores are obtained by dimensions: accommodator, assimilator, convergent and divergent. The ranges of the latter can be found between -18 and 18 points.

**Procedure**

The coordinations were carried out with the head of the welfare office of the institution where the research was carried out, presenting a work plan. Upon obtaining the approval of this plan, the Excel list of the 2023 incoming students already enrolled was received, selecting only those who belonged to the study programs of the headquarters where the evaluation would be carried out and excepting the subjects of the admission modality called people with disabilities. The participants developed a virtual survey conducted in Google Forms, which was divided into three sections: (1) informed consent and general data, (2) inventory of the first variable and (3) inventory of the second

variable. Participation was voluntary and was not conditional on any monetary incentive; instead, an individual report was offered with results and recommendations based on the evaluation carried out.

## RESULTS

The presentation of results has the following sequence: First, a bar graph of the percentages on personality traits is displayed. Second, and similarly, the column diagram of the percentages on learning styles is shown. Third, a contingency table and a table are presented where the degree of association between the variables is tested through Pearson's Chi-square with a significance level of 0.05.

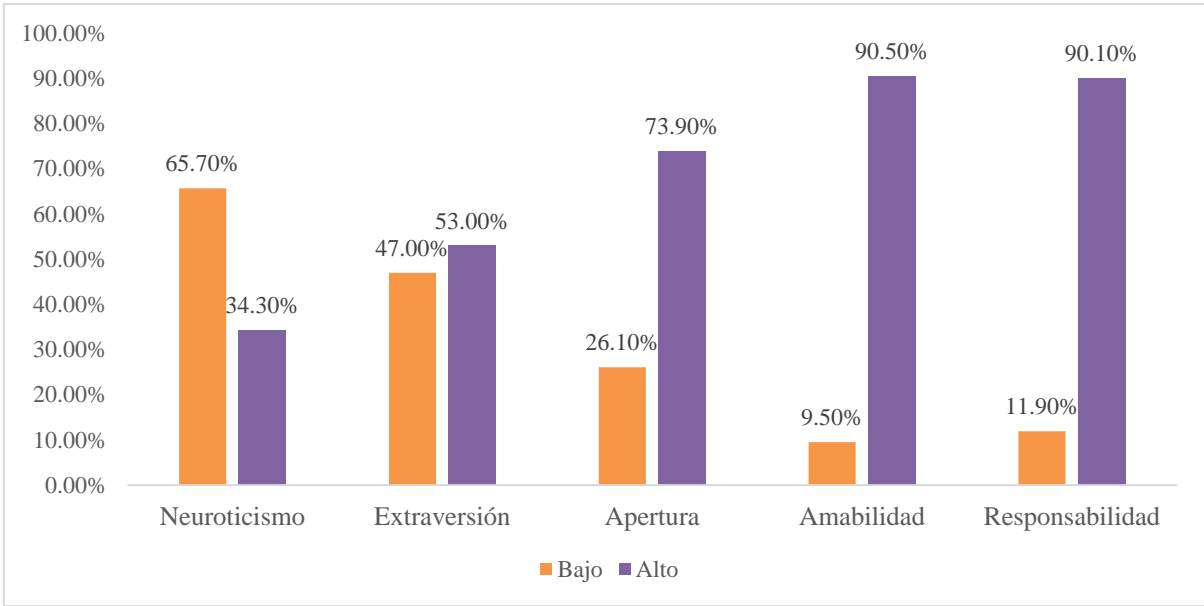**Figure 1** *Personality traits of the participants*



Figure 1 shows that the most frequent traits in the participants are kindness (90.5%) and responsibility (90.1%). These results translate, respectively, into a high predisposition to help, act sincerely and trust other people; as well as in the taste for effort, rectitude and organization. It is also noted that the least predominant trait is neuroticism (34.3%), which means that these students will present impulsivity, anxiety and vulnerability.

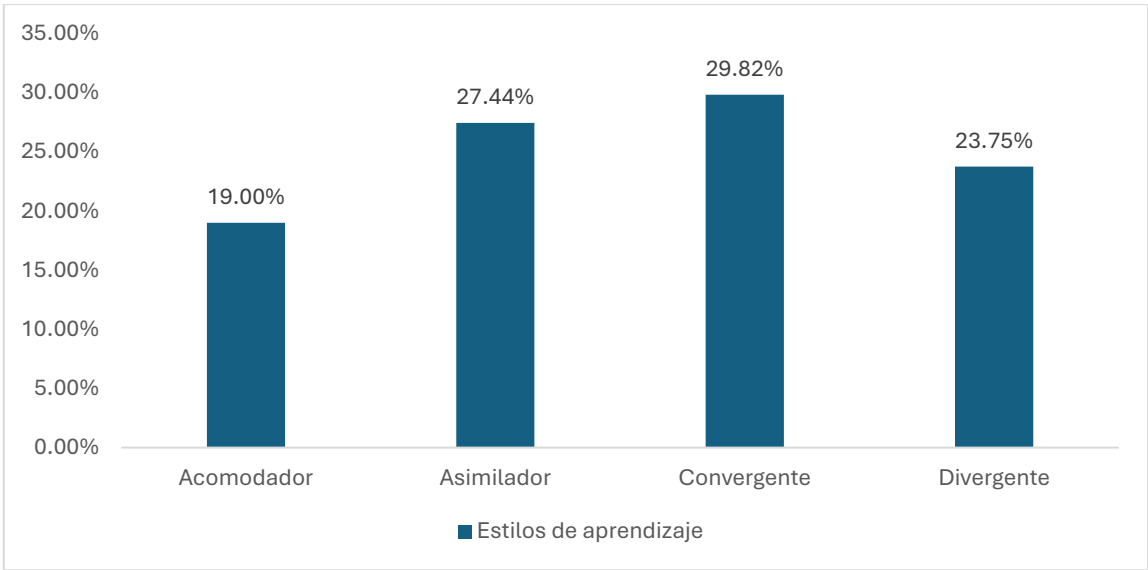**Figure 2** *Study Sample Learning Styles. In original Spanish language.*



Figure 2 shows that the convergent style (29.82%) is the most characteristic; therefore, there is evidence of a predilection for learning in a concrete way and with practice, getting involved in new experiences and going directly

to problem solving. On the other hand, the accommodating style represents the least preference, where only 19% of students would distinguish themselves by learning intuitively, through direct experience and involvement in novel situations.

**Table 2** *Frequencies and percentages among the variables examined*

| Features | | Styles | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | | Usher | Assimilator | Convergent | Divergent | Total |
| Neuroticism | Level low | 45 11,9% | 70 18,5% | 77 20,3% | 57 15,0% | 249 65,7% |
| | Level high | 27 7,1% | 34 9,0% | 36 9,5% | 33 8,7% | 130 34,3% |
| Extroversion | Level low | 33 8,7% | 49 12,9% | 56 14,8% | 40 10,6% | 178 47,0% |
| | Level high | 39 10,3% | 55 14,5% | 57 15,0% | 50 13,2% | 201 53,0% |
| Aperture | Level low | 20 5,3% | 18 4,7% | 36 9,5% | 25 6,6% | 99 26,1% |
| | Level high | 52 13,7% | 86 22,7% | 77 20,3% | 65 17,2% | 280 73,9% |
| Amiability | Level low | 5 1,3% | 9 2,4% | 14 3,7% | 8 2,1% | 36 9,5% |
| | Level high | 67 17,7% | 95 25,1% | 99 26,1% | 82 21,6% | 343 90,5% |
| Responsibility | Level low | 7 1,8% | 16 4,2% | 13 3,4% | 9 2,4% | 45 11,9% |
| | Level high | 65 17,2% | 88 23,2% | 100 26,4% | 81 21,4% | 334 88,1% |
| Valid frequency | | | | | | 379 |

Table 1 shows that the highest percentage of students with high responsibility also have a convergent learning style. This means that those who have a high level of commitment, organization, and righteousness prefer to learn through practical demonstrations, using their hypothetical deductive reasoning, and looking for a single solution to problems.

**Table 3** *Association Test*

| Relationship analyzed | Asymptotic significance (bilateral) | Relation |
| --- | --- | --- |
| Neuroticism and Learning Styles | ,809 | In the significant |
| Extraversion and Learning Styles | ,903 | In the significant |
| Openness to experience and learning styles | ,096 | In the significant |
| Friendliness and Learning Styles | ,621 | In the significant |
| Responsibility and learning styles | ,602 | In the significant |

Table 2 shows that the p value of Pearson's Chi-square test for each relationship analyzed is higher compared to alpha (0.05); for this reason, it is determined that the variables examined are not associated.

## DISCUSSION

Based on the objective of this work, it is observed in Table 2 that the p value of the Chi-square test of each relationship analyzed is greater than alpha (0.05), which means that each of the personality traits that describe the participants are independent of their learning styles. This result is closer to what they argued when they concluded, through the Chi-square test, that personality traits are not associated with learning styles. On the other hand, when performing a multinomial logistic analysis, they identified that the extraversion trait would be a predictor of the accommodating

style. However, even though this study also used one of Kolb's versions of the inventory, the findings may have been affected by the size of his sample, which was composed of 31 students. Conversely, they found that, in a virtual learning environment, personality traits are indeed associated with learning styles; although the instrument used to measure personality traits was not based on the Big Five approach, nor was any of Kolb's inventories applied, and the scope of instruction was different, this methodological proposal made it possible to demonstrate that the variables studied are indeed related.    Sohrabi    et al. (2023)    Kamal Y Radhakrishnan (2019)

Obviously, the results are also not in accordance with those studies where some relationships between the variables were partially found. For example, in whose study they used the Felder and Solomon Learning Styles Inventory, they found that neuroticism and extraversion had a positive and negative relationship, respectively, with all learning styles. They also demonstrated the direct relationship between openness and active-reflective styles; while the trait of agreeableness presented a positive relationship with the active, reflective, visual and sequential styles and; a negative relationship, with sensory, intuitive, verbal and global styles; demonstrating, in turn, that kindness was the trait that presented more relationships with learning styles. Finally, consciousness had a direct relationship with the sensitive-intuitive styles.  On the other hand, in the research supported by the VARK model, they verified that openness was positively associated with kinesthetic style and academic performance, which is similar to what was published in which it was identified that those students who present openness and kindness as dominant traits are more willing to learn with the kinesthetic style.    Siddiquei the Khalid (2018)    Abouzeid    et al. (2021)    Seyal    et al. (2019)

It should be specified that in all the aforementioned researches, differences related to the population, the instruments used, the number of participants and the geographical location are revealed; but in most of them a total or partial relationship was found between the variables analyzed, which informs about the main inconsistency with the current work.

Likewise, it is considered important to mention as a strength that this study involved 379 students out of a population of 494, having been selected for convenience and requesting their voluntary participation. In addition, as a stimulus, a report of their results with the pertinent recommendations was delivered to those evaluated, through the institutional mail. However, the design of the sample is also one of the limitations that may have influenced the results; since, as it is a heterogeneous population made up of students from four different study programs, it was convenient to carry out non-probabilistic sampling by quotas, weighting the sample to adjust the number of students and achieve a balance in each study program, thus avoiding any bias related to the representativeness of the population.   (López-Roldán & Fachelli, 2015)

Another limitation that is considered is the one that derives from the instrument chosen to measure learning styles. The Kolb E version inventory, although it has validity and reliability in the Peruvian university population, was applied in this case to students who started university in person after four previous years of remote teaching due to the health emergency, which leads to question how much experiential learning was present in distance lessons. as well as to presume a possible lack of compatibility between the tools used in this modality such as video calls by Whatsapp, Zoom, Google Classroom and Microsoft Office 365 and the different phases of learning that are evaluated in Kolb's instrument, which consist of learning by engaging, understanding, generalizing and applying. The latter suggests that the use of the VARK inventory could have been more pertinent, since it evaluates whether one learns better from visual, auditory, reading/writing (printed material) and/or kinesthetic (practical experimentation) information. Another aspect to take into account is that when the Kolb E version inventory was applied, approximately one month had already elapsed since the start of face-to-face classes; Therefore, the question arises as to whether or not the teaching system of the institution where the research was carried out influenced the participants' recognition of their learning preferences as proposed by experiential learning. (Escurra, 1992) (Dávila & Agüero, 2021)   (  Qutieshat    et al., 2021)

Finally, the contribution of this work is to consider that the study of the relationship between personality traits and learning styles requires more evidence in the Latin American context and, overcoming the limitations related to the chosen instrument and the design of the sample, the results could provide inputs for the design of teaching strategies and methods at the teaching staff level according to the characteristics of the students; at the institutional level, to develop pedagogical designs that are more student-centered and, at the student level, to improve their performance and productivity.  (  Abouzeid    et al., 2021)  (  Seyal    et al., 2019)

## CONCLUSIONS

Regarding the research objective, it was resolved that the variables analyzed do not present an association with each other. In accordance with the above, it is explained that the probability of presenting certain personality traits is not associated with the learning styles of the subjects who constituted the sample.

Since the expected association was not identified, it would be convenient to apply the sample weighting technique in future research where the selection of the sample has been for convenience and voluntary participation, in order to reduce biases or avoid overrepresentation and achieve a representative sample of the population. Likewise, it is considered important that the Kolb Learning Styles Inventory be applied to subjects whose learning environments promote the development of the four skills proposed by the author and that its application, instead of virtual, be face-to-face to clarify the doubts of understanding that the surveyed students may have regarding the items of the questionnaire.

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