



## Academic experiences: adaptation of Civil Engineering students

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**Abstract:** This study used the "Academic Experiences Questionnaire", in version reduced (QVA-r), to investigate how students at a public university realize their integration and adaptation to the university environment. Participated in this study 98 (ninety-eight) civil engineering students, freshmen between 2018 and 2022. The application of the QVA-r was carried out online and remotely, through the Google Docs platform, on an individual and voluntary basis. In this study, we sought to explore correlations and differences between general variables, such as "VUNESP grade" (entrance exam) and "Academic Performance Coefficient", and variables specific in each dimension of the QVA-r, which included gender (female and male) and the types of entry through the entrance exam (self-declared black quota participants, *pardos* and indigenous people (PPI) and/or from public schools). The results indicate that, in general, students are well adapted to the University, but the personal dimension, which corresponds to items related to physical and psychological stability, emotional stability, self-perception and self-confidence are harmed by others. From the specific analyses, it is clear differences due to the gender and race of students, with students self-declared black, *pardos* and indigenous people presented mean frequencies lower in the questionnaire (QVA-r). The data indicate that the University must pay attention to the difficulties that face adaptation and that new studies need to be carried out to enable a better understanding of the psychosocial aspects of students at different stages of the institution.

**Keywords:** academic experiences; adaptation; civil engineering.

**Resumo:** Este estudo utilizou o “Questionário de Vivências Acadêmicas”, em versão reduzida (QVA-r), para investigar como estudantes de uma universidade pública percebem sua integração e adaptação ao ambiente universitário. Participaram deste estudo 98 (noventa e oito) estudantes do curso de Engenharia Civil, ingressantes entre os anos de 2018 e 2022. A aplicação do QVA-r foi realizada de forma online e remota, por meio da plataforma Google Docs, de modo individual e voluntário. Neste estudo, procurou-se explorar correlações e diferenças entre variáveis gerais, como “nota VUNESP” (vestibular) e “Coeficiente de Rendimento Acadêmico”, e variáveis específicas em cada dimensão do QVA-r, que englobam gênero (feminino e masculino) e os tipos de ingresso pelo vestibular (cotistas autodeclarados pretos, pardos e indígenas (PPI) e/ou oriundos de escolas públicas). Os resultados indicam que, de forma geral, os estudantes estão bem adaptados à Universidade, porém a dimensão pessoal, que corresponde aos itens relativos ao bem-estar físico e psíquico, à estabilidade afetiva, à percepção de si e a autoconfiança, estão prejudicadas perante as demais. A partir das análises específicas, evidencia-se diferenças em razão do gênero e da raça dos estudantes, sendo que os estudantes autodeclarados pretos, pardos e indígenas apresentaram frequências médias inferiores no questionário (QVA-r). Os dados indicam que a Universidade deve se atentar às dificuldades que atravessam a adaptação e que novos estudos precisam ser realizados para possibilitar uma melhor compreensão dos aspectos psicossociais dos estudantes em diferentes etapas da instituição.

**Palavras-chave:** vivências acadêmicas; adaptação; engenharia civil.

**Resumen:** Este estudio utilizó el “Cuestionario de Experiencias Académicas”, en versión reducida (QVA-r), para investigar cómo los estudiantes de una universidad pública realizan su integración y adaptación al entorno universitario. Participaron en este estudio 98 (noventa y ocho) estudiantes de Ingeniería Civil, estudiantes de primer año entre 2018 y 2022. La aplicación del QVA-r se realizó en línea y de forma remota, a través de la plataforma Google Docs, de forma individual y voluntaria. En este estudio, buscamos explorar correlaciones y diferencias entre variables generales, como “Calificación VUNESP” (examen de ingreso) y “Coeficiente de Desempeño Académico”, y variables específicas en cada dimensión del QVA-r, que incluía el género (femenino y masculino) y los tipos de ingreso a través del examen de ingreso (participantes autodeclarados de cuota negra, morenos e indígenas (PPI) y/o de escuelas públicas). Los resultados indican que, en general, los estudiantes se adaptan bien a la Universidad, pero la dimensión personal, que corresponde a ítems relacionados con el ámbito físico y La estabilidad psicológica, la estabilidad emocional, la autopercepción y la confianza en uno mismo son perjudicado por otros. De los análisis específicos se desprende claramente diferencias por género y raza de los estudiantes, siendo los estudiantes los autodeclarados negros, morenos e indígenas presentaron frecuencias promedio más bajo en el cuestionario (QVA-r). Los datos indican que la Universidad debe prestar atención a las dificultades que enfrenta la adaptación y que es necesario realizar nuevos estudios para permitir una mejor comprensión de los aspectos psicossociales de estudiantes en diferentes etapas de la institución.

**Palabras clave:** experiencias académicas; adaptación; ingeniería civil.

## 1 Introduction

Like any social institution, the role of the university is tied to the historical context in which it actively serves as both a producer and a product. Significant changes have been impacting public higher education in Brazil, particularly in terms of expanding access and ensuring the support of historically excluded groups (Sampaio; Santos, 2023). In this context, the present research aims to understand—through the application and analysis of the Academic Experiences Questionnaire, short version (QVA-r) (Granado *et al.*, 2005)—how students from the Civil Engineering program at São Paulo State University, Ilha Solteira Campus, are adapting to university life.

This research seeks to broaden the understanding of students' adaptation to higher education, a topic that can be explored in university studies, particularly in the Brazilian context, with a focus on UNESP, a public university in the state of São Paulo characterized by its multi-campus structure. Specifically, it examines Civil Engineering students in Ilha Solteira, a city in the interior of São Paulo state.

Previous research, such as that of Granado *et al.* (2005), Bariani (2005), Mercuri and Polydoro (2004), and Schleich (2006), has demonstrated the importance of factors such as academic performance, gender, and other characteristics in students' adaptation to university. In conjunction with the works of Coelho (1999), Vargas (2010), and Carvalhaes and Ribeiro (2019), which highlight social inequalities in engineering courses, this research aims to discuss the influences of characteristics such as gender and the type of university admission on student adaptation. Although the quota system has been implemented at UNESP since 2014, and despite the well-documented intersectionality between race and gender in the marginalization of Black women in certain courses (Sotero, 2013), there is a specific gap in the literature on how these variables impact students at this institution.

The choice of the Civil Engineering program for this study is based on objective, theoretical, and practical considerations. Historically, prestigious professions such as medicine, law, and engineering have been closely linked to the perpetuation of state power, as presented by Coelho (1999). Vargas (2010) further highlights that medical and engineering programs tend to have lower representation of poor and non-white students. In many cases, professions reinforce social inequalities through a phenomenon of stratified access based on class, gender, and race.

Engineering professions originated in modernity, with institutional forms of modern professions oriented toward the interventionist axis of state administration or the self-regulation between the state and the market, according to the pioneering studies of Coelho (1999).

In the field of Civil Engineering education, specific issues remain unresolved in higher education in Brazil. Among them is the complexity of new educational directions centered on communication regarding the interpretation of interrelated and intersecting project areas. The construction of the student's educational process now follows new performance standards, which are directly related to technological expertise, without losing the foundation of pure exact sciences.

These challenges were explored decades ago by Oliveira (2000), who found that Civil Engineering courses lacked mechanisms for curricular integration. The researcher inferred that pedagogical aspects were insufficient to ensure empirical cohesion among the disciplines in Civil Engineering curricula. The work of Molina and Azevedo Júnior (2014), which presented an analysis of the evaluation conducted by the Ministry of Education (MEC) (Brazil, 2010), highlighted "an imbalance in the distribution of course hours among the professionalizing areas, leading to important subjects becoming elective." In the current 2019 curriculum, the integration of content and knowledge remains open to examination, to determine whether the course's disciplinary structure will provide students with a holistic view of technical, scientific, environmental, and ethical processes.

Engineering courses across Brazil were recently restructured. In 2019, the National Education Council (CNE), through Resolution No. 02, April 2019 (Brazil, 2019), established the new National Curriculum Guidelines for Undergraduate Engineering Programs. With the recent curriculum, Civil Engineering brings the specificity of ensuring the articulation of disciplines to achieve a strategic yet humanized level of knowledge, without losing the formalization of processes inherent to the course's functioning and mechanisms. The dynamic of adaptive updates, which allow for qualitative training that meets the expectations of the new profile of public university students—whose diversity is imperative—must be linked to the achievement of personal goals and societal demands.

Carvalhoes and Ribeiro (2019) also emphasize that access to high-prestige courses, particularly in the exact sciences such as engineering, is significantly more likely among male individuals from higher economic strata, further accentuating educational and professional disparities. Thus, analyzing the adaptation of Civil Engineering students, specifically from a gender and admission type perspective, allows for a better understanding of their academic experience and how this adaptation may be related to power dynamics and social stratification, considering the current transformations in higher education due to affirmative action policies implemented in public universities.

Undergraduate engineering courses in Brazil have specific curricular and pedagogical characteristics that encompass both technological areas and pure sciences, engaging in discussions and reflections on educational trends in scientific teaching, while



also addressing the ethical challenges in the new social roles of engineers. The interdisciplinary relationship between basic science and technical knowledge in engineering results in heavy course loads, distributed across teaching, research, and outreach activities. The full-time nature of these programs involves learning in very specific environments and contexts (such as laboratories and technical areas), where the use of tools, equipment, and materials are integral components of the educational process (Barbosa, 2024).

Furthermore, the profile of students and their needs, which is central to this study, encompasses the various dimensions of life. Studies from Observatório da Vida Estudantil (Sampaio, 2011; Santos, 2013) have long inferred that the transition from high school to higher education can be exciting and bring a sense of happiness. However, this same unique period in young people's lives, marked by learning experiences and psychosocial development, can also be a source of stress and anxiety for students adapting to the new academic model. Understanding these aspects allows us to focus on two main areas.

The first area is the human and social factor, which emphasizes the potential of students and fosters their human development by nurturing a diversity of competencies. The second area is characterized by the consequences of the first, including negative elements such as low academic performance, lack of professional perspective, and failure to develop a life plan (which is not limited to new students). The issues in this area highlight the importance of studying student adaptation and dropout factors in higher education (Coulon, 2017; Rodrigues, 2020; Santos, Vasconcelos, & Sampaio, 2017).

Understanding students' academic experiences is a means to analyze how they perceive themselves within the course, as well as to comprehend how certain social variables influence this perception. In this study, the variables selected for more specific analyses were: gender<sup>1</sup> (Montañez, 2017). (male and female); the mode of university admission, since there are two forms— the universal system (SU)<sup>2</sup> and the Reservation System for Public Basic Education (SRVEBP); and among those admitted through the VEBP<sup>3</sup>, students who self-identify as Black, pardo, or Indigenous (PPI), and those from public schools (EP).

<sup>1</sup> In the West, the binary understanding of sex forms the basis of gender configuration (male and female), as social roles are assigned to biological functions. However, it is important to note that science shows us that biological reality is more ambiguous than this binary structure.

<sup>2</sup> The universal system (SU) is open to all candidates who registered for the VUNESP entrance exam. This system ensures that the reservation of places accommodates students whose entrance exam scores did not qualify them through the universal system. In other words, it guarantees that more students from public basic education schools can enter the university.

<sup>3</sup> The Reservation System for Public Basic Education (SRVEBP), designed by UNESP, reserves 50% of the places, for each course and shift of UNESP's undergraduate programs, for students who completed

Access to certain educational levels in Brazil represents an important mechanism for maintaining social inequalities across various dimensions (Silva; Hasenbalg, 2003; Carvalhaes; Senkevics; Costa Ribeiro, 2022). Thus, the choice to conduct specific analyses based on social markers stems from the fact that the literature indicates that class, gender, and race are oppressions that intersect and shape inequalities (Akotirene, 2019; Bento, 2022; Schuman, 2023).

Differences between genders are evident in the engineering courses at the institution of this research, with women representing 38% of the enrolled students. In terms of race, since 2018, according to data from IBGE (IBGE, 2019), the black/pardos population is the majority in public universities, accounting for 50.3%<sup>4</sup> of enrolled students. However, this reality is not reflected in the university of this study, as, despite UNESP reserving 50% of its slots for graduates from public schools since 2018, and of that percentage, 35% for individuals who identify as black, pardo, or indigenous (PPI), the number of enrolled PPI students has never exceeded 20% (UNESP, 2022a). Other studies have shown significant differences regarding the ethnic-racial issue in Brazilian society as a whole, in higher education in particular, and at UNESP in a unique manner (Bento, 2022; Carvalhaes; Senkevics; Costa Ribeiro, 2022; Sampaio; Santos, 2015; Santos, 2005; Santos; Vasconcelos; Sampaio, 2017; Rodrigues, 2020).

Another important point to highlight in this text concerns the socioeconomic background of the students enrolled in the university studied. Since 2014, COPE<sup>5</sup> has analyzed the family income of incoming students. A look at the collected data reveals that the profile of the students has changed, as the number of students from families with a per capita income above two minimum wages has decreased, while the number of students from families with a per capita income of less than or equal to 1.5 minimum wages has increased (UNESP, 2022b). In other words, the analyzed university should pay attention to the potential socioeconomic difficulties faced by students, which can affect the psychosocial aspects involved in their affiliation with the university (Coulon, 2017; Sampaio, 2015, 2023; Santos; Vasconcelos; Sampaio, 2017).

That said, the method used to conduct this research is described in the following sections.

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high school entirely in public schools; of this total, 35% are reserved for self-declared black, mixed-race, or Indigenous.

<sup>4</sup> Still underrepresented, since they correspond to 55.8% of the population.

<sup>5</sup> UNESP Student Support Coordination.

## 2 Method

### 2.1 Sample

The subjects of this research consist of Civil Engineering students enrolled between the fourth and sixth semesters. A total of 98 students participated in the study, out of 365 enrolled in the program. The participating students entered the institution at different times: 7 in 2018, 11 in 2019, 22 in 2020, 29 in 2021, and 29 in 2022.

Among the 98 participating students, specific analyses were conducted, differentiating them by gender, with 51 identifying as male and 47 as female (from a total of 225 male students and 140 female students enrolled). Similarly, analyses were performed based on the type of admission, with 55 participants entering the university through the universal system (SU) and 43 through the Public Basic Education Vacancy Reservation System (SRVEBP) (out of a total of 173 students admitted through the SRVEBP).

Detailed analyses were also carried out on students who self-declare as Black, pardos, and Indigenous (PPI) compared to those from public schools (EP), with 25 students being graduates of public schools and 18 self-declaring as PPI (from a total of 118 public school graduates and 55 PPI students enrolled).

It is important to note that this research received authorization from the Research Ethics Committee: CAAE: 53091921.0.0000.5401, opinion 5.156.383.

### 2.2 Instrument

The Academic Experiences Questionnaire (QVA-r, Brazilian version) was developed and validated in Brazil in 2005 by Granado and other researchers (Granado et al., 2005). It is a self-report instrument consisting of 54 items, divided into five major areas, and is designed to be completed by students without the researcher's assistance. The objective of the QVA-r is to identify the student's thoughts and feelings about the university, particularly concerning their academic adaptation.

The choice of the reduced version is due to its ability to assess five dimensions related to academic adaptation: the personal dimension, which includes items associated with self-perception and well-being, both physical and psychological; the interpersonal dimension, which refers to relationships established between students, more intimate relationships, as well as engagement in extracurricular activities; the career dimension, which covers aspects related to learning in the course and perspectives on future professional paths; the study-learning dimension, which includes items related to work habits, time management, and the use of resources offered by the university; and finally, the institutional dimension, which addresses the student's interest in the

institution, the desire to continue their studies there, and their perception of the university's structures and quality of services provided.

The questionnaire is answered according to the participant's level of satisfaction with each item on an ascending Likert scale with 5 options, ranging from "does not apply to me/totally disagree/never happens" to the maximum level of satisfaction, such as "completely applies to me/totally agree/always happens." It is important to note that, during the scoring process, 16 of the 54 items are reversed (items 4, 6, 9, 11, 13, 16, 19, 24, 26, 33, 39, 46, 49 from the personal dimension; items 25 and 53 from the interpersonal dimension; item 46 from the career dimension; and item 40 from the institutional dimension). This reversal means that if the student selects option 5 ("completely applies to me"), they will only receive one point.

## 2.3 Procedures

First, PET Civil Engineering<sup>6</sup> scholarship students carried out campaigns to promote the application of the instrument through a handout. Subsequently, students interested in participating were directed online to the free platform Google Docs. Upon digital acceptance of the Free and Informed Consent Form, the Academic Experiences Questionnaire – reduced version (QVA-r), adapted and validated for the Brazilian context (Granado et al., 2005), was administered.

After data collection via the free Google Docs platform, the research results were exported into a spreadsheet, consisting of rows (student) and columns (data per student), allowing for data organization and enabling future calculations.

## 3 Analysis and Results

Using UNESP's SISGRAD system, we consulted the data regarding the participants' entrance exam scores (VUNESP score), their classification within the two possible admission systems (SU and SRVEBP+PPI), as well as each participant's academic performance (CR). Next, the questions were grouped by dimension, allowing for more meticulous analysis of each question, each dimension, and the indicated variables.

We opted to use the aggregated mean of all dimensions of the QVA-r for analyzing the relationship with the CR and VUNESP entrance exam scores, as this approach provides an overview of students' perceptions of their adaptation compared to their academic performance on the entrance exam, i.e., before their entry into the university, and the CR used as an evaluation reference by the institution, which can influence students' development (Peixoto *et al.*, 2016).

<sup>6</sup> Tutorial Education Program UNESP. The students affiliated with PET Civil Engineering at UNESP/Ilha Solteira assisted in the data collection and analysis for this research.



We also conducted analyses by gender and modes of entry, broken down by the dimensions of the QVA-r. This approach was chosen because such analyses can reveal significant differences that support the works presented in the introduction, highlighting discrepancies between gender, class, and race in engineering courses within the Brazilian context.

To verify the consistency of the QVA-r questionnaire data, Cronbach's Alpha was used, a statistical tool that quantifies, on a scale from 0 to 1, the reliability of the questionnaire. The minimum acceptable value to consider a questionnaire reliable is 0.7. The results of this analysis show good reliability, as shown in Table 1, validating all the data collected.

Table 1 – Cronbach's Alpha by Dimension.

Personal		Interpersonal		Career		Study-Learning		Institutional	
<b>K<sup>7</sup></b>	14	<b>K</b>	12	<b>K</b>	12	<b>K</b>	9	<b>K</b>	7
<b>ΣVPi<sup>8</sup></b>	19,7143	<b>ΣVPi</b>	13,5332	<b>ΣVPi</b>	13,8474	<b>ΣVPi</b>	10,9998	<b>ΣVPi</b>	7,3881
<b>VPt<sup>9</sup></b>	117,2058	<b>VPt</b>	49,4495	<b>VPt</b>	68,1479	<b>VPt</b>	42,5906	<b>VPt</b>	19,2036
<b>Alfa</b>	0,8957	<b>Alfa</b>	0,7923	<b>Alfa</b>	0,8692	<b>Alfa</b>	0,8344	<b>Alfa</b>	0,7178

Source: Own elaboration.

In order to investigate the existence of a relationship between the QVA-r and the variables VUNESP score and academic performance (CR), the mean value of each questionnaire (QVA-r) per student was initially calculated, encompassing all dimensions. To achieve this, Pearson's correlation coefficient (r) was used, which measures the statistical relationship between two continuous variables.

The scores on the VUNESP entrance exam ranged from 26.9 to 70.1<sup>10</sup>. Regarding the participant academic performance (CR), there is a variation from 2.11 to 9.11<sup>11</sup>. To ascertain the existence of a relationship between the variables, Pearson's correlation (r) was applied to the VUNESP scores, participant academic performance (CR), and the mean value of each QVA-r, as shown in Table 2.

Table 2 – Pearson correlation between CPC, VUNESP score, and QVA-r mean

CPC x VUNESP score	CPC x QVA-r mean	QVA-r mean x VUNESP score
0,35	0,28	-0,02

Source: Own elaboration.

<sup>7</sup> "K" indicates the total number of questions per dimension.

<sup>8</sup> "ΣVPi" corresponds to the sum of the variance of the responses to each question, by dimension.

<sup>9</sup> "VPt" corresponds to the total variance of the sum of the responses of each individual, by dimension.

<sup>10</sup> The scores on the VUNESP entrance exam range from 0 to 100.

<sup>11</sup> The scores on the VUNESP entrance exam range from 0 to 100.

The data reveal that, in general, the relationship between the CR, the VUNESP score, and the QVA-r mean showed weak or no correlation. More specifically, the strongest relationship is between the VUNESP scores and students with higher CR scores, followed by a higher CR correlating with higher scores on the questionnaire. However, the mean QVA-r has no relationship with the VUNESP score.

Subsequently, two types of analyses were conducted: a global analysis and a specific analysis. In the global analysis, no distinctions were made among the participating students. In the specific analysis, distinctions were made by gender; by the method of admission to the institution (SU and SRVEBP); and among those admitted through the SRVEBP, between those self-declared as black, pardos, or indigenous (PPIs) and students coming from Public Schools (EPs).

### 3.1 Global Analysis of the QVA-r

Initially, a global analysis of the QVA-r was conducted, calculating the mean and standard deviation of all responses by dimension, as well as identifying the question that had the highest mean and the lowest mean for each dimension, as shown in Table 3.

Table 3 – Overall QVA-r mean, standard deviation, and questions with maximum and minimum values by Dimension.

	General Dimensions	QVA-r	Std. Dev	Question with Highest Mean	Question with Lowest Mean
<b>Means</b>	Personal	3,08	0,51	39 (4,08)	49 (2,19)
	Interpersonal	3,85	0,57	28 (4,39)	25 (2,22)
	Career	3,84	0,32	20 (4,29)	45 (3,03)
	Study-Learning	3,41	0,41	47 (4,09)	10 (2,84)
	Institutional	4,14	0,26	15 (4,57)	3 (3,78)

Source: Own elaboration.

Analyzing these responses, it can be inferred that, in general, the students are excited about the course; they believe that the course will enable their professional fulfillment; they feel that they will be able to realize their values in the chosen profession; they would like to complete their degree at the institution and have a positive view of the university.

Similarly, the students recognize that they are anxious; they feel tired and sleepy during the day, despite feeling physically well; they experience mood variations; they have difficulties finding a peer who can help them with a personal problem, even though they have good friendships with peers of both genders; they struggle with decision-making; they manage their time poorly and do not engage in daily planning of their demands.

## 3.2 Specific Analysis of the QVA-r: Female and Male Gender

For the specific analysis of the QVA-r by gender, the mean of all responses for each question was first calculated. Then, analyses of the means of the QVA-r in each dimension were conducted, as shown in Table 4.

Table 4 – General QVA-r Mean and by Dimensions Based on Female x Male Gender

	Dimensions	Female	Male
Mean	General	3,58	3,98
	Personal	2,87	3,27
	Interpersonal	3,87	3,82
	Career	3,80	3,88
	Study-Learning	3,51	3,32
	Institutional	4,19	4,10

Source: Our elaboration.

It can be observed that individuals of the female gender had a lower overall mean compared to the male gender, with the most significant difference in the personal dimension. When looking at each of the dimensions and certain questions, it becomes clear that females experience higher levels of anxiety, sadness, discouragement, pessimism, fatigue, drowsiness, greater mood swings, more loss of control, and have more difficulty finding a peer to help with a personal problem. On the other hand, females show a higher average frequency in questions regarding daily planning and demonstrate greater interest in the educational institution they attend.

Male students, on the other hand, have more difficulty socializing with peers outside of class hours. However, male students are better able to identify the reasons that led them to choose their course, believe more strongly that the course will enable professional fulfillment and the realization of values in their chosen profession, and express greater satisfaction with the university they attend and their desire to complete their degree at the institution.

## 3.3 Specific Analysis of the QVA-r Between SU and SRVEPB

For the specific analysis of the QVA-r between students who entered through the Universal System (SU) and those who entered through the Quota System (SRVEPB), the overall mean and the mean for each of the five dimensions were previously calculated, as shown in Table 5.

Table 5 – QVA-r General mean and by dimensions based on admission method (SU vs. SRVEBP)

	Dimensions	SU	SRVEBP
<b>Means</b>	<b>General</b>	4,04	3,55
	Personal	3,04	3,12
	Interpersonal	3,93	3,74
	Career	3,83	3,85
	Study-Learning	3,40	3,41
	Institutional	4,08	4,21

Source: Our elaboration.

Observing the numbers in Table 5, it is noticeable that students admitted through SRVEPB show a lower overall mean frequency in the QVA-r compared to those admitted through the SU. However, significant differences are only found in the personal and interpersonal dimensions. In the career, study-learning, and institutional dimensions, both groups exhibit more homogeneous results.

Analyzing the means of each question and dimension, it can be seen that SRVEPB students feel healthier and maintain a good work rhythm, yet they also have more difficulty finding a peer to help with a personal problem. Meanwhile, SU students find it easier to socialize with their peers outside of class, have increasingly stable, long-lasting, and independent friendships, and are able to establish close relationships with their peers. However, they report feeling more tired and drowsy during the day.

### 3.4 Specific Analysis of QVA-r between PPI and EP

For the specific analysis of the QVA-r between SRVEPB students who self-identify as black, pardos, or indigenous (PPI) and those from Public Schools (EP), the overall mean was initially calculated, as shown in Table 6. Subsequently, the mean of each question by dimension was calculated.

Table 6 – Overall QVA-r Mean and by Dimensions for PPI vs. EP.

	Dimensions	EP	PPI
<b>Means</b>	<b>General</b>	3,71	3,47
	Personal	3,24	2,96
	Interpersonal	3,84	3,59
	Career	3,92	3,75
	Study-learning	3,54	3,23
	Institutional	4,32	4,06

Source: Own elaboration.



The results presented in Table 6 shows that PPI students achieved a lower overall mean compared to EP students. Analyzing the means of each question and dimension, it is clear that, in the personal dimension, PPI students report more sadness and dejection, more pessimism, increased fatigue and drowsiness, and do not feel healthy or with a good work pace.

In the interpersonal dimension, PPI students experience more difficulty in making friends, interacting with classmates outside of class hours, finding a peer to help with a personal problem, initiating conversations, and developing increasingly stable, lasting, and independent friendships.

In the career dimension, EP students are better able to recognize that their university journey aligns with their professional expectations, that the course choice seems more in line with their aptitudes and abilities, and they also perceive themselves as having good qualities in their chosen field, with less difficulty making decisions.

In the study-learning dimension, PPI students have more difficulty managing their time, setting priorities regarding time management, taking good class notes, and organizing/systematizing the information provided in class.

In the institutional dimension, EP students are more satisfied with the University library, the University's infrastructure, and feel a stronger connection to the city where the University is located, showing greater adaptability to the institution compared to PPI students.

## 4 Discussion

The intersectionality of race, class, gender, and the social prestige of academic programs is a crucial aspect for understanding the educational dynamics that influence students' adaptation in Brazilian higher education institutions. As previously presented, various studies indicate that individuals from different racial, gender, and socioeconomic backgrounds experience diverse and unequal academic trajectories (Rodrigues, 2020; Sampaio, 2011; Sampaio; Santos; Borja 2023).

Students from higher socioeconomic strata are more likely to access prestigious programs, such as Engineering, and there is significant gender stratification, with males predominating in exact science courses (Carvalhaes & Ribeiro, 2019). Directing analyses toward different social backgrounds, race, and gender can highlight the need for affirmative action policies that address these disparities, providing adequate support for equity in educational development.

The way academic and university life unfolds can be paradoxical, as it involves learning to be a student, and being a student is a provisional status that lasts for a

certain period of time. If a student does not learn their job, adapt, and affiliate themselves with the university and the student status, they will remain an outsider, and as occurs in some cases, they may abandon their craft (Coulon, 2017).

The mechanisms of adaptation and affiliation with the university result in a selective process that distinguishes students capable of developing with the necessary autonomy from those who will be excluded from this trajectory (Coulon, 2017; Sampaio; Santos 2015). In this study, the results were analyzed by specific dimensions—personal (3.08), interpersonal (3.85), career (3.84), teaching-learning (3.41) and institutional (4.14) — compared with the average scores of the QVA-r from the original construction and validation test (Almeida; Soares; Ferreira, 2002). It was observed that the levels obtained in each dimension in this study were higher than the average values from the original study.

In this research, we also examine the differences in academic experiences based on gender, indicating that the female gender generally scored lower than the male gender on the QVA-r. Female students make up 38% of the course, which is higher than the national average for Engineering programs, but still lacks similarity.

The personal dimension showed the greatest difference between the mean values. The question “I have been feeling anxious” revealed a difference of 0.94 (with the female mean being 1.70 and the male mean being 2.65). Both mean values demonstrate that students generally feel anxious, but women feel even more so, which is consistent with studies that have analyzed anxious behaviors in university students by gender (Castillo Acobo; Luque Ruiz de Somocurcio, 2019; Agudelo Vélez; Casadiegos Garsón; Sánchez Ortiz, 2008; Serrano-Barquín *et al.*, 2005).

At the institution of study, out of the 365 students enrolled in the Civil Engineering course, 173 entered through the SRVEPB, meaning 47%. Of these, 31% are PPI. This number of PPI students is higher compared to the numbers for the university as a whole, where the average number of PPI over the past five years is 16% (UNESP, 2022b). The overall QVA-r means of students who entered through the SU and those who entered through the SRVEPB are similar.

Supporting the results presented by studies conducted at Unesp with these two groups (Galhardo *et al.*, 2020; Massini-Cagliari *et al.*, 2021), which show that both academic performance and dropout rates do not present significant statistical differences, when the analysis is refined, decomposing the SRVEPB entrants into EP and PPI, some inequalities emerge.

With a higher overall mean, EP students demonstrated better adaptation in all dimensions analyzed by the questionnaire. They also showed lower dropout rates than PPI entrants (Massini-Cagliari *et al.*, 2021). The academic performance (CR) indicates something already demonstrated by Galhardo *et al.* (2020), that despite having similar academic performance to SU entrants, the variation between the CR of the SRVEPB

entrants presents a higher standard deviation, indicating that this group has a wider range of academic experiences.

Carvalho (2023) conducted a study with students from the investigated institution and demonstrated that low grades and failures further weaken the mental health of some students. In a study specifically with PPI students at the analyzed university (Rodrigues, 2020), it was concluded that students face difficulties in recognizing and affiliating themselves with the institution. The PPI students interviewed had difficulty creating self-representations that align with their lived reality. This is due to the racist structure of society and the institution (Almeida, 2019).

This research, in turn, reveals that in all dimensions, PPI students present lower mean values than EP students (which are similar to those of SU entrants), corroborating other studies that identify difficulties in assimilation, affiliation, and adaptation to the university by PPI students.

Furthermore, the implementation of affirmative policies and support for students based on their specific needs must be considered to mitigate the inequalities evidenced in academic experiences. Previous studies indicate that the presence of support networks, mentoring programs, and training and awareness for faculty and administrative staff can be crucial in improving student adaptation and academic performance (Massini-Cagliari et al., 2021; Sampaio, 2011; Santos, 2013; Sotero, 2013). Such policies not only aid in adaptation to the university environment but also foster a sense of belonging and identity within the institution (Rodrigues, 2020).

Additionally, by addressing the multiple layers of difficulties faced by SRVPBP entrants, such as racism, sexism, and socioeconomic inequalities, universities can create policies to promote a more equitable and inclusive environment, adopting an intersectional approach in the formulation of their access, support and retention policies. Promoting an institutional culture that values diversity and inclusion is essential to ensuring that all students, regardless of social background, race, or gender, have the opportunity to reach their full academic and professional potential (Sampaio; Santos; Borja 2023).

The affirmative policies implemented for students from public schools and Black, *pardos*, and Indigenous (PPI) students have revealed the importance of intersectionality in the context of student adaptation and development in higher education. Studies indicate that these students face particular challenges in adapting and affiliating with universities due to a social and educational structure permeated by racial and socioeconomic inequalities (Rodrigues, 2020; Barbosa, 2024; Sampaio; Santos; Borja 2023).

For example, research shows that female students exhibit higher levels of anxiety and interpersonal difficulties, negatively affecting their performance and academic well-being (Silva et al., 2021). Additionally, studies demonstrate that the lack of representation and adequate support within universities can reinforce socio-racial barriers

in institutions, highlighting the need for affirmative policies that enable a more inclusive and equitable educational environment for all students (Marcondes *et al.*, 2013).

## 5 Conclusions

This study was conducted to understand how students in the Civil Engineering program at a public state institution in São Paulo perceive their affiliation and adaptation to the university environment. The collected and analyzed data indicated that there is no correlation between the means of the research participants on the Academic Experience Questionnaire (QVA-r), the entrance exam score from VUNESP, and the academic performance (CR) of the participating students.

The students obtained an overall QVA-r mean of 4.6, above those indicated in the literature. The global analysis of the questionnaire (QVA-r) infers that students at UNESP/FEIS in the Civil Engineering program, who entered between 2018 and 2022, are well adapted to the course, the chosen profession, and future career possibilities; however, they feel anxious, tired, and sleepy. Although the students have good friends, they struggle to find someone to help them with personal problems and to plan and manage their time.

Female students exhibited higher levels of anxiety, sadness, fatigue, sleepiness, and difficulty finding peers to assist with personal problems. Women have a lower affinity for the institution and face more challenges in identifying the reasons that led them to the course, whereas male students believe that the course will enable them to achieve their values and professional fulfillment, and they show greater interest in the institution with a stronger desire to complete their studies there.

Among the students who entered through the SRVEBP and the SU, it can be concluded that the quota students perceive themselves as healthier and with a good work pace; however, they have greater difficulty socializing with peers outside of class hours, showing challenges in building more stable and lasting friendships. In the dimensions of career, study-learning, and institutional context, the results obtained demonstrate that there is no significant difference in the self-perception of students.

In the analysis of entrance through SRVEBP and self-declaration as black, *pardo*, and Indigenous (PPI) or merely graduates of public schools (EP), greater difficulty in adaptation was identified among PPI students. They reported feeling sadder, more fatigued, and sleepy, and they do not perceive themselves as healthy. At the same time, they are the ones who have the greatest difficulty making friends and finding peers willing to assist with personal problems, making them the group with the most challenges in establishing healthy relationships with university peers. They also express more doubts about their academic choices and future projections, perceiving the university environment as less appealing.



It is important to note that PPI and the female students demonstrate greater difficulties in adapting to the university, which reflects the way our society is structured around gender and race. It is essential to complement that this adaptation difficulty, as demonstrated by the results of the QVA-r, does not justify individual blame of the participants, as the institution must create mechanisms that promote the affiliation of these students to the university environment and university life. It is also concluded that further research is needed to better understand the difficulties presented in this study.

The results of this research complement previous studies by revealing how different groups of Civil Engineering students perceive their academic experiences. It is observed that university adaptation is influenced by intersectional factors such as race and gender, with female and PPI students facing greater adaptation challenges, especially in the personal dimension. Perhaps this difficulty in the personal dimension is due to the lack of female and PPI representation in the courses, reflecting a historical construction of this field (Carvalhaes; Ribeiro, 2019; Coelho, 1999; Sotero, 2013). Despite affirmative policies and the increase in female presence in engineering courses, disparities persist, underscoring the need for continuous affirmative actions and institutional support to foster a more democratic environment. These findings highlight the importance of educational policies aimed at mitigating historical inequalities and providing fair access, support and retention conditions for all groups, contributing to the improvement of educational experiences in Brazilian universities.

Regarding its relevance, this study, focused on the engineering field, addresses the issues of dropout and support, posing a challenge that can be confronted through understanding student academic experiences, seeking to recognize these as an area of intervention that presupposes validated investigations to bridge youth with the university, analyzing the Brazilian context without disregarding the international scenario. Therefore, recognizing the transition from high school to higher education as a complex stage that seeks to align prior competencies, intellectual capacities, interpersonal and personal variables, along with sociocultural and political context variables, can be examined within this field, as illustrated by this study.

Finally, social inclusion in public universities, linked to qualitative training in engineering, permeates the intervention in the process of access and student support, a distinct and complex context that presents challenges that, if not overcome, will perpetuate dropout rates and low academic and social development.

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## Authorship Contribution

**Rogério de Oliveira Rodrigues** - Project coordinator, conceptualization, data curation, data analysis, final revision of the article.

**Edgar Bendahan Rodrigues** - Writing of the article, methodology, data curation, and discussion of results.

**Renata Trasse de Oliveira Barbosa** – Methodology, conceptualization, writing of theoretical sections, article review.

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