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TECHNOLOGY AND INCLUSION: THE QUOTA SYSTEM AS A MANAGEMENT TOOL AT FAETEC

TECNOLOGIA E INCLUSÃO: O SISTEMA DE COTAS COMO FERRAMENTA DE GESTÃO NA FAETEC

TECNOLOGÍA E INCLUSIÓN: EL SISTEMA DE CUOTAS COMO HERRAMIENTA DE GESTIÓN EN FAETEC

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ABSTRACT
This article discusses quota policies in Brazil and presents the development of a computerized system to manage the FAETERJ-Rio Quota Program. The goal is to modernize management, promoting greater efficiency, transparency, and social inclusion. The main requirements and functionalities of the system are described, structured to meet different user profiles, such as administrators, school units, students, and the SESOEDUC team. The database model adopted is based on relational structures with tables interconnected by primary and foreign keys. Technologies such as PHP, SQL, and the Bootstrap framework were used to ensure stability and accessibility to the platform. Use cases illustrate how each user interacts with the system, from registration to monitoring reports and payments. The digitalization of processes allows for more rigorous control of data, reducing errors and speeding up decision-making. The system also facilitates communication between sectors and improves the user experience. The inclusion of tools such as dynamic forms and automated reports strengthens the management of affirmative action policies. The article also proposes future improvements, such as integration with other institutional systems. The strategic role of technology in promoting equity is highlighted. The use of digital solutions ensures greater traceability of actions. Digitalization also contributes to institutional sustainability. The system represents an advance in public education administration. Finally, it reinforces FAETERJ-Rio's commitment to social justice.

Keywords: Quota system. Scholarship program. Affirmative action policy. Educational management. Digital inclusion.

RESUMO
Este artigo discute as políticas de cotas no Brasil e apresenta o desenvolvimento de um sistema informatizado para gerenciar o Programa de Cotas da FAETERJ-Rio. O objetivo é modernizar a gestão, promovendo maior eficiência, transparência e inclusão social. São descritos os principais requisitos e funcionalidades do sistema, estruturados para atender a diferentes perfis de usuários, como administradores, unidades escolares, alunos e equipe da SESOEDUC. O modelo de banco de dados adotado é baseado em estruturas relacionais com tabelas interconectadas por chaves primárias e estrangeiras. Tecnologias como PHP, SQL e a estrutura Bootstrap foram utilizadas para garantir a estabilidade e acessibilidade da plataforma. Casos de uso ilustram como cada usuário interage com o sistema, desde o registro até o monitoramento de relatórios e pagamentos. A digitalização dos processos permite um controle mais rigoroso dos dados, reduzindo erros e agilizando a tomada de decisões. O sistema também facilita a comunicação entre os setores e melhora a experiência do usuário. A inclusão de ferramentas como formulários dinâmicos e relatórios automatizados fortalece a gestão das políticas de ação afirmativa. O artigo também propõe melhorias futuras, como a integração com outros sistemas institucionais. É destacado o papel estratégico da tecnologia na promoção da equidade. O uso de soluções digitais garante maior rastreabilidade das ações. A digitalização também contribui para a sustentabilidade institucional. O sistema representa um avanço na administração da educação pública. Por fim, reforça o compromisso da FAETERJ-Rio com a justiça social.

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Palavras-chave: Sistema de cotas. Programa de bolsas de estudo. Política de ação afirmativa. Gestão educacional. Inclusão digital.

RESUMEN
Este artículo analiza las políticas de cuotas en Brasil y presenta el desarrollo de un sistema informático para gestionar el Programa de Cuotas FAETERJ-Rio. El objetivo es modernizar la gestión, promoviendo una mayor eficiencia, transparencia e inclusión social. Se describen los principales requisitos y funcionalidades del sistema, estructurado para satisfacer los diferentes perfiles de usuarios, tales como administradores, unidades escolares, estudiantes y el equipo de SESOEDUC. El modelo de base de datos adoptado se basa en estructuras relacionales con tablas interconectadas por claves primarias y externas. Se utilizaron tecnologías como PHP, SQL y el marco Bootstrap para garantizar la estabilidad y la accesibilidad de la plataforma. Los casos de uso ilustran cómo cada usuario interactúa con el sistema, desde el registro hasta el seguimiento de informes y pagos. La digitalización de los procesos permite un control más riguroso de los datos, lo que reduce los errores y agiliza la toma de decisiones. El sistema también facilita la comunicación entre sectores y mejora la experiencia del usuario. La inclusión de herramientas como formularios dinámicos e informes automatizados refuerza la gestión de las políticas de acción afirmativa. El artículo también propone mejoras futuras, como la integración con otros sistemas institucionales. Se destaca el papel estratégico de la tecnología en la promoción de la equidad. El uso de soluciones digitales garantiza una mayor trazabilidad de las acciones. La digitalización también contribuye a la sostenibilidad institucional. El sistema representa un avance en la administración de la educación pública. Por último, refuerza el compromiso de FAETERJ-Rio con la justicia social.

Palabras clave: Sistema de cuotas. Programa de becas. Política de acción afirmativa. Gestión educativa. Inclusión digital.

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INTRODUCTION

This research focuses primarily on the management of quota students in public educational institutions, with special emphasis on the importance of transparency and equity in promoting access to quality education. In an educational scenario increasingly focused on social inclusion and overcoming historical inequalities, it is essential to build mechanisms that ensure not only the admission, but also the retention and academic success of these students.

With the advancement of public affirmative action policies, such as racial, social and disability quotas, institutions' responsibility for controlling and adequately managing this information also increases. This requires improvements in monitoring instruments, standardization of criteria and administrative efficiency.

In the case of the “Fundação de Apoio à Escola Técnica do Estado do Rio de Janeiro” (FAETEC), significant challenges have been observed in the management of data on quota students. The main obstacles include the lack of uniform criteria for institutional monitoring, which compromises the reliability of information and makes it difficult to generate consistent reports. Added to this is the slowness of administrative processes, which compromises the agility of the institutional response to legal and social requirements.

Considering this scenario, this research proposes the development and implementation of a computerized system aimed at managing quota students at FAETEC. The proposal is based on principles of information security, digital accessibility, and reliability of academic records, with the aim of automating data control, reducing human errors, and filling gaps in current processes.

The specialized literature on educational management and information technology consistently points out the benefits of digitizing administrative processes, such as reducing operational failures, optimizing workflows, and saving time and resources. In addition, it highlights the increased capacity of institutions to respond to legal requirements and public oversight.

The system developed includes specific features for FAETEC's needs, such as standardized student registration, automatic verification of eligibility criteria, issuing reports by sociodemographic profile, and integration with existing academic systems. It also includes a continuous monitoring module, allowing management to identify dropout patterns, difficulties in remaining in the program, and demands for support.

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Another relevant aspect is the support for stricter compliance with institutional standards and current legislation. Digitalization facilitates access to information by managers, monitoring committees and control bodies, such as the Public Prosecutor's Office and the Courts of Auditors, promoting greater transparency.

The system was also designed to be accessible to different user profiles, such as administrative technicians, pedagogical coordinators and managers, with an intuitive interface, support resources and training that favor its full use. The aim, therefore, is to strengthen the data culture in the institution and increase the effectiveness of inclusive practices.

In summary, this article presents the proposal and implementation of a technological tool that directly contributes to the consolidation of affirmative actions at FAETEC. By integrating technology, management and social commitment, the system becomes a strategic ally in overcoming the challenges of inclusive public education.

METHODOLOGY

The methodology used to develop the Quota System involved a structured approach, consisting of several stages, from requirements gathering to system modeling and implementation of the graphical interface. The process began with a detailed survey and analysis of the needs of users and public management, a fundamental step for defining the functional and non-functional requirements of the project. This survey included interviews with the main users of the system, such as FAETEC employees involved in managing the Quota Program and participating students, which allowed for a deeper understanding of the difficulties faced and expectations regarding the new system. The interviews were essential to capture the specificities of the quota management process and ensure that the system was designed to meet the real demands for efficiency, transparency and social inclusion in public policies.

BACKGROUND LITERATURE

SOCIAL INCLUSION POLICIES AND AFFIRMATIVE ACTIONS IN BRAZIL

Over the past 20 years, Brazil has undergone a significant transformation in its social inclusion policies, with a special emphasis on higher education. This change is directly related to the implementation of affirmative actions, such as racial and social quotas, which

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aim to correct historical inequalities and guarantee access to public universities for marginalized groups.

According to Junqueira (2010, p. 745) points out, “affirmative actions represent a form of government intervention to guarantee equity in access to fundamental rights”.

The most relevant milestone in this process was the enactment of Law No. 12,711/2012, known as the Quota Law, which determined that 50% of places in federal higher education institutions would be reserved for students from public schools, with the distribution of places based on income and race criteria. According to this law, quotas seek to democratize access to higher education, offering opportunities to students who have historically been excluded from these academic and professional spaces (BRASIL, 2012).

The implementation of racial and social quotas in public universities is one of the most important milestones in this process. As Munanga (2004, p. 26) states, “quotas are compensatory and corrective measures of a temporary and exceptional nature that aim to accelerate the integration of black people into society”. These policies emerged as a response to the demands of the black movement and other social movements for greater racial and social equity, being implemented as a pioneer at the Federal University of Bahia (UFBA) and, later, at several other higher education institutions (Lima & Hngria, 2018).

Historically, Brazil has been marked by profound social, economic and racial inequalities, reflecting a long period of slavery and racial exclusion. According to Schwarcz and Starling (2015, p. 456) point out, “the marks of the slave past are still present in social relations and access to opportunities”. Until the late 1990s, Brazilian public universities were mostly attended by white students from private schools, contributing to the maintenance of an academic and professional elite that did not reflect the racial and social composition of the country.

The quota policy is not without controversy. One of the main arguments against it is the so-called “reverse discrimination”, based on the idea that quotas favor certain groups over others, violating the principle of meritocracy. However, as Dworkin (2005, p. 101) states, “treating unequal people equally is a form of injustice”. The notion of “injustice” in quotas often ignores the profound inequalities that mark the Brazilian education system and labor market (Carvalho, 2008).

In this sense, racial and social quotas are an application of the concept of equity, which aims to “treat the unequal unequally so that effective equality can be achieved” (Bobbio, 2004, p. 79). Based on the Aristotelian theory of justice, this notion postulates that

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it is necessary to provide more resources and support to those at a disadvantage in order to create truly fair conditions of competition.

The approval of Law No. 12,711/2012 was a decisive step, resulting in a substantial increase in the number of black, brown, indigenous, and low-income students in public universities. According to data from INEP (2020), there was continuous growth in the enrollment of black and brown students after the adoption of the policy. According to Paixão & Carvalho (2008, p. 39) note, “the black presence in higher education began to be perceived as a right and not as an exception”.

However, the implementation of quotas is not enough in itself to guarantee the academic success of these students. Quota policies must be accompanied by measures that guarantee retention and academic success, considering the challenges faced by many quota students, such as learning gaps and financial and psychological difficulties. According to Fernandes (2010, p. 84) points out, “true inclusion requires retention policies, without which dropout becomes inevitable”.

The use of technology in the management of quota policies emerges as a crucial tool to ensure the efficiency and transparency of these policies. The digitalization of administrative processes can significantly improve the ability of universities to manage their quota programs. As Castells (2003, p. 42) says, “the networked society transforms the way power is exercised and how institutions operate”. Computerized systems allow real-time monitoring, the cross-referencing of socioeconomic and racial data, and the assessment of the impact of policies, providing greater transparency to the process.

Despite the benefits of technology, digital exclusion is still a significant challenge in Brazil. According to Ribeiro (2019, p. 11), “inequality in access to information technologies reproduces existing social inequalities”. Furthermore, implementing effective systems requires investment in infrastructure and training.

The debate on quotas should include discussions on retention, academic success and life opportunities after graduation, as they are a powerful tool for social inclusion whose success depends on a holistic approach. As Fraser (2008, p. 55) summarizes, “social justice requires both economic redistribution and cultural recognition”.

In short, racial and social quotas are part of a broader set of policies needed to promote inclusion and equity in Brazil. They are an important step, but they require other policies to solve the structural problems of inequalities.

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OBJECTIVES OF QUOTAS

The objectives of quotas are diverse and interconnected, aimed at promoting social inclusion and equity in access to higher education in Brazil. First, the quota policy seeks to correct historical inequalities that are deeply rooted in society. According to Silva (2010, p. 23) states, “affirmative actions constitute a symbolic and concrete reparation for the historical injustices suffered by certain social groups”. In this sense, guaranteeing access to public universities for marginalized groups is a way of responding to these structural inequalities, ensuring that students from vulnerable socioeconomic backgrounds can have the opportunity to enter higher education.

Law No. 12,711/2012, known as the Quota Law, represented a milestone in this process by democratizing access to federal institutions, reserving places for students from public schools, based on income and race. As Carvalheira (2013, p. 77) explains, “the reservation of places in public universities is a mechanism that aims to break with the elitist logic that has always prevailed in Brazilian higher education”. By opening up opportunities for traditionally excluded students, such as black, mixed-race, indigenous and low-income students, these policies aim to ensure a more proportional and representative presence in the academic environment and, consequently, in the job market.

In addition, there is a clear objective of reversing the historical pattern of an academic and professional elite formed mostly by white people from the middle and upper classes. According to Schwarcz & Starling (2015, p. 444), “the university environment still reflects the legacy of privileges of the white Brazilian elite”, and quotas are an attempt to change this reality. In order for competition for places to be truly fair, it is necessary to consider the inequalities in access to quality educational resources, which justifies the differential treatment. Dworkin (2005, p. 103) argues that “equality requires the State to combat the effects of inherited injustices, offering unequal treatment to achieve real equity”. This understanding is anchored in the concept of equity, whose principle is to treat the unequal unequally in order to promote effective equality. Bobbio (2004, p. 78) reinforces that “true equality is only achieved when inequality of conditions is recognized as the starting point”. Thus, providing more resources and support to disadvantaged students is not a privilege, but a necessity to ensure more balanced and inclusive competition. In this context, quotas also contribute to making the university student body more representative of the Brazilian population. According to Oliveira (2014, p. 61) highlights, “the presence of black, indigenous and poor students in public universities transforms the profile of

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institutions and promotes a new social narrative". Finally, the objectives of quotas are directly linked to the promotion of social justice, by enabling the redistribution of opportunities and the recognition of diversity as a value. Fraser (2008, p. 50) summarizes this perspective by stating that "social justice demands the recognition of difference and the redistribution of opportunities". Thus, quotas not only correct past inequalities, but project a more plural and equitable future, in which diversity becomes a constitutive part of academic excellence and citizenship.

EQUITY VERSUS MERITOCRACY

The tension between equity and meritocracy is central to the debates on affirmative action in Brazil, especially with regard to the adoption of racial and social quotas in higher education. Meritocracy is often invoked as a universal value, in which individual achievements should be the result of talent, effort and personal dedication. According to Mendes (2016, p. 42), "the meritocratic principle is based on the idea of fair competition, where everyone would, theoretically, have the same initial conditions to achieve success". Based on this principle, critics of quotas claim that they would constitute a form of "institutionalized privilege", promoting what they call "reverse discrimination".

However, this reasoning ignores the historical and structural inequalities that condition the educational trajectories of different social groups in Brazil. Equity, in turn, proposes differentiated treatment as a way of achieving real equality of opportunities. This concept, inspired by Aristotelian distributive justice, argues that "justice consists in treating the unequal unequally to the extent that they become unequal" (Aristotle, 2009, p. 135). From this perspective, the quota policy presents itself as an instrument of compensation, which seeks to balance the starting point of students who have been socially disadvantaged.

In this way, equity is not contrary to meritocracy, but a condition for it to be effective. According to Souza (2017, p. 59) argues, "without correcting structural inequalities, meritocracy becomes a myth that legitimizes social exclusion". In this scenario, quotas function as an attempt to level the academic competition field, recognizing that not all students have access to a quality basic education, nor to the same material conditions to prepare for the entrance exam or the ENEM. It is important to highlight that meritocratic arguments, when decontextualized from Brazilian social realities, tend to mask privileges. As Nogueira (2015, p. 91) points out, "the discourse of meritocracy, by ignoring social

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factors, ends up reinforcing an unequal structure under the pretext of neutrality". The quota policy, therefore, proposes a state intervention that seeks to correct this imbalance of origin, offering additional support to those who have historically been excluded from public higher education.

Thus, the application of racial and social quotas can be understood as a way of expanding the conditions for meritocracy to be carried out in a fairer manner. It is about ensuring that individual merits are not evaluated based on completely disparate trajectories in terms of access to opportunities. According to Dworkin (2005, p. 120) summarizes, "justice demands more than formal equality of treatment; it demands equality of conditions to compete".

Therefore, although there are conceptual tensions between equity and meritocracy, quota policies should not be seen as opposed to merit, but as a way to make it more legitimate, by recognizing and addressing the different starting points of individuals in Brazilian society.

CHALLENGES AND COMPLEMENTARY NEEDS FROM QUOTAS

The adoption of quotas in Brazilian higher education represents an important step forward in promoting social justice and democratizing access to education. However, its full effectiveness depends on complementary actions that guarantee not only admission, but also the permanence and academic success of quota students. Access alone does not resolve historical structural inequalities. Many of these students face socioeconomic difficulties, deficiencies in basic education, cultural barriers, and a lack of institutional support, which can compromise their performance and lead them to drop out. In this scenario, student assistance policies such as scholarships, pedagogical support, mentoring programs, and psychological care have become essential. As Carvalho (2019, p. 88) points out, "access to university through quotas is often accompanied by adaptation difficulties, especially academic ones, requiring institutional support so that inclusion is not merely symbolic." Leveling, tutoring, and pedagogical monitoring programs are essential measures to mitigate these inequalities.

Furthermore, quota students face serious financial obstacles. Many need to balance studying and working, which affects their academic performance. According to Silva (2017, p. 104), "the lack of adequate student assistance policies ends up making it impossible for

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the most vulnerable students to remain in public universities". Thus, assistance with food, housing and transportation is essential.

Psychological well-being also requires attention. Prejudice and the feeling of not belonging directly affect these students. Gomes (2020, p. 77) emphasizes that "prejudice and symbolic isolation are still barriers that undermine the self-esteem and retention of black and poor students". Psychological support programs help overcome these obstacles.

Another challenge is digital exclusion. The lack of access to quality equipment and the internet compromises the monitoring of academic activities. As Lima (2021, p. 63) points out, "digital inequality reflects and deepens social inequalities, requiring public policies for technological inclusion for quota students".

It is also crucial to combat institutional racism. Almeida (2018, p. 51) notes that "the black presence in universities cannot be just numerical but must be accompanied by transformations in institutional culture". To this end, actions that promote diversity and confront discriminatory practices must be strengthened.

Finally, improving basic education is essential to enhance the effects of affirmative action. As Santos (2022, p. 95) points out, "without improving the quality of basic education, inclusion policies in higher education will have limited reach and may perpetuate inequalities in new forms." Therefore, the effectiveness of quotas requires a coordinated set of pedagogical, financial, psychological, technological, and cultural measures. Only with this comprehensive support will it be possible to transform access into permanence and success, consolidating the democratization of Brazilian higher education.

THE ROLE OF TECHNOLOGY IN QUOTA POLICY MANAGEMENT

The application of technology in the management of quota policies in Brazil has proven essential to modernize and make these processes more transparent and efficient. Specialized computerized systems, such as the "Quota System", automate complex tasks, accurately monitor student performance and generate reliable data to assess the impacts of public policies. Digitalization enables real-time control of information on enrollment, selection, retention and academic performance of quota holders, in addition to improving communication between those involved. Brito (2021, p. 112) emphasizes that "technology contributes decisively to the transparency and reliability of affirmative actions, by offering effective control and monitoring mechanisms".

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The “Quota System” is a concrete example of this technological application. It integrates features such as registration, analysis of socioeconomic forms, attendance control, reporting and payment history. The use of technologies such as PHP, JavaScript, SQL, HTML, Bootstrap, Google Sheets API and SweetAlert2 shows how robust solutions can be developed with modern tools. In addition, integration with VLibras reinforces digital accessibility. Oliveira (2020, p. 134) points out that “digital platforms need to be designed from the beginning to include different user profiles, ensuring the principle of inclusion in all its dimensions”.

However, digital exclusion is still a significant obstacle. Ferreira (2022, p. 56) warns that “inequality in access to devices and the internet compromises the effectiveness of technological tools in higher education”. Therefore, it is necessary to combine digitalization with public policies for connectivity, distribution of equipment and digital training.

The incorporation of technology into public administration represents an advance in the State's response to social demands. In the case of affirmative actions, such as quotas, technology ceases to be a simple support and begins to act strategically in promoting equity. It allows for strict control of the data of the students benefited and enables precise analyses, promoting adjustments based on evidence. This strengthens the effectiveness of policies and their adherence to social justice.

Technology also integrates different sectors of academic management, cross-referencing enrollment, performance, dropout and retention data. This allows managers to act more quickly and assertively. Interactive dashboards, real-time indicators and automated reports strengthen the culture of assessment, which is essential for efficient public management.

In institutions such as FAETEC, the digitalization of quota processes represents more than a technical advance: it reflects an institutional commitment to social responsibility. By making higher education more transparent, accessible and representative of Brazilian diversity, technology reaffirms its role as an ally in building an inclusive and fair university.

LONG-TERM IMPACT OF QUOTAS

Quota policies have implications that go far beyond immediate access to higher education, resulting in far-reaching structural transformations. Their implementation is part of a broader effort to promote a more equitable, diverse and fair society. The impact of

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these affirmative actions, when sustained over time, can result in significant changes in both the academic profile of institutions and the social and economic dynamics of the country.

One of the most relevant consequences of the quota policy is the expansion of the representation of groups that have historically been excluded in university spaces. This inclusion contributes to the formation of social, professional and academic leaders who more accurately reflect the diversity of the Brazilian population. As Santos & Gomes (2016, p. 87) point out, “the presence of students from marginalized groups tends to positively alter institutional dynamics and foster a more plural university culture”.

In addition to the academic environment, the effects of quotas also extend to the job market. By providing access to higher education, these policies expand opportunities for social mobility and qualified professional integration for groups previously relegated to the margins. However, this full integration requires ongoing efforts to eliminate barriers such as institutional racism and inequality of opportunities. In this sense, quotas represent a starting point, but not an end in themselves.

The incorporation of technologies in the management of these policies, as exemplified by the “Quota System”, reinforces their ability to produce lasting effects. Process automation, efficient data control and the possibility of continuous assessment of affirmative actions make public management more responsive and effective. For Santos (2021, p. 140), “technological innovation applied to the management of public policies strengthens governance mechanisms and expands the scope of inclusion actions”.

In addition to supporting the operationalization of quotas, digital tools such as the system promote student empowerment by ensuring easy access to information, resources and communication channels with the university. This contributes not only to their permanence in higher education, but also to their active engagement with the inclusion policy itself.

However, for the effects of quotas to be fully consolidated, it is essential that there be continuity and coordination with other public policies. Investments in quality basic education, strategies to combat discrimination and the promotion of diversity in the job market are indispensable actions. According to Almeida (2018, p. 203), “addressing inequalities requires a long-term, intersectoral agenda that goes beyond the university entrance”.

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In short, the long-term impact of quotas is directly linked to their potential to reconfigure the Brazilian social structure, expanding access to opportunities and promoting distributive justice. Affirmative actions, when combined with technology and complementary policies, become powerful instruments of transformation, capable of altering not only the statistical profiles of institutions, but also the life horizons of thousands of students and their communities.

CONTEXT OF THE FAETEC QUOTA SYSTEM

The development of the FAETEC Quota System emerged from the need to improve institutional mechanisms aimed at managing inclusion policies, especially regarding Quota Program. Inserted in a national scenario marked by the strengthening of affirmative actions, FAETEC seeks to align itself with the principles of administrative efficiency, transparency and social responsibility by incorporating digital technologies into its quota management process.

Law No. 12,711/2012, known as the Quota Law, established a milestone in the democratization of access to public higher education in Brazil, determining the reservation of places based on social and racial criteria. Although originally aimed at federal institutions, its principles inspired initiatives in state networks such as FAETEC, which began to demand solutions to operationalize and monitor with greater rigor the execution of its own inclusion policies.

In this context, the Quota System was designed as part of a Final Course Project, called TCC in Brazil, with the purpose of structuring a software tool capable of organizing, centralizing and automating the steps involved in the management of quota students. The project not only meets technical control and monitoring requirements, but also expresses a commitment to expanding equity and social justice within the institution.

The specific objectives of the system include everything from the survey and analysis of functional and non-functional requirements to the implementation of key functionalities, such as individual registration of quota students, generation of management reports, monitoring of attendance and control of financial contributions linked to the program. These resources are essential to ensure that processes occur in a systematic manner, reducing operational errors and making the flow of information more fluid between the different sectors involved.

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The system was designed to serve a diverse set of users, each with specific permissions, which allows for personalized access to functionalities according to the role played in the FAETEC structure. These profiles include system administrators (Master), teaching units, employees of institutional directorates (DAIE, DESUP), social workers from the socioeconomic assessment sector (SESOEDUC), and the students who benefit from the program.

The system architecture was developed using widely consolidated technologies, such as PHP in the back-end, JavaScript for interactivity, HTML and Bootstrap in the composition of the interface, and phpMyAdmin for database management. These choices prioritize compatibility, accessibility, and maintenance of the system, aspects that are essential for its long-term sustainability.

According to Souza (2020, p. 119), “the digitalization of educational management processes not only streamlines administrative flows but also enables a more transparent public policy that is responsive to the needs of its target audience”. In this sense, the Quota System acts as a vector for institutional transformation by integrating data management, communication with beneficiaries, and monitoring of the program's stages on a single platform.

Thus, the implementation of the system at FAETEC represents more than a technological innovation: it is a strategic measure that contributes to strengthening affirmative actions, by ensuring that the resources allocated to quota holders are used in a fair, effective and monitorable manner. With this, the institution reinforces its commitment to educational inclusion and to the constant improvement of its performance as an agent of social change.

DEFINITIONS OF RELEVANT TERMS

To properly understand the Quota System and its application context at FAETEC, it is essential to define the main technical, operational and conceptual terms that guide both the functioning of the system and the associated public policies.

User profiles are categories that delimit access and permissions: the Master acts as general administrator; the Unit profile refers to FAETEC's higher education institutions; the Employee is linked to a specific unit; the DAIE is from the Directorate of Educational Articulation and Integration; the DESUP, from the Directorate of Higher Education; the SESOEDUC, responsible for the socioeconomic assessment; and the Student, beneficiary

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of the Quota Program, who may have statuses such as “APPROPRIATE”, “APPROPRIATE WITH OBSERVATION”, “DENIED”, “PENDING DOCUMENTATION”, “BLOCKED” or “UTMI” (Exceeded the Maximum Completion Time).

Retroactive payment refers to amounts due for periods prior to the current month. A table is a database structure organized into rows and columns, where an attribute represents a specific characteristic. The primary key (PK) uniquely identifies a record, and the foreign key (FK) links tables, referencing the PK of another.

Semester indicates each six-month division of the school year, while period expresses the student's stage in the course. In the system, suspend temporarily limits a user's access; deleting permanently eliminates the registration.

The logical data model defines entities, attributes, and relationships without dealing with the technical implementation, while the relational model organizes data into tables with relationships established between them.

Quota policies are affirmative actions aimed at reserving places for historically excluded groups, such as students from public schools, black people, indigenous people, people with disabilities and low-income students. According to this understanding, such policies promote social inclusion, ensuring equal access to basic rights.

Other central concepts include efficiency, related to process optimization; transparency, linked to clarity of information; user experience, which assesses the usability of the system; and process automation, which reduces errors and speeds up administrative tasks.

Data management, collection, organization and analysis of information are facilitated by the Quota System. In the operational sphere, the FAETEC Quota Program offers financial assistance upon completion of the Socioeconomic Form, which is analyzed by SESOEDUC. If the student disagrees with the decision, he or she may file an appeal, which will result in the issuance of an opinion. The absence of documents results in pending documentation. One of the essential documents for receiving the benefit is the Account Opening Letter.

These definitions establish the basic vocabulary for understanding the structure and objectives of the Quota System, as well as the foundations of the inclusion policies linked to its application.

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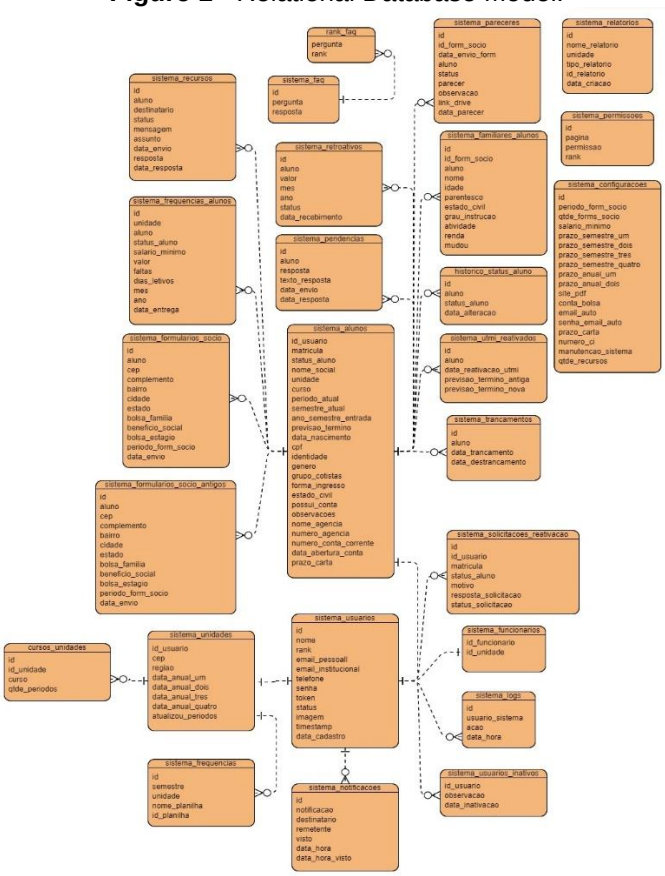
DATABASE MODEL

The database model, illustred in Figure 1, used in the Quota System represents, in an abstract and structured way, the organization, storage and manipulation of data in the adopted management system. This model defines the data elements, their relationships and the rules that guide their operation. The system uses both the logical model and the relational model to structure the information necessary for its operation.

The logical model describes how the data is organized in terms of tables, relationships and restrictions, without considering the technical aspects of implementation. It specifies the entities, attributes, keys and links between the data, according to the requirements defined for the system. The relational model organizes the data in tables composed of rows (tuples) and columns (attributes), allowing formal relationships to be established between these tables through primary and foreign keys.

In the system, information is distributed across several tables, each containing specific attributes that describe the characteristics of the records. In this context, attributes are represented by table columns and play an essential role in structuring the data.

Figure 1 - Relational Database Model.



Source: Authors, 2025.

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The following tables stand out among the implemented tables: users_system, which stores data on all users in the system; inative_users_system, which contains a history of suspended users; and reactive_request_system, which records requests for user reactivation.

Also relevant are the units_system tables, which contain information on teaching units; units_course, which lists the courses offered; employees_system, which contains data on staff; students_system, which contains data on students; and student_family_system, which records information on family members.

Other important tables include: system_configurations, responsible for the general system settings; system_permissions, which defines profile access; system_faq, with frequently asked questions; system_logs, which records actions performed; system_notifications, with messages sent; and current and previous socioeconomic forms (system_forms_partner and system_forms_partner_olds).

The database also has the following tables: system_resources, which stores appeals filed by students; system_pending, which records pending documents; system_frequencies, which contains semester attendance sheets; and system_frequencies_students, with monthly attendances.

In addition, there is the academic_history_status_student, with changes in student status; system_results, with SESOEDUC's opinions; system_reports, which stores generated reports; system_retroactives, with retroactive payments; system_locks, with blocks; and system_utmi_reactivated, with data from students reactivated after exceeding the maximum course time.

Each table has a primary key (PK) that uniquely identifies each record. Some also include foreign keys (FK), which establish links between data, such as the id_user column of the sistem_students table, which refers to the id of sistem_users.

This relational model provides the Quota System with a solid basis for organizing, controlling and protecting the information of students who benefit from the quota policy at FAETEC, ensuring efficiency, integration and security.

RESULTS AND DISCUSSIONS

The functional requirements of Quota System identified describe the essential functionalities of the system, such as the registration and management of different types of users and students, attendance control, document and permission management, among

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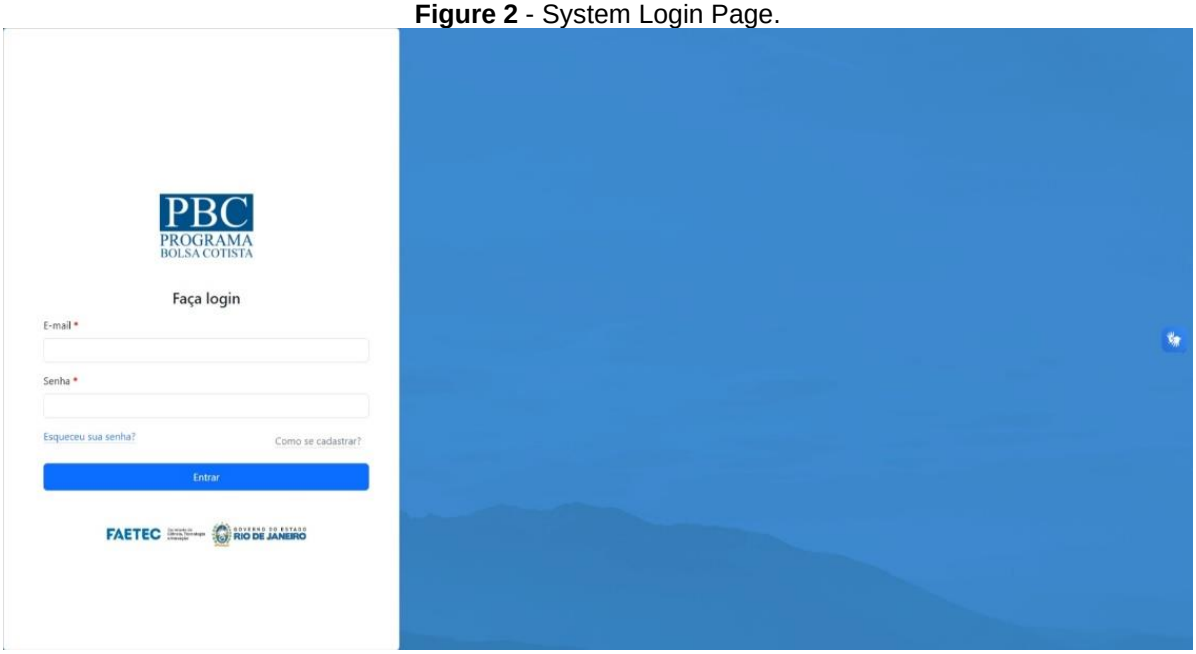
others. Non-functional requirements address aspects related to accessibility, such as integration with the VLibras tool, as well as, performance, security and usability. The detailed description of use cases also contributed significantly to the specification of functional requirements, allowing the mapping of interactions between users and the system, with a focus on achieving specific objectives.

Next, the system modeling phase involved the creation of visual and structural representations that illustrate the system architecture and its operation. The login page illustrated in Figure 2.

Figure 2 - System Login Page.



Source: Authors, 2025.

A Use Case Diagram was created, which provides an overview of the interactions between the different user profiles and the functionalities made available. In addition, a BPMN (Business Process Model and Notation) Diagram, a Class Diagram and a Relational Database Model were developed. The logical model of the database was constructed based on the details of tables such as system_users, system_students, system_configurations, among others, and their respective attributes. This logical model was then translated into a relational model, effectively implemented in a relational database.

Regarding the technologies used, tools and resources compatible with the system's objectives and the needs identified during the requirements gathering were selected. The design and implementation of the graphical interface were guided by the search for an

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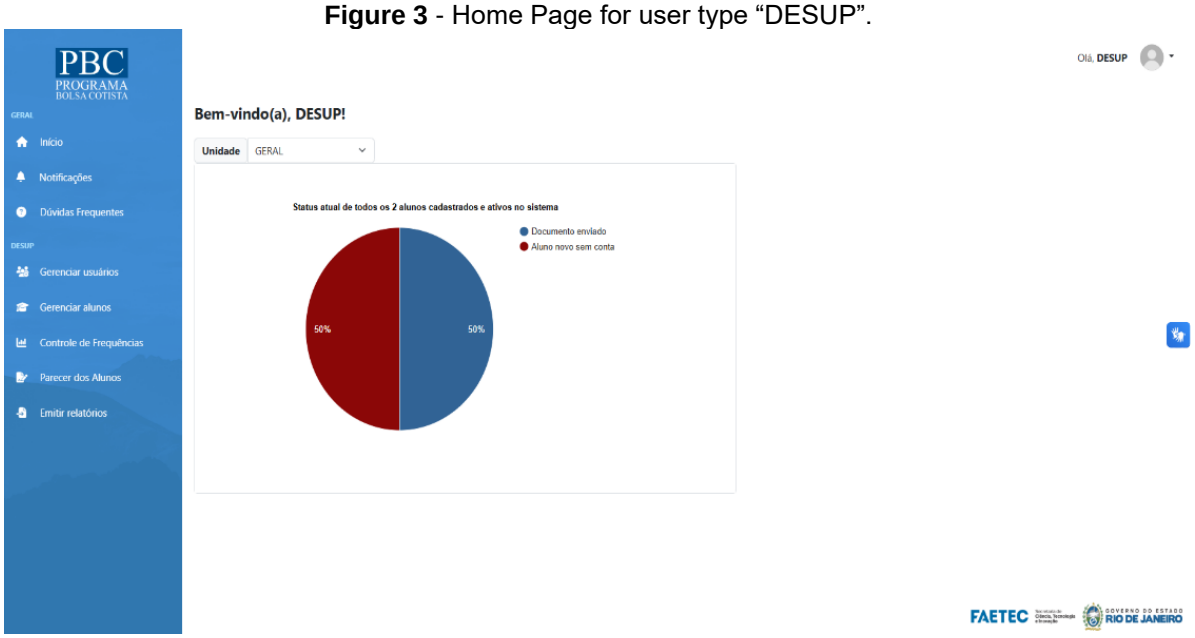
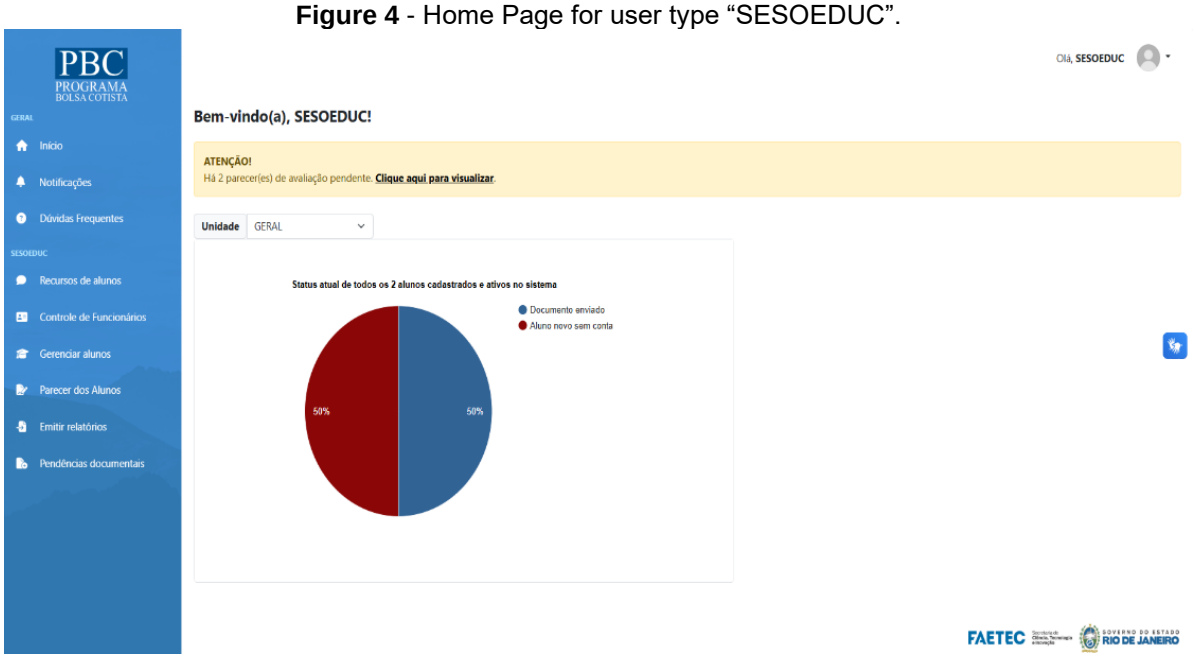
intuitive and accessible user experience. The Quota System interface was designed with attention to usability, ensuring efficient navigation, and inclusion, highlighting the integration with VLibras, a tool that ensures accessibility for deaf users. The home page for users type “DESUP”, “SESOEDUC”, “STUDENT”, “MASTER ADMINISTRATOR”, “DAIE”, “UNIT” ans “EMPLOYEE” are illustred in Figures 3, 4, 5, 6, 7, 8 and 9, repectives.

Figure 3 - Home Page for user type “DESUP”.



Source: Authors, 2025.

Figure 4 - Home Page for user type “SESOEDUC”.



Source: Authors, 2025.

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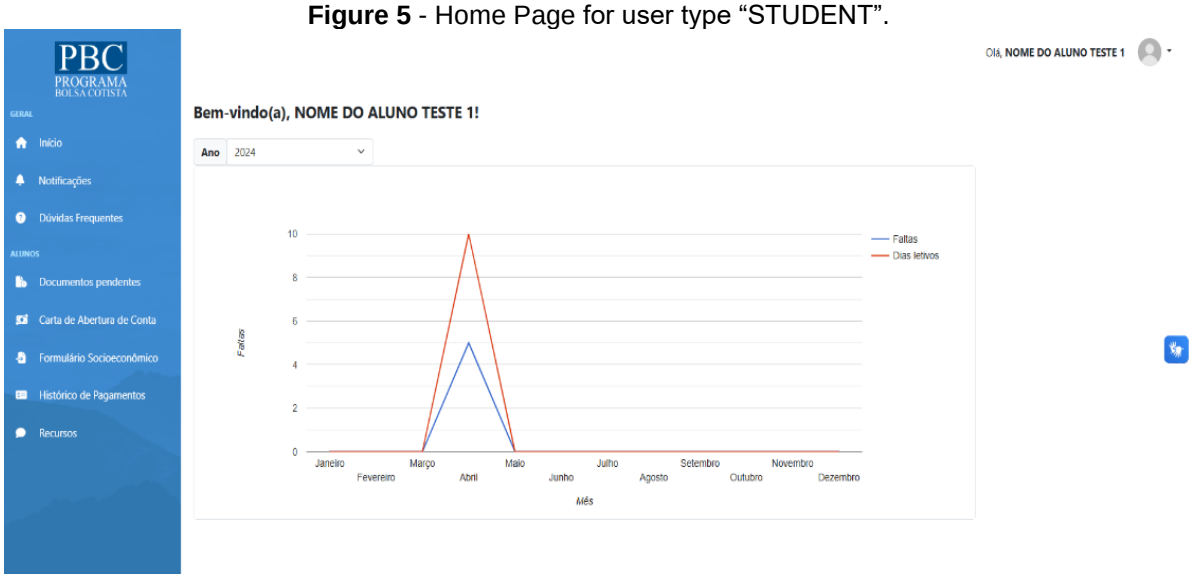
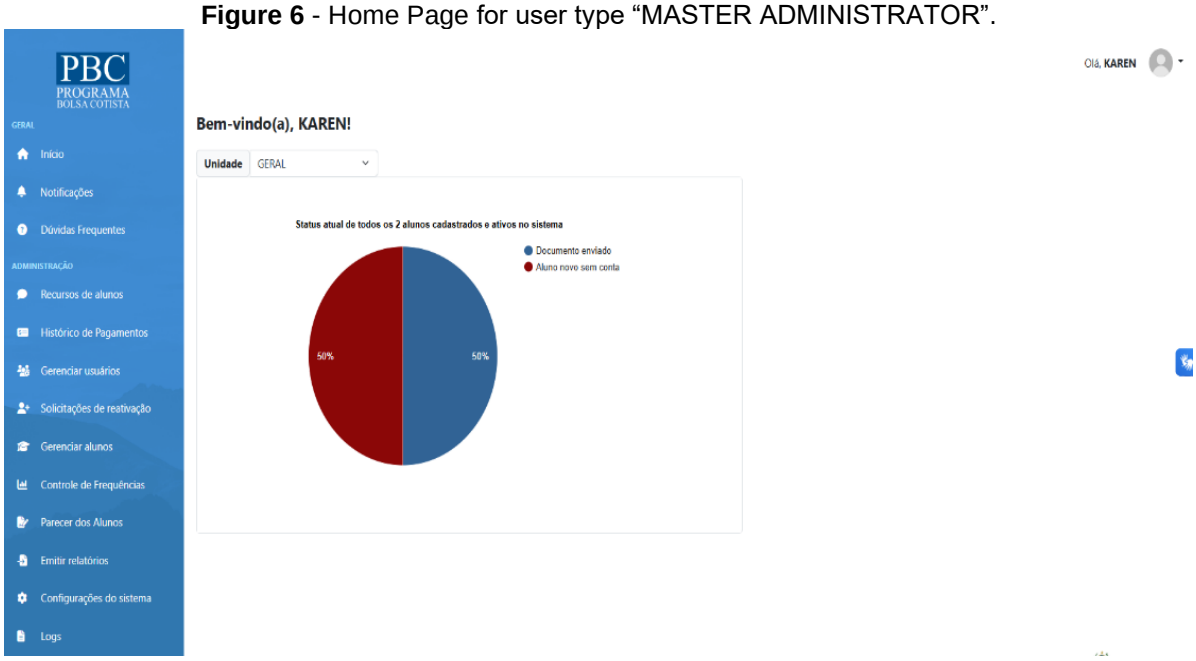
Figure 5 - Home Page for user type “STUDENT”.



Source: Authors, 2025.

Figure 6 - Home Page for user type “MASTER ADMINISTRATOR”.



Source: Authors, 2025.

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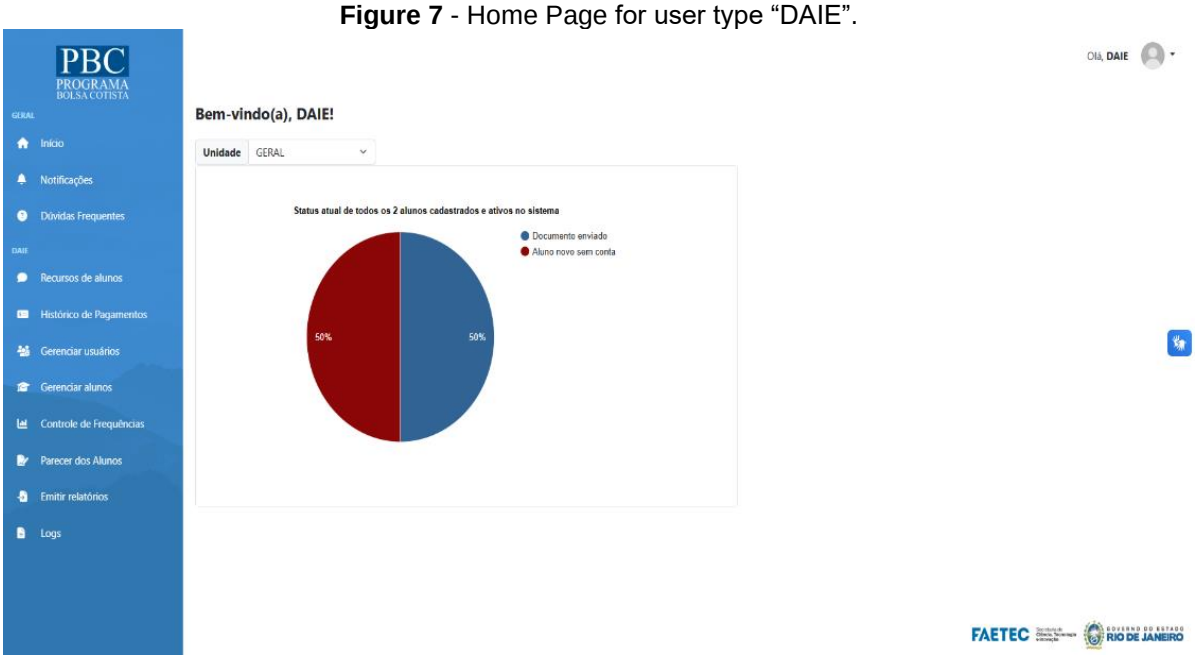
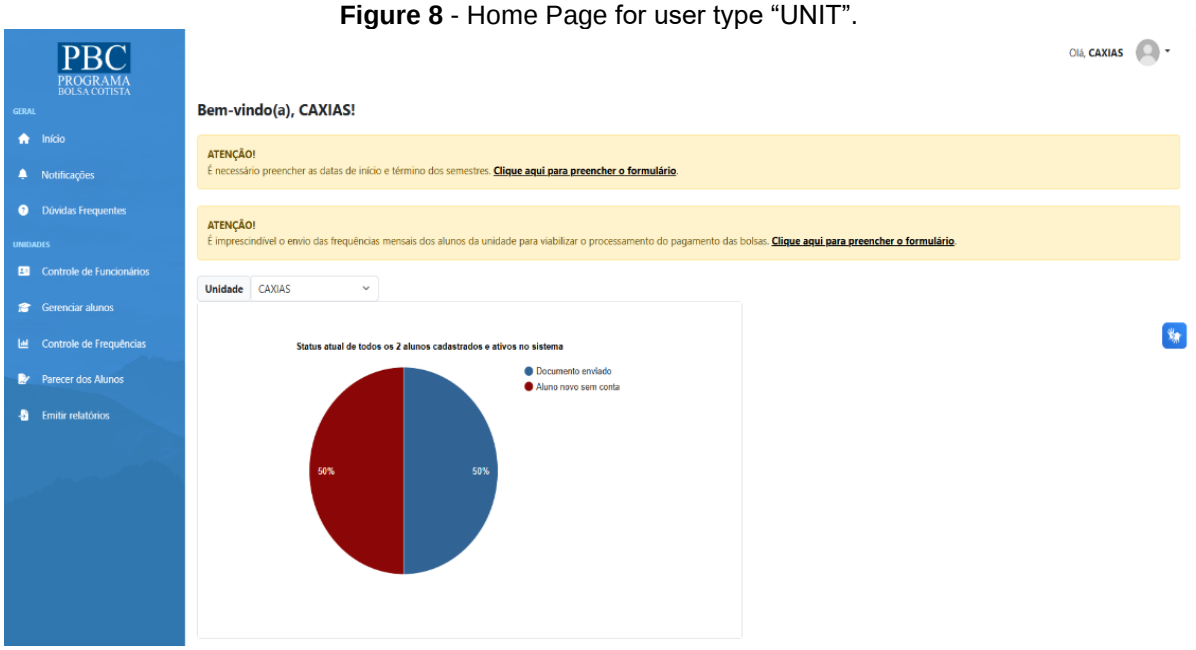
Figure 7 - Home Page for user type “DAIE”.



Source: Authors, 2025.

Figure 8 - Home Page for user type “UNIT”.



Source: Authors, 2025.

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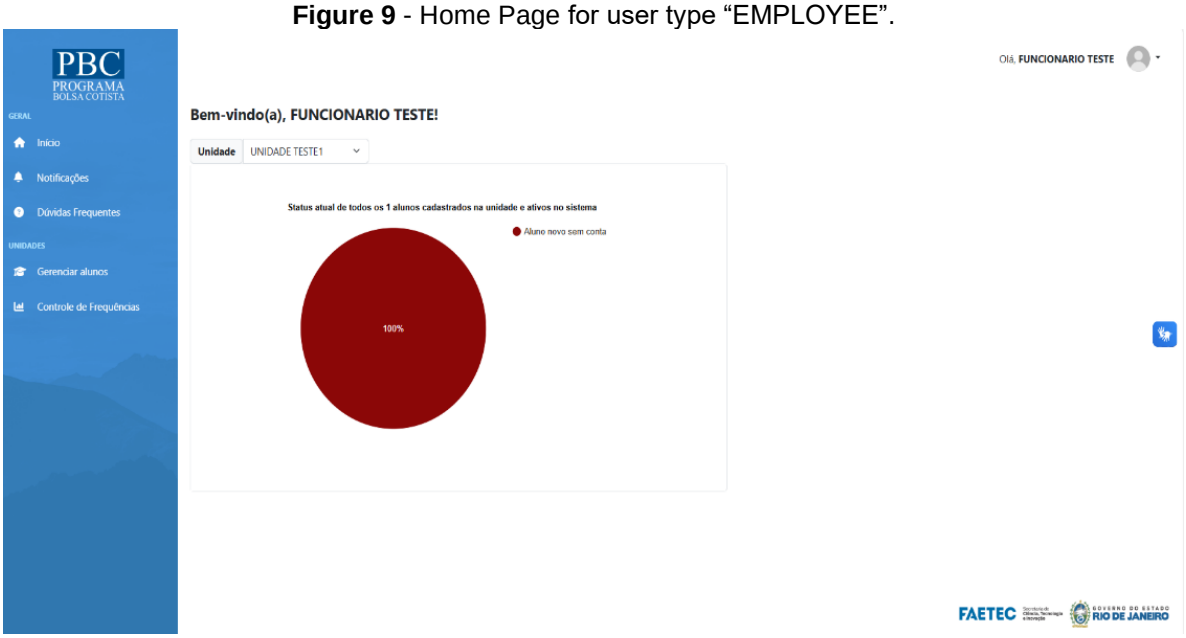
Figure 9 - Home Page for user type “EMPLOYEE”.



Source: Authors, 2025.

The methodology used in the development of the Quota System followed a logical and structured sequence. Initially, the system requirements were collected and analyzed. This stage was based on interviews with real users of the platform.

Next, the system was modeled at different levels of abstraction. The use cases, business processes and class structure were defined.

The database was also modeled, which is essential for organizing the information. After this phase, the most appropriate technologies for the project were chosen. The technological selection took into account performance, compatibility, and security. Then, the design and implementation of the system's graphical interface began.

The interface was planned with a focus on clarity, accessibility, and intuitive navigation. Usability was prioritized, aiming to facilitate the end user's experience.

Accessibility was guaranteed with tools that expand digital inclusion. Each stage sought to maintain coherence with the objectives of affirmative action policies. Development was guided by efficiency in managing quota holders' data. In the end, the system met the principles of functionality, fairness and transparency.

As previously mentioned in this article, the Quota System also offers the VLibras technology feature, which assists deaf users, people with hearing impairments, as illustrated in Figure 10.

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Figure 10 - VLibras Resources.

Source: Authors, 2025.

Note that the visual interface developed for the VLibras resource follows the User eXperience (UX) standard, fully adapted to the reality of its specific audience, enabling a 100% inclusive system.

CONCLUSION

The Quota System has brought significant advances to the management of public inclusion policies at FAETEC. Among the main benefits, the increase in efficiency and transparency stands out, with the automation of processes such as quota registration, attendance control, resource management and reporting. These features make operations more agile and organized, while ensuring greater clarity and visibility of the actions carried out.

Another highlight is the improvement of the user experience. The interface was developed with a focus on usability and accessibility, offering intuitive navigation and support resources. Integration with the VLibras tool, for example, guarantees access to the system for deaf people, promoting digital inclusion and expanding the scope of educational policies.

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The ease of data collection and analysis also contributes to more strategic and informed decisions. The generation of detailed reports provides important support for the monitoring and continuous improvement of inclusion policies, strengthening the capacity for evidence-based management.

In the long term, the system directly contributes to increased efficiency in public management, as it optimizes the use of resources and allows managers to focus their efforts on more strategic actions. In addition, the systematization and analysis of data favor the strengthening of inclusion policies, allowing for the identification of flaws, monitoring of results and ensuring that the objectives of equity and social justice are effectively achieved.

Finally, by facilitating access and retention of quota students in higher education, the Quota System is consolidating itself as an essential instrument for promoting social inclusion and equal opportunities. Its implementation represents a decisive step towards more efficient, transparent educational management committed to building a fairer society.

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