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Impact of computer science in the educational work of university student residences

Impacto de las ciencias informáticas en el trabajo educativo de las residencias estudiantiles universitarias

Impacto da ciência da computação no trabalho educacional de residências de estudantes universitários

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ABSTRACT
According to the Ministry of Higher Education, university student residences are facilities that higher education centers have to satisfy the minimum-indispensable needs of students who require the benefits of scholarship status to develop their studies and other oriented activities. A significant number of students are grouped in them for whom an educational work is carried out by certain social actors, who as a specific function of their performance perform personalized attention with them, in which the required effectiveness has not been achieved in the creative application of the "comprehensive approach to educational and political-ideological work". Its application is today limited by the insufficient systematicity with which educational work is developed. Responding to this problem, the objective of this research is to assess the impact of computer science as a support tool in educational work developed in university student residences. Different methods were used, including the analytical-synthetic, historical-logical and inductive-deductive methods and techniques such as observation, survey, and interview, as well as computer tools for software development. As a result, a computer system was obtained that contributed to the improvement of the educational work developed in the university student residences and to decision making, which concluded that the use of computer technologies is a reliable solution for the information management of the scholarship students for the achievement of their educational training.

Keywords: comprehensive training; student residences; computer system; educational work.

RESUMEN
Según el Ministerio de Educación Superior, las residencias estudiantiles universitarias son instalaciones con que cuentan los centros de educación superior para satisfacer las necesidades mínimas-indispensables de los estudiantes que requieren de los beneficios de la condición de becario, para desarrollar sus estudios y demás actividades orientadas. Se agrupa en ellas una cantidad significativa de estudiantes, para con los cuales se

realiza una labor educativa por determinados actores sociales, que como función específica de su desempeño realizan una atención personalizada con los mismos, en la cual no se ha logrado la efectividad requerida en la aplicación creadora del "enfoque integral para la labor educativa y político-ideológica". Su aplicación se ve hoy limitada por la insuficiente sistematicidad con la que se desarrolla el trabajo educativo. Respondiendo a esta problemática, el objetivo de esta investigación es valorar el impacto de las ciencias informáticas como herramienta de apoyo en el trabajo educativo desarrollado en las residencias estudiantiles universitarias. Se emplearon diferentes métodos, entre los que cuentan el método analítico-sintético, histórico-lógico y el inductivo-deductivo y técnicas como la observación, la encuesta y la entrevista, además de herramientas informáticas para el desarrollo del software. Se obtuvo como resultado un sistema informático que contribuyó al mejoramiento del trabajo educativo desarrollado en las residencias estudiantiles universitarias y a la toma de decisiones, la cual concluyó que el uso de las tecnologías informáticas es una solución fiable para la gestión de la información de los estudiantes becados, para el logro de su formación educativa.

Palabras clave: formación integral; residencias estudiantiles; sistema informático; trabajo educativo.

RESUMO
Segundo o Ministério do Ensino Superior, as residências universitárias são as instalações que os centros de ensino superior dispõem para satisfazer as necessidades mínimas indispensáveis dos alunos que requeiram o benefício do estatuto de bolsa, para o desenvolvimento dos seus estudos e outras atividades orientadas. Neles se agrupa um número significativo de alunos, para os quais o trabalho educativo é realizado por determinados atores sociais, que como função específica de sua atuação realizam com eles uma atenção personalizada, na qual a eficácia exigida não foi alcançada na aplicação criativa de a "abordagem abrangente do trabalho educacional e político-ideológico". Sua aplicação é hoje limitada pela insuficiente sistematicidade com que o trabalho educativo é desenvolvido. Respondendo a essa problemática, o objetivo desta pesquisa é avaliar o impacto da informática como ferramenta de apoio no trabalho educacional realizado em residências de estudantes universitários. Diferentes métodos foram utilizados, incluindo os métodos e técnicas analítico-sintético, histórico-lógico e indutivo-dedutivo como observação, levantamento e entrevista, além de ferramentas computacionais para desenvolvimento de software. Como resultado, obteve-se um sistema informatizado que contribuiu para a melhoria do trabalho pedagógico desenvolvido nas residências universitárias e para a tomada de decisões, que concluiu que o uso de tecnologias de informática é uma solução confiável para a gestão da informação dos bolsistas, para a realização da sua formação educacional.

Palavras-chave: formação integral; residências estudantis; sistema de computador; trabalho educacional.

INTRODUCTION

A university is an academic institution of higher education and research that grants academic degrees in different disciplines, whose mission is aimed at teaching, researching, thinking, generating and transmitting culture and professionalizing. Globally, institutions of higher education have great importance for the development of any country, not only because it contributes to democratization, promoting social advancement through training of cadres qualified, but because it generates knowledge in areas of strategic value, and it also acts as a catalyst for the

university system. We must consider that these centers are institutions of strategic values for the country, promoting equity (Simões, ML O, 2013).

When the Cuban revolution triumphed, the need to universalize higher education and to extend its radius of action to the different regions of the country led to the construction of residences for students in all centers of this type, an area of great importance in the universities. Student residences, as part of educational institutions, house subjects with different histories and trajectories, who carry dissimilar meanings, which in turn must be oriented towards a single objective, which demands the development of educational proposals with a view to having a favorable impact on in resident students and in managers who attend to their educational needs in a personalized way (Fernández, García & Fernández, 2017). Said proposals must take into account that these subjects are inserted in a variability of situations, contexts and cultures, which require collaborative work with the constant challenge of recognizing and respecting diversity, through the dialogue in reflective and critical spaces with the optics of building new knowledge, promoting a social interaction that, articulated dialectically, allows to transform this educational scenario . For this reason, the living conditions, the care and insurance of the scholarship holder and the personalized attention constitute priority elements in the educational work (Fernández, García, & Fernández, 2017).

A student residence is a university service that provides housing to students and other members of the university community of both sexes and visiting students who carry out stays of different lengths. The university student residence offers lodging services for all those whose distance from their homes is considered so long that it makes it difficult to comply with the teaching schedule. These facilities are intended to put the service of the university community the basic comfort and relevant facilities to increase the study and work (Fernández, García, & Fernandez, 2017). In these facilities, several processes of vital importance are carried out for their proper functioning; in addition to playing an important role in the educational, political and ideological work of its members.

The student residence is a space to provide not only accommodation service to students, but also an active space for comprehensive training. It is a university area where naturally can integrate training curriculum dimensions, university extension and socio - political activity. Despite the importance in the training of the student that the university delegates, in this area it could be verified, from a study carried out, that there are deficiencies in some of its processes, reflected in:

1. Inadequate analysis of the indicators established for the evaluation of scholarship students.

2. The information handled in this area sometimes does not reach the center's management in a timely manner.

3. Poor planning of residence activities.

4. Inadequate availability of information between the offices that comprise it in many cases.

The subjects that participate in the educational work process in the university student residences assume very specific functions in their work as educators, oriented to provide personalized attention to the scholarship holders who live in the residences. The transformation projects of the student residence in the new university (Fernández, García, & Fernández, 2017) have among their priorities the following:

1. Strengthening of the personalized attention of each recipient.

2. Provision of specific tasks for the scholarship recipients related to the transformation of the residence.

3. Reinforcement of the institutional and student structures of the residences for the strengthening of the work in the base.

4. Evaluation of the scholarship transformation process in the year of work.

5. Enhancement of the quality of human resources.

In Ministerial Resolution (RM) 34/2000 (Superior, 2000) , in its section "Evaluation of the scholarship holder" , in articles 13 to 16 , it is established how to proceed by the direction of the student residence, according to the indicators , issue an educational evaluation to each scholarship student depending on their attitude as a scholarship student. Other aspects to consider to issue such individual assessment, which are not stipulated in the RM, son the realization of the quartile estuary and participation activities convened by the board and management of student residence, which are controlled by the educational instructors and qualified personnel by the management, elements that are subsequently analyzed for the stimulation process, both personal and collective (rooms, modules and venues).

Since 2009, several investigations, at the global and national level, have addressed educational strategies or computer tools to support in some way the daily work carried out in this area, especially in terms of the educational work carried out with students. An example of these are those developed by Jiménez (2016), which makes a contribution to strengthen the attention received by students from the residences of the Caribbean Headquarters, University of Costa Rica and that of Alegre, Berlanga, Agudo, & Vallés (2017), where the authors address different scholarship and study aid systems in Spain, Catalonia and Valencia, which emerged in the last decade from the general and specific regulatory framework in this field. In the bibliography consulted at the national level, there is an investigation entitled "Educational actions for work in the student residence of the UCP "Raúl Gómez García" in Guantánamo (Bertot & Yoveny, 2009), in which specific educational actions are addressed for the proper functioning of the student residence of the University of Pedagogical Sciences "Raúl Gómez García".

From the study on different existing (national and international) exiting systems, specifically on the topic of information management student residences and the work done by specialists in the area, it is concluded that existing tools do not meet the needs current university students residences according to educational work, which is directed to the integral formation and the ones that inhabit it; in addition, they are under proprietress licenses or at high prices for purchase, including a marked failure in the management of information handled in university residence halls.

For these reasons, the objective of this research is to assess the impact of computer science as a support tool in the educational work developed in university student residences, by its specialists, using Web development tools and Databases.

MATERIALS AND METHODS

To carry out this study there were selected as a sample the student residences of the Centers for Higher Education (CES) of the province the authors of this research (University of

Ciego de Avila "Máximo Gómez Báez" and the University of Medical Sciences "José Assef Yara") belong. The selection criteria were focused on the idea that they have different performance characteristics, besides those students from different training profiles, which gives a wider spectrum for the investigative process converge.

The research, in general, was supported by different methods, among which are those of the theoretical level such as: historical-logical for the determination of the historical antecedents of the management process in student residences; analytic-synthetic method, mainly for the characterization of the process management information in dormitories and tools used in this process and the inductive-deductive, to induce the general characteristics of the process management and from this to obtain deductions and conclusions in the preparation of the document ; at an empirical level, the documentary analysis on the legal basis (Professional Models, RM 34/2000, in its section "Evaluation of the scholarship holder" in articles 13 to 16); the observation, to determine the ways to manage the information of the scholarship students; the survey, to determine the criteria for workers in student residences is the CES treated in article and students saw how the work in student residence impinged on their education; in addition to the interview with workers of the residence and mainly their managers to measure the improvement of the main management processes of the scholarship students.

The development of software architecture is one of the fundamental stages and, in many cases, the most important in software development. The software architecture constitutes a set of significant decisions about the organization of a system; it includes the selection of the structural elements from which the system is composed. This not only is interested in the structure and behavior, but also by the constraints and commitments of use, functionality, flexibility to change, reuse, understanding and technology, as well as aesthetic aspects (Moreno, 2020). To carry out this work, the following computer tools and programming languages are proposed.

As programming languages, on the server side, Python is a programming language that is based on the object-oriented programming paradigm, thereby increasing the potential and versatility of this language. From the HTML, JavaScript and CSS client (Álvarez, 2017) SQLite has been selected as a database manager because it is a free software tool that allows information to be stored on embedded devices in a simple, efficient, powerful, fast and in computers with few hardware capabilities, such as a PDA (Personal Digital Assistant or Personal Digital Assistant) or a cell phone (SQLite Documentation, 2018).

The methodology used in the application development was Programming (XP), it focuses on enhancing interpersonal relationships between the work team and the client through dynamic and flexible user stories (Crêspo, Peña, Verdecia, & Fustiel, 2016). The function of having the client within the work team is to quickly answer any questions from the team and correct in the same way. The idea is also that they are as automated as possible, allowing you to quickly assess if functionality has been lost or if something is wrong.

Visual Paradigm is the tool Computer Aided Software Engineering (CASE) that supports visual modeling with UML 2.2 (Unified Modeling Language) to the system performed. This tool increases the quality of the software through improving productivity in the development and maintenance of the software. It increases the computer knowledge of a company, thus helping to find solutions for the requirements. It also allows the reuse of software,

portability and standardization of documentation, in addition to the use of the different methodologies of Software Engineering (Pressman, 2010).

System security

Computer security, in the same way as it happens with security applied to other environments, tries to minimize the risks associated with the access and use of certain systems in an unauthorized and generally malicious manner. The goal of computer security is to protect valuable computer resources of the organization, such as: information, hardware or software. Through the adoption of the appropriate measures, computer security helps an organization to meet its objectives; it allows protecting financial resources, information systems, reputation, legal situation and other assets, both tangible and intangible. Indeed, managing organizational computer security is a demanding task and evaluating the value of security technologies is essential to effectively manage information security (Vera & Vera, 2017).

One of the pillars of Symphony is to give security to projects. Since 2008 security policy was changed because of a serious security hole. Due to the XSS and CSRF attacks Symphony included numerous strategies and utilities to deal with. Forms since version 1.1 do not allow fields that do not correspond to the form to be injected. To configure security Symphony has a file called security.yml, where firewalls are established. In other words, the areas which will protect the different routes are defined, in this case (^ / * and ^ / admin / *) the first for the frontend area and the other for the administration; These guarantee users access to the parts established according to the roles they have, if they do not have the required roles to enter the various areas, they are sent to the login form or a message is displayed informing that they do not have permission to enter the requested area.

RESULTS

The proposed system has been in operation for 4 years. At the end of this time, and by conducting an interview to workers of the residence and mainly to the Directors. It was possible to measure the improvement in the performance of the main processes, which generate a series of vital information for the optimal fulfillment of its mission. With the same instrument, it was found that 96 % of the nursing home staff was satisfied with the solution, and only 4 % showed a medium degree of satisfaction.

In the documents that legally regulate the information management procedure of the scholarship students, it was observed that the functions of the personnel who work directly and indirectly with the scholarship holder were not delimited. In the analysis of key documents that support the educational work it was observed that there was no uniformity in the conduct of them and in some cases there were not made or were made improperly, directly affecting the decision-making. For example: slowness in the traffic of information on activity is in the student residence; disorganization and inconsistencies in the reporting information, since it is accounted for manually using paper, pencil and Microsoft Excel documents in isolation; deterioration or loss of information regarding scholarship students; unfavorable elements for the successful realization of educational work in the student residences in question.

Triangulation of the results obtained by the observations made to the operation of the student residences and students behavior in them as well as the survey of workers and students allowed to appreciate that, in general, the students know about their evaluation and what to be performed in the educational area and apply some methods of evaluation which are communicated to the students. However, the methods

used to issue the assessment of individual performance are uninformative; In addition to not being previously discussed with the student, it is not adequately stimulated and the student does not feel that his performance as a scholarship student affects his educational training.

It is determined that 25 % of the people linked to the information management of scholarship students have a university level, while 75 % are Middle Technician or graduated from Pre-university. 16.66 % of the respondents have a work experience that ranges between 3 and 5 years and 58.33 % between 5 and 10 years of experience and 25 % with 15 or more years of work. As for how to manage the information that is inadequate detected (58.33 % of respondents), 25 % inadequate or the 8.33 % replied that it is adequate. Among the causes that originate this situation are: the complexity in the calculations and the time to perform it manually (100 %). They added, in addition, they are difficult access to the required information for such activity (83.33 %) and only 16.66 % expressed otherwise.

100 % of the respondents state that the information management of the scholarship students is always carried out in the student residence; despite how cumbersome the aforementioned management is, but that it will be a tool that facilitates the management of information.

The screen outputs of the reports correspond to the printed reports, in order to facilitate the reading of the user, regardless of the means used to obtain the information. The distribution of the elements and the length of the fields will be the same in both cases.

The response time by the system would be immediate, since the data will be centrally available, in addition to having reports created in an automated way and that they currently do not have. In addition, there are users trained in the management of software. This allowed the new system to carry out requests in a much shorter time than before its implementation, since only the operator has to fill out the form corresponding to the type of request.

Interface

In designing the user interface of the system (figure 1), the following aspects were taken into account:

1. Use of gray color to help to avoid, to a certain extent, visual fatigue and at the request of the user.

2. Use of no more than two fonts of letters, which were used for specific purposes. The use of the same appearance in all the visual components of the forms to maintain uniformity in the application.

3. Access to all the functionalities provided by the system is allowed from a main menu, always visible, and a pleasant and professional design of the interface elements was made to facilitate user interaction with the system's functionality.

4. The final size of the XHTML content was optimized to allow relatively fast browsing on low-speed networks.

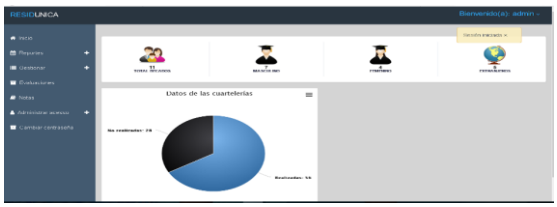

Fig. 1- Main interface

Safety

Several security principles were analyzed to develop the proposed system. Starting from these there were used several as Broken Authentication and Session Management (Failures Authentication

and Management of sessions); Web2py incorporates a mechanism for administrative authentication and handles sessions independently for each application. The administrative interface, in addition, forces the use of safe cookies when the client is not on local host. For applications, it includes a powerful API for Role Based Access Control (RBAC).

Insecure Cryptographic Storage (Storage Cryptographic Insecure) it is common that web applications do not use own cryptographic functions to protect data and credentials. Attackers use weakly protected information for identity theft. For that, Web2py uses the MD5 and HMAC + SHA-512 algorithms to protect stored passwords.

Failure to Restrict URL Access (Unrestrictive Access with URL): commonly applications only protect sensitive features display avoiding link or URLs to unauthorized users. Attackers can use this weakness to access and perform unauthorized operations by accessing those URLs directly. For this, web2py associates the URL requests with Python functions; web2py provides a mechanism to declare which functions are public and which require authentication and authorization. API access control based on incorporated roles allows developers restricting access to any function based on simple authentication (login), permissions based on groups. Web2py, in addition, allows the use of URLs with digital signature and provides an API to digitally sign requests with Ajax.

To ensure that unauthorized persons do not access the system, a prior authentication is carried out, where the system checks that the username and password match the data stored in the database; otherwise the user is informed through an error message. A each registered user is assigned a role that describes the rights to perform operations on the system; For this, three roles have been defined: the administrator, who has permission to perform the software administration operations; the chief director of scholarships, who is in charge of reading and inserting data into the system, and the instructors, who are the people who have the task of assigning the barracks to the students. Depending on the role of the authenticated user, the system provides
the corresponding permissions. Then the authentication window for safety (shown in figure 2); only system users have privileges and permissions to access.

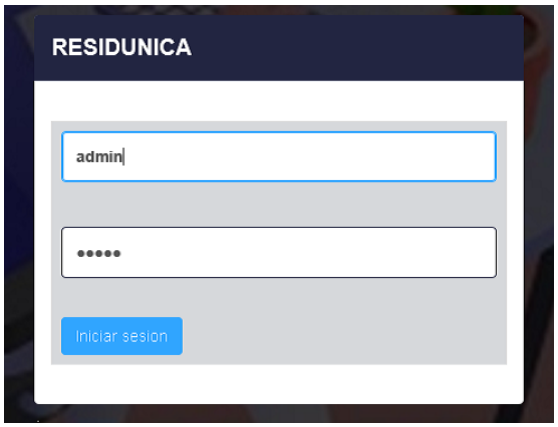

Fig. 2- Authentication interface

Acceptance Tests

In tests of acceptance made by the Directors of the residence halls, it could be verified that the system meets with the expectations, based on compliance with the requirements defined by the (client 100 % of requirements). Acceptance testing is essential, which is why it must be included in the software testing plan.

The new system provided benefits to the company such as:

1. Optimization of working time, which allows the residence management workers to focus on the particularities of each student and address existing deficiencies.

2. Access to an easily scalable system.

3. Improved expense control; therefore, these tend to be reduced.

4. Availability of a specialized and personalized computer service.

5. More effective and productive in university development processes in this area.

With the implementation of the new information management system, it was possible to make a precise and detailed analysis of the development of each student; Furthermore, the stimulation system carried out, both individually and collectively, positively encourages the participation of students in activities regulated by resolution such as those directed by different instances. There is uniformity in the reports issued through reports that substantially support decision-making by the residence management, which favors the timely taking of measures when necessary.

With the use of the proposed system, despite not having it as an objective when conducting this research, it is important to mention the economic valuation made by the authors in conjunction with the directors of the residence and the economic director of one of the CES (UNIQUE). The center will save a value of 18676.02 MN annually (Table 1), then the director will have access to this information from the system and they will be handled and stored in the database for later use correctly.

Table 1- Annual economic calculation of the address of the student residence with and without system.

Materials	**Tangible costs without system (annual)**	**Tangible costs with system (annual)**
Bond paper	22700.12 MN	13600 MN
pen	54.4 MN	30.2 MN
Pencil	15.96 MN	7.48 MN
Water corrector	27.00 MN	27.00 MN
Clip for Folder	79.8 MN	39.9 MN
Plastic file with clips	180.00 MN	100.00 MN
Yen loops	88.00 MN	40.00 MN
Clip Standard clamp	13.68 MN	8.64 MN
Cardboard File	8.00 MN	4.00 MN
Toner: 1U laser / month	12249.42 MN	4083.14 MN
Gasoline	2400.00 MN	1200.00 MN
TOTAL	**37816.38 MN**	**19140.36 MN**

DISCUSSION

The results obtained from the application of the exposed methods, as well as the deepening of the bibliographic reviews on the subject demonstrate the importance and need to investigate it. The realization of an excellent educational work in the area of university student residences constitutes a neuralgic point nowadays; for this reason, constant work is necessary to achieve the integral formation of the university student, the first mission of Cuban universities.

The importance of educational work today include investigations of various authors on the subject, among which are Martinez (2015), Fernández, García & Fernandez (2017), Molina, laundry & Hernandez (2018) between others, from whose review concluded

how cumbersome and complicated the proper performance of educational work tends to be. They also agree that educational work is the essential objective of orientation in the university context and of great importance for the formation of the new man, in terms of their formation of values and their civic behavior.

With the above conclusion we can say that the investigation fully agrees with the authors, mainly the criteria of Fernandez Garcia, & Fernandez (2017) which proposes that educational work should be managed as a process transiting through Proposed stages, by virtue of achieving coherence in the projection of actions aimed at the integral formation of the student, from a personalized work that involves all the educational agents that systematically interact with these students. The scientific and technological advances should encourage society to use the Technologies of Information and Communications (ICT) to generate a change in all contexts of human activity. Therefore, it is necessary to view education from the global, emerging and changing perspective, according to the knowledge society, demanding new ways of learning and teaching, to organize schools, and thereby to transform culture around it.

It is also emphasized that these professionals must assume guiding functions in their performance, from considering the educational work as an objective of the psycho pedagogical orientation, which is valued as a helping relationship that favors the personal- social-professional development of scholarship students. Likewise, educators must facilitate the orientation and activation of potentialities in the student from the relationship they establish with the same, providing them with the resources, necessary information, from the use of techniques, mechanisms that cause change, transformation. The use of dialogue, evaluation, and reflective reasoning in this guiding process is also considered appropriate, which will undoubtedly give educational work a deeply human, formative and axiological character.

It is worth highlighting the role of tutoring as a way of carrying out guidance in the educational work process in the student residence; It allows to attend to the personal-social, to prepare the student for life in a context very marked by interpersonal relationships, diverse origins, cultures and other factors that at certain times become barriers that the student needs to overcome, but that can be exploited In his training, meanwhile, in his professional future he may be interacting in coexistence with counterparts who come from other regions, and even from other nationalities.

A hypothetical and practical study was carried out, in which a group of documents that constitute the legal basis of the information management process of scholarship students were studied, among which stand out: professional models, RM 34/2000. The analysis of these documents allowed to know the training profiles that each student has with which both student residences have to be able to convene activities according to their needs and preferences and the aspects that are measured when issuing the monthly evaluation to the students for do it fairly and thus create a more complete and applicable computer system for any sphere of action.

The assessments made to documents (models professional, RM 34/2000) and the plays of the aforementioned authors allowed authors of this research the proposal embodiment of a computer system for managing information of scholarship students for the improvement of educational work in university student residences, due to the fact that they do not have their own tools to manage said information, which leads to a cumbersome result in carrying out this entire process manually. Similarly, the problems that came to light in the

application of empirical techniques and methods were taken into account. This system constitutes a valuable tool in the hands of the specialists of the student residence, as it allows the completion of the entire information management process of the scholarship students quickly and accurately.

The result of this research showed that the performance of a computer system that allows the management of information relating to scholarship students, significantly improves how management made earlier, which was by using office automation tools such as spreadsheets, which made it difficult to create statistical graphs; the reception of data takes time and there were errors in spelling and writing documents. With the use of the technologies described, it was appreciated that the new system has several components that give it a high added value, such as: the template editor for the preparation of documents to be presented during the process flow, the viewer of documents that allows the loading, visualization, export and modification of the editable parts of the documents generated by the system and the response time to the requests made by the specialist, which is an average of two minutes regardless of the request.

Taking into account the flexibility of the design and the technologies used, the proposed computer system can be applied in other university student residences in the country to favor the comprehensive training of the students who live there, as the main objective of educational work, in addition to the taking of decisions by specialists and administrators of the area.

The use of free tools allowed the development of a system that saved the universities
involved a considerable sum of money, as observed in table 1. In this way, the country's computerization process of Cuban society is contributed.

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