MENDIVE

REVISTA DE EDUCACIÓN

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University and information management in the design of technological scientific information services

Gestión universitaria y de información en el diseño de servicios de información científico tecnológicos

Universidade e gestão da informação na concepção de serviços de informação científica e tecnológica

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ABSTRACT
Despite the fact that educational management has evolved over time according to the needs and demands of its environment, context and processes, there are still dimensions that have been little investigated in university management. An insufficiently studied dimension is information management, as well as its respective scientific and technological information services. Based on this research gap, the present study aims to identify the interrelationships that exist between the dimensions of university management and the dimensions of information management, which influence the improvement of the different scientific and technological information services of a university. The research was based on the materialist dialectical method, and fundamentally applied the logical historical methods, analysis and synthesis, modeling together with the structural systemic method. As a result, the identification, characterization and graphic representation of the main interrelations that are manifested between the dimensions of university management and the dimensions of information management were obtained. Based on this, reference services were defined as the most relevant type of service for universities classifying them into: training services, information services and guidance services. Achieving in this way, the coherence of the information management with the university management for the strengthening of the substantive processes of a university, from the definition of services that involve both the administrative, managers, professors and students, as well as society and university environment.

Keywords: Educational management; university management; information management; dimensions of university management; dimensions of information management; reference services; scientific and technological information services.

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RESUMEN
A pesar de que la gestión educativa ha evolucionado en el tiempo de acuerdo a las necesidades y exigencias de su entorno, contexto y procesos, aún existen dimensiones que han sido poco indagadas en la gestión universitaria. Una dimensión insuficientemente estudiada es la gestión de la información, así como sus respectivos servicios de información científico tecnológicos. A partir de esta brecha investigativa, el presente estudio tiene el propósito de identificar las interrelaciones que existen entre las dimensiones de la gestión universitaria y las dimensiones de la gestión de la información, que influyen en el mejoramiento de los diferentes servicios de información científico tecnológicos de una universidad. La investigación se basó en el método dialéctico materialista, y aplicó fundamentalmente los métodos histórico lógico, el análisis y la síntesis, la modelación junto al método sistémico estructural. Como resultado, se obtuvo la identificación, caracterización y representación gráfica de las principales interrelaciones que se manifiestan entre las dimensiones de la gestión universitaria y las dimensiones de la gestión de la información. A partir de ello, se definió a los servicios de referencia como el tipo de servicio más pertinente para las universidades. Clasificándolos en: servicios de formación, servicios de información y servicios de orientación. Logrando de esta forma, la coherencia de la gestión de la información con la gestión universitaria para el fortalecimiento de los procesos sustantivos de una universidad, a partir de la definición de servicios que involucran tanto a los administrativos, directivos, profesores y alumnos, como a la sociedad y entorno universitario.

Palabras clave: Gestión educativa; gestión universitaria; gestión de la información; dimensiones de la gestión universitaria; dimensiones de la gestión de la información; servicios de referencia; servicios de información científico tecnológicos.

RESUMO
Apesar de a gestão educacional ter evoluído ao longo do tempo de acordo com as necessidades e demandas de seu ambiente, contexto e processos, ainda existem dimensões pouco investigadas na gestão universitária. Uma dimensão pouco estudada é a gestão da informação, bem como seus respectivos serviços de informação científica e tecnológica. A partir de esta brecha investigativa, el presente estudio tiene el propósito de identificar las interrelaciones que existen entre las dimensiones de la gestión universitaria y las dimensiones de la gestión de la información, que influyen en el mejoramiento de los diferentes servicios de información científico tecnológicos de uma universidade. A pesquisa baseou-se no método dialético materialista, e aplicou fundamentalmente os métodos históricos lógicos, de análise e síntese, modelando em conjunto com o método sistêmico estrutural. Como resultado, obteve-se a identificação, caracterização e representação gráfica das principais inter-relações que se manifestam entre as dimensões da gestão universitária e as dimensões da gestão da informação. Com base nisso, os serviços de referência foram definidos como o tipo de serviço mais relevante para as universidades. Classificando-os em: serviços de treinamento, serviços de informação e serviços de orientação. Conseguindo desta forma, a coerência da gestão da informação com a gestão universitária para o fortalecimento dos processos substantivos de uma universidade, a partir da definição de serviços que envolvem tanto os administradores, gestores, professores e alunos, como também a sociedade e ambiente universitário.

Palavras-chave: Gestão educacional; Gestão universitária; gestão da informação; dimensões da gestão

universitária; dimensões da gestão da informação; serviços de referência; serviços de informação científica tecnológica.

INTRODUCTION

Recent views on educational and pedagogical approaches consider that, for the most part, they focus on the meaningful functional organization of learning which allows, through them, to make approximations of how educational actors have to perceive the process, content, resources and services, among other elements (Rico Molano, 2016; Gorozabel Quiñonez, Tyrone Gualberto, Moreira-Morales & Zambrano -Delgado, 2020). All of it driven by proper and pertinent management.

Management, in the context of Higher Education according to Pulido and Pérez, is the action of… "carrying out actions that make possible the performance of the organization, for the achievement of the mission that it has established, in which they intervene, by less, on one hand the different academic leaders and on the other the teachers and students" (Pulido Díaz & Pérez Viñas, 2021, p.9). And Alpízar (2013: p.23) considers it as "the scheme or frame of reference for the administration of an entity […] and in public organizations they are used to address other issues, such as people's social welfare, where universities are included".

In the domain of Higher Education, educational management supports harmonious and collaborative work, aimed at the mutual effort of all to promote actions of critical and analytical interests of the organization (Villagómez, Giraldo & Passailaigue, 2019). This educational management approach seeks to understand the environment in order to contribute to the solution of its problems, from curricular teaching supports, action plans, educational strategies, among other contributions. What will support the coherent progress of the educational processes of the organization with its environment (Moreno-Rodríguez & Tejada-Cruz, 2018).

One of the most current currents of educational management focuses its attention on groups of acts composed of organizational knowledge to achieve an end, in a certain time; where the transcendental work is the direction and organization of the processes (Serrano-Arenas, Ochoa Cervantes & Arcos-Miranda, 2019). It is also stated that their responsibility is in the entire set of subjects involved in the processes of the organization, under the guidance of the academic leader, who with their respective wisdom conducts comprehensive actions for the fulfillment of the proposed objectives (Torres-Pacheco, 2015).

In this same line of thought, Chacón (2014) argues that educational management is the process that is deliberately established to build new forms of relationship, collaboration and organization between the various actors that intervene to implement, operate and evaluate the educational proposals that arise from the society; based on policies and premises that guide social devices, with the purpose of adaptation and transformation of the environment, to solve problems associated with the well-being of the population (Chacón, 2014).

The conceptual analysis of educational management carried out by this research, as well as the systematization of the contents that it addresses, allowed us to understand that despite the fact that educational management has evolved over time according to the needs and demands of its environment and of the processes involved; there are still dimensions of educational management

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within a Higher Education Institution (IES) that have been little investigated.

An insufficiently studied dimension from contemporary approaches to educational management is information management (IG). Considered by this research a transversal instance from which the information, intermediate, the different components that make up the management in any organization, including the EIS.

In the field of Information Sciences, IG can be defined as "a structured set of codified mental representations (signs and symbols) that are significant, socially contextualized, and possible to be recorded on any material support and / or communicated in different spaces" (Linares-Columbié & Mena Mugica, 2015).

But the truth is that IG constitutes a process or managerial activity of vital importance in any organization, and in society, since it is in charge of the management and use of information, either in organizational contexts or in social dynamics (Rodríguez-Cruz, 2020, p.13). The IG has become in recent years a strategic process of mandatory development for decision-making and organizational development.

Based on these assumptions, this research considers that in HEIs the GI dimension must be interrelated with the dimensions of university management, the latter part of educational management. It is inferred that the incorporation of this dimension will enhance the use and relevance value of the information managed by the different processes and dimensions of university management.

Based on this research gap, the present study aims to identify the interrelationships that exist between the dimensions of university management and the dimensions of GI, which influence the improvement of the

different types of scientific and technological information services of a University.

The result of this research will allow the characterization of the interrelationships that exist between the dimensions of university management and the dimensions of information management, in order to better define the types of scientific and technological information services that should be offered in a HEI in correspondence with the dimensions of university management. This proposal will facilitate carrying out actions that improve the performance of the organization based on the established goals, based on the definition of services that involve the administration, managers, teachers and students, as well as the society and environment of the IES.

METHODS AND PROCEDURES

The research is based on the dialectical-materialist method. As theoretical methods, the logical history was used for the search; recovery and interpretation of the different variables under study, as well as for its theoretical systematization through an extensive documentary review, analysis and synthesis were handled.

The modeling method together with the structural systemic method was applied for the conceptual, graphic, functional and strategic design of the interrelationships identified between the dimensions of information management and the dimensions of university management; which allowed typifying the different scientific and technological services that provide informational support to university management in an IES.

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RESULTS

The review and analysis of the state of the art allowed us to recognize the conceptual references of this research, which conform to the definition of university management issued by Galarza (2007) as the one that best suits the subject analyzed in this study, by conceiving it… "as a process that favors, as far as possible, the balanced functioning of the university with its environment, the vertical and horizontal integration of all its processes (teaching-learning, scientific research, university extension, economic-financial and others), so that they operate and are developed in a coherent and articulated way, anticipating changes and promoting the effective insertion of people in them, to achieve results that have a favorable impact on the individual, the collective, the institutional and social, always under the influence of certain historical conditions- social" (Galarza López, 2007, p.108).

Management in universities according to Galarza and Almuiñas must take care of the integral development of the institution to effectively and efficiently fulfill its social function, perfecting its internal relations and with the outside environment, making it a relevant cultural environment in its community environment (Galarza López & Almuiñas Rivero, 2014). And, more recently, information has been added, due to the importance of this resource as a support for competitiveness and decision-making in HEIs.

And among the methodological references, the research recognizes the four dimensions of educational management proposed by the United Nations Educational, Scientific and Cultural Organization (Unesco, 2011). And that the present investigation assumes as follows:

- Institutional dimension provides a framework to systematize the behaviors of the members of the university community, taking into account the aspects of the formal structure (organization charts, division of labor, use of time and spaces, among others), and those of the informal structure (links and ways of relating). It verifies that there is congruence between the institutional policies that regulate the behavior of the community and the institutional principles and vision.
- Administrative dimension encompasses all functions, actions and strategies related to the management of available resources (human, material, economic and time), with a view to obtaining, distribution, articulation and optimization. It covers information related to all members of the organization, as well as compliance with regulations and supervision of functions, with the purpose of favoring the teaching-learning process.
- Pedagogical dimension refers to the activities of the organization that differentiate it from others and that are characterized by the links that the actors build with knowledge and didactic models; unleashing the teaching modalities, the theories of teaching and learning that underlie teaching practices, the value and meaning given to knowledge and the criteria for evaluating processes and results.
- Community dimension points to the relationships established between HEIs with the local community and other municipal and state institutions and civil and union organizations. It includes the programs of social projection of the IES and its integration and participation in the community culture. The university extension

is highlighted, as a fundamental architect of this dimension, and seen as a library extension, it is directed to the creation of cultural values, the conservation of created values, the dissemination and enjoyment and its objective is to contribute to the elevation of general culture.

Based on the above, the conceptual and methodological framework of this research recognizes university management as a process that includes the institutional, administrative, and pedagogical and community dimensions; thus, planning, organization, execution and control, to be effective and efficient, as basic management functions. In this way, the definitions of the dimensions are closely related to those declared in educational management, but contextualized to university processes.

Regarding IG, the analysis and systematization of knowledge allowed us to understand that there are two fundamental approaches in its management: one oriented to the conception and improvement of informational activity in organizational contexts Ponjuán Dante (2008, 2011, 2014, 2015), Best (2010); and another influenced by the processual vision of the use and management of information worked by Choo (2001), Valentim (2009) and Detlor (2010) among other authors.

And it is precisely this duality of functions that give IG a strategic character, since on the one hand it encompasses the organizational perspective of IG, focusing on all institutional capacities; and on the other, the procedural look guarantees decision-making, strengthening its strategic character.

From this condition then the IG has broad strategic objectives in an organization, in this regard Ponjuán Dante (2014) lists the following:

- generate informational capacities that guarantee greater organizational efficiency and effectiveness from an effective use and management of information;
- optimize decision-making and achievement of goals, organizational objectives;
- reduce risks and uncertainties from the generation of internal and external information;
- design and manage informational structures, systems, processes, products and services;
- create and promote skills and informational culture;
- guarantee continuous flows of information that contribute to generating value in all organizational processes;
- satisfy informational demands and needs;

And to meet these objectives, as well as manage the duality of functions that it integrates, different IG models have been designed. Among the most prominent in the scientific literature are:

- Páez-Urdaneta Information Management Model
- Butcher & Rowley Information Management Cycle
- Choo Information Management Process Model
- Ponjuán-Dante Information Management Model

This research, on the basis of these models, approaches and perspectives of IG establishes its theoretical framework of work, taking as a premise that IG encompasses the entire social organizational scenario under which information acquires a strategic value. And its institutionalization should take care of:

- informational flow (formal and informal),

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- management of the supply chain (for informational activity) and its risks,
- informational processes for decision making,
- content, documentary and archive management,
- informational products and services.

In this regard, this study will only include within the analysis proposal the information services that must be designed for the harmonious articulation between university management and information management in an HEI. Then, once the area of action and store of the relationships between the two dimensions has been specified, the relationships identified in this research are exposed.

Definition of essential relationships

This research interrelates information management with university management since both share the principles of management, as well as information being the center of their analysis.

In this case, the four dimensions of university management (pedagogical, administrative, institutional and community) are taken from the theoretical and methodological analysis according to Unesco (2011); and, on the other hand, the three dimensions defined in the IG model of Paez Urdaneta 1992 (information resources dimension, the strategic management dimension and the holistic dimension). In this case, the interrelation between both dimensions is based on four essential relationships.

1. The relationship between the dimensions of university management and the managerial cycle of management.

2. The relationship between university management and the dimensions of information management.

3. The relationship between the dimensions of information management and the functions of the different types of information services.

4. The dynamic relationship between the theoretical and practical components of the model with the dimensions of university management.

These essential relationships show the interrelation that exists between the dimensions of university management and the dimensions of IG in an organization, being able to guide the types of CTI services that are needed to provide informational support, in a coherent way, based on these categorical structures, in an IES.

Graphic representation: relationship between the dimensions of university management and information management

The analysis of the first essential relationship made it possible to identify the opportunities offered by each of the dimensions of the IG to lead and sustain the different functions of university management in an HEI (Fig. 1).

Each one is briefly explained below, for example, the information resources dimension of the IG covers all the training and information actions that are managed in the university, related to the pedagogical dimension of university management. The strategic management dimension not only deals with managing data of strategic value for the organization but also adds value, offering information that supports decision-making in various substantive processes of the institution, this dimension of GI encompasses the administrative and institutional management of the university; and,

finally, the holistic dimension encompasses a wide group of actions from IG (internal and external) that are related to the community management dimension within university management.
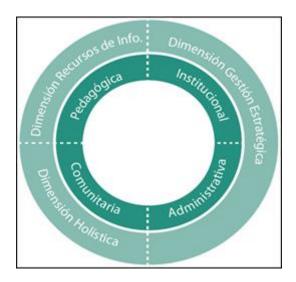

Fig. 1- Articulation of the university management dimensions with the information management dimensions.

Articulated the theoretical and methodological correspondence that exists between the dimensions of university management and the dimensions of the IG, the research was able to identify within the wide typology of information services that exist, the reference services, as the most pertinent for this investigation. His analysis provided the necessary elements for the definition of the second essential relation.

Graphic representation: relationship between the dimensions of information management and the functions of the different types of information services

It is proposed that the design of the information services offered in IES starts from the theoretical conception of the IG for their classification, and that the actions that are planned in each type of service take into account the function that they must fulfill within the University

management. Based on this guideline, the research proposes:

- that training services are designed from the theory of information resource management;
- that information services take as a reference for their design the theory of strategic information management;
- and, finally, that guidance services are built from a holistic dimension of information management.

The presence of these elements and the approach advocated by the research allowed classifying the reference services into: information services, training services and guidance services interrelated, the functions that each service has with the dimensions of IG that was previously related to each dimension of university management (Fig. 2).
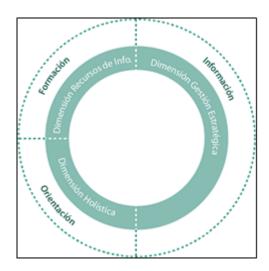

Fig. 2- Articulation of the management dimensions of information management with the function of the different types of information services.

From this relationship, HEIs can have a greater influence on the definition and design of the type of services that the organization needs to support its

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different processes. Through the different services, skills, competencies and new states of knowledge can be enhanced in students and teachers from the instructive, educational and developer aspects.

At the same time, the components of the training, learning and research process are strengthened in correspondence with the different dimensions of the university management of the organization, and even, extension actions that cover the macro environment of the IES are incorporated.

Graphic representation: relationship between the types of services and the dimensions of university management.

This relationship shows the coherent articulation that must exist between the dimensions of university management and the types of ICT services, in order to provide coherent informational support with the fundamental processes of an HEI (Fig. 3). Much of the efficient fulfillment of the organization's objectives and goals will depend on its harmonious articulation.

HEI requires ICT services that equitably cover the demands and basic information, of each of the dimensions of university management that contribute to the fundamental processes of a university.

From this perspective, ICT services are an essential product not only for the teaching-learning process, but also essential resources in the research and extension process; even relocating its use in the processes that require strategic information for decision-making.

Fig. 3- Types of information services by dimensions of university management and main university processes.

DISCUSSION

The current contexts and demands of Higher Education both in the world and in Cuba require the re-definition and re-design of processes, products and services in the field of HEIs. One of the areas of action that must be more flexible to evolution, advances and progress, are the universities.

From the perspective of this study, the approaches that can evolve the most in correspondence with sudden movements in the environment are ICT services.

The efficient management of many university processes will depend on its proper design and development. For this reason, its re-definition according to the objectives and goals of each university is so important. As well as the re-design of each value-added service based on the specific needs demanded by the pedagogical, administrative, institutional and community dimension of the university.

The research did not conceive the relationships between the different dimensions in a rigid and strict way; on the contrary, they are flexible from the dynamics of the processes that intervene in each dimension. In this way, it is

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possible to make changes in the actions contemplated by each service based on new administrative guidelines, modification in institutional strategies, changes in the teaching-learning processes or in the face of any new demand from the environment which gives a significant value to the proposal allowing its continuous improvement and feedback.

The proposal of this research contributes to the new approaches that must necessarily be introduced in HEIs in order to cope with the constant changes imposed by their environment; leaving behind static and traditional services that do not interact with the different dimensions of university management in an HEI.

Broadly speaking, this research considers that IG requires that HEIs allocate, depending on the information, certain economic, infrastructure and human resources to manage efficiently operate both the information that the organization produces and consumes for the management of its different internal processes; such as the one offered to the community of users to whom it offers its services, as part of its university management. And in general, it will pay in a singular way to the substantive processes of an IES

This research emphasizes the need to define, in a more holistic and comprehensive way, the different ICT services in an HEI. The proposal that is made directs all the attention that the contents, scope and purpose of each type of service are interrelated with each of the dimensions of university management; both paying tribute to the strengthening of the university from the interrelation and scope of its ICT services.

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Conflict of interest:

Authors declare not to have any conflicts of interest.

Authors´ Contribution:

The authors prepared the article, complying with the different actions corresponding to this purpose.

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