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VISIÓN ELECTRÓNICA

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Proposal for a school management model mediated by information and communications technologies; *Regional, rural and dispersed rural contexts of the department of Santander, Colombia*

Propuesta de un modelo de gestión escolar mediado por tecnologías de la información y las comunicaciones; Contextos regionales, rurales y rurales dispersos del departamento de Santander, Colombia

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Abstract

The purpose of this article is to prepare a proposal for a school management model mediated by ICT, which requires starting with its diagnosis until reaching its viability. Its methodological design addresses the socio-critical paradigm, which focuses on the deep understanding of phenomena from the point of view of those who, with projective design through Participatory Action Research; As a research scenario, the seven (7) provinces of the department were considered and, due to their institutional representativeness, the Inmaculada Concepción Integrated School and the San José Integrated Commercial Secondary Education Institute were addressed, with their key participants made up of their directors and 46 teachers, through projective interview and focus group techniques. As findings, the study shows how institutions lack the necessary technological equipment and connectivity, as well as low skills of some participants in the management of technological tools, which supports the final proposal called

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Escolatio (Contextualized Strategy for the Administration mediated by ICT from official institutions), as a school management model mediated by ICT, a model whose Value proposal is based on its characteristics of being Consultable, Traceable, Contextualized, Integrable, Intuitive, Self-forming, Light, Free, to be executed as future work, through the Institutional Improvement Route (RMI), Official School Management Model of Colombia.

Keywords: school management model, ICT, Institutional Improvement Route, regional context.

Resumen

El propósito de este artículo es elaborar una propuesta de un modelo de gestión escolar mediado por las TIC, lo cual requiere partir de su diagnóstico hasta llegar a su viabilidad. Su diseño metodológico aborda el paradigma sociocrítico, el cual se centra en la comprensión profunda de los fenómenos desde el punto de vista de quienes participan en ellos, con un diseño proyectivo mediante la Investigación Acción Participativa. Como escenario de investigación se consideraron las siete (7) provincias del departamento y, debido a su representatividad institucional, se abordaron la Institución Educativa Integrada Inmaculada Concepción y el Instituto de Educación Media Comercial Integrado San José, con participantes clave conformados por sus directivos y 46 docentes, a través de técnicas de entrevista proyectiva y grupo focal. Como hallazgos, el estudio evidencia cómo las instituciones carecen del equipamiento tecnológico y la conectividad necesarios, así como las bajas competencias de algunos participantes en el manejo de herramientas tecnológicas, lo cual sustenta la propuesta final denominada Escolatio (Estrategia Contextualizada para la Administración mediada por TIC desde instituciones oficiales), como un modelo de gestión escolar mediado por TIC, cuya propuesta de valor se fundamenta en las características de ser Consultable, Trazable, Contextualizado, Integrable, Intuitivo, Autoformativo, Liviano y Libre, para ser ejecutado como trabajo futuro a través de la Ruta de Mejoramiento Institucional (RMI), modelo oficial de gestión escolar en Colombia.

Palabras clave: modelo de gestión escolar, TIC, Ruta de Mejoramiento Institucional, contexto regional.

1 Introduction

School management constitutes the fundamental pillar to guarantee the quality and efficiency of educational establishments. In this sense, the Institutional Improvement Route (RMI), proposed by the Ministry of National Education (MEN) in 2008, offers a structure to promote self-assessment, planning and monitoring processes in educational institutions. However, in dispersed regional and rural contexts, such as the department of Santander, Colombia, institutions face challenges that go beyond traditional tools, including limitations in technological resources, lack of connectivity and gaps in teacher training, which make it difficult to effective implementation of institutional improvement strategies.

From this reality, the research is problematized through the question: what should be the proposal for a school management model mediated by information and communications technologies to be implemented in the regional, rural and dispersed rural contexts of the department of Santander, Colombia? To this end, the socio-critical interpretive paradigm is adopted with a qualitative, non-experimental approach, based on projective research through Participatory Action Research (PAR), with the purpose of not only understanding the specific dynamics and needs of the regional educational context. , but also to build, together with the school communities, a solution that fits their reality. The research findings revealed multiple barriers in school management processes, such as the lack of searchable, traceable and context-adapted tools; the absence of integration between pedagogical, administrative and community processes; and the difficulties in implementing technological solutions due to the complexity of rural environments. These results gave rise to the ESCOLATIO model (Contextualized Strategy for Administration Mediated by ICT in Official Institutions), as a

navigation chart that aims to guide these institutions towards a more efficient, effective, contextualized management aligned with the demands of the century. XXI.

ESCOLATIO is structured into three fundamental axes: managerial, training and community, each developed at three levels: strategic, tactical and operational, which allows institutional challenges to be addressed in a comprehensive and adaptive manner. Likewise, these levels and axes are supported by four (4) dimensions or processes: Planning, Implementation, Monitoring and Adjustment. This design ranges from the definition of policies and long-term goals, to the concrete implementation of strategies in the administration of the educational establishment, pedagogical practices in the classroom and interaction with the educational community. Its approach not only organizes school management, but also links it directly to the realities and demands of the environment.

The research indicates how, in order to guarantee the effectiveness of the model and its ability to respond to the challenges present in regional educational contexts, the model must consider seven key characteristics: be consultable, traceable, contextualized, integrable, intuitive, self-forming, lightweight and free. These characteristics are not annexed elements, but are intrinsically linked to the model, ensuring that Information and Communications Technologies (ICT) play a transformative role in administrative, pedagogical and community processes.

2 Development of the theme

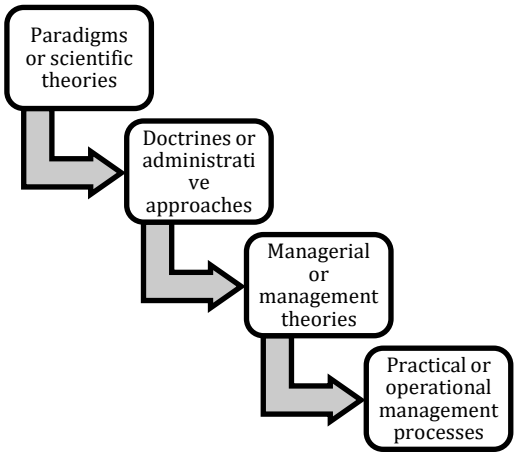
2.1 Conceptual bases

2.1.1 Management Model

As seen in the following illustration number 1, management models constitute an essential tool to guide and structure organizational processes in various contexts, including the educational field, which is addressed as an archetypal "model" or reference that guides organizational actions. , highlighting its specific application in school management [1]. To do this, three fundamental aspects are addressed: first, the concept of the model as an ideal guide for the

development of processes; second, the importance of school management models as frameworks that structure and optimize activities in educational institutions and, third, the conceptual hierarchy between paradigms, approaches and models, which allows us to understand how the theoretical bases that underpin these practices are articulated. organizational in the school context.

Figure 1. Hierarchy around the construction of the Management Model



Source: own elaboration from

These elements are key to understanding how management models contribute to institutional improvement and efficiency.

One of the ways in which the Royal Academy of the Spanish Language [2] defines model is an archetype or reference that serves as a guide, with the aim of imitating or implementing an action. In this sense, a Model is an example from which the development of a process is guided, that is, an ideal pattern that is sought to be achieved. From this definition, it can be stated that a school management model is the set of reference actions proposed to be developed within the framework of the administration of an educational establishment [3].

Now, school management models are developed from management approaches, which are based on paradigms, which offer the philosophical, epistemological and axiological context.

Thus, school management models come to be the representation of a management approach, which is determined by a system of thought. From this perspective, [4], a conceptual hierarchy is established that makes it possible to smooth out the terminological diversity that generates noise in the discussion around said models, so management models establish in the daily life of institutions, tools, standards and especially techniques through which planning is carried out, decisions are made, information is collected and systematized, continuous improvement plans are established, organizational structures are designed and redesigned, management teams are formulated, projects are designed and executed, the mechanisms of control, problems are solved, concessions and synergies are achieved, as well as leaderships are defined.

2.1.2 School Management

School management constitutes the central axis of the research, since it covers the regulatory, structural and practical frameworks that guide the administration of educational establishments. This framework includes key public policies, such as the General Education Law (1994) and the Institutional Improvement Route (RMI), designed to guarantee the efficient functioning of institutions and raise educational quality standards. Likewise, school management focuses on promoting effective management leadership, encouraging the participation of the educational community and ensuring continuous improvement in administrative and pedagogical processes. In this sense, its relevance lies in acting as an organizational base capable of articulating national strategies with local and regional needs, taking into account the diversity and complexity of the educational system [5].

In relation to the above, school management finds a natural connection with Rural and Regional Contexts, since it provides the necessary strategies to adapt management models to specific and challenging realities. These adaptations are essential in rural areas, where factors such as limitations in infrastructure, connectivity and human resources require more flexible and contextualized approaches [6].

2.1.3 Rural and Regional Contexts

Rural and regional contexts represent the second category of research and allow us to understand the particular conditions faced by educational institutions in rural areas. This category makes visible the existing structural gaps between rural and urban schools, evidencing significant limitations in infrastructure, connectivity and human resources. Beyond material deficiencies, it also addresses social, economic and cultural factors, such as the influence of the local economy—mainly agriculture and livestock—on educational dynamics. Likewise, it highlights the role of rural schools as educational establishments of social and cultural cohesion, performing functions that transcend education, being spaces where traditions, values and local knowledge are preserved. In this way, the category emphasizes that school institutions do not operate in isolation, but are deeply rooted in and shaped by the characteristics of their communities [7].

In terms of relationship with other categories, rural and regional contexts directly complement school management by offering the necessary framework to adapt administrative and pedagogical strategies to the specific conditions and challenges of these areas. At the same time, it is closely linked to the Integration of ICT in school management, since these technological tools are essential to overcome typical barriers in rural contexts.

2.1.4 Integration of ICT in school management

The Integration of ICT in school management focuses on the strategic role of these emerging technologies as key tools to optimize administrative processes, raise educational quality and promote institutional sustainability. This category addresses both institutional processes and the training of teachers and managers in computational thinking, and from this, digital competencies as an essential component to guarantee the adequate use of these technological inputs [8]. It also discusses significant limitations, especially in rural areas, where poor

connectivity and lack of access to technological equipment represent critical barriers that hinder the effective implementation of ICT.

In terms of its relationship with other categories, the integration of ICT enhances the strategies developed in them, by providing tools that improve the efficiency and traceability of the processes [9]. Consequently, ICT acts as a facilitating/mediating means, not as an end, to implement public policies and management models more effectively, contributing to continuous improvement in administration and pedagogical processes. Likewise, this category is deeply linked to rural and regional contexts, as it allows addressing the structural limitations characteristic of these areas through technological innovation. In this way, technologies are presented as a tangible solution to overcome the connectivity, access and resource gaps that affect rural institutions [10].

2.2 Analysis and interpretation of the results

2.2.1 Triangulation Process of Findings

Phase I. Diagnosis of the Institutional Improvement Route (RMI)

- The RMI processes from the experience of the teaching manager.

Although there are several problems identified by the teaching managers in each of the categories, the most relevant ones are selected, considering their contributions [11]. Regarding the processes carried out in the RMI, the teaching managers agree in identifying four problems: complexity of the processes, number of components, disarticulation of stages and lack of monitoring and feedback.

Table 1. List of statements about the problems in RMI associated with the processes

Category	"Focus group statements"
Complexity of Procedures	The RMI protocols are too complicated for the school community.
	The technical terms in the RMI are difficult for teachers and students to understand.
	The complexity of the RMI demotivates the work team and makes it difficult for them to participate in the process.
	The 93 components of the MRI are too many and make proper care and follow-up difficult.

Quantity of Components	The number of components disperses efforts and resources, hindering the effectiveness of the route.
	It is difficult for us to prioritize actions and assign teachers in small institutions, due to the exaggerated number of components.
Disarticulation between Stages	There is no clear transition between the stages of RMI, which makes it difficult to advance the process.
	The lack of coordination between the stages of the RMI generates confusion and redundancy of improvement actions that are not articulated with each other.
	The disarticulation between stages prevents efficient progress in the implementation of the RMI.
	Many times the school year ends and the community is not even aware of the objectives.
Lack of Monitoring and Feedback	We find it difficult to evaluate our progress and the impact of improvement actions due to the lack of a monitoring and feedback system.
	The lack of feedback hinders our ability to identify areas of improvement and make timely adjustments to our actions.
	The absence of adequate monitoring systems limits our ability to learn and adapt in the institutional improvement process.
	There is no time or space created in the academic calendar to rethink the improvement path and adjust it to achieve the goals.

Source: own elaboration based on field work

• The RMI tools from the experience of the teaching manager.

As recorded in the following table number 2, the perceptions of the principal teachers regarding the adoption of the RMI tools are gathered.

Table 2. List of statements and problems in the implementation of the RMI associated with the tools.

Category	"Focus group statements"
Complexity of formats	The formats provided by the guide are too extensive and detailed, which makes them difficult to understand and complete.
	The amount of information requested in the forms is brutal, especially for small institutions.
	The technical terms of the formats are difficult to understand for most colleagues.
Lack of adaptability	The RMI formats do not adjust to the reality and specific needs of our context, which makes their practical usefulness difficult.
	We cannot customize the formats according to our needs, which results in the generation of inaccurate and useless documents.
Limitations on data collection	The tools we use to collect data during MRI execution do not capture all relevant information.
	The RMI formats do not allow us to effectively collect data on certain critical aspects of our institutional improvement process.
Lack of clear guidance	We are not given clear guidance on how to complete the RMI forms, leaving us confused and unsure of what information to include.
	The examples provided in the RMI guide are not clear enough to help us complete the forms properly.

	The Departmental Education Secretariat does not generate adequate training spaces and when it proposes them, it does not take into account the school calendar and the occupations of educational establishments.

Source: own elaboration based on field work

From the above, the use of appropriate tools is crucial for the effective implementation of RMI in school establishments. However, in the opinion of the focus group, during the implementation process, several problems related to these tools arise that can hinder their effectiveness and make it difficult to achieve the established objectives. One of these problems lies in the complexity of the formats used in the three phases of the RMI. These documents, designed to guide the process of self-assessment, planning and monitoring, can often be overwhelming and difficult for teaching and management staff to understand. The amount of information required, along with the technical terminology used, can generate confusion and demotivation among users, making it difficult for them to participate in the process.

- The users of the RMI from the experience of the teaching manager.

The problems associated with users, who include teachers, teaching managers and the school community in general, are fundamental to understanding the challenges in the effective implementation of RMI. As can be seen in the following table number 3, one of the main difficulties identified by the focus group is the lack of adequate training and support.

Table 3. List of statements about problems in the implementation of RMI associated with users

Category	"User statements"
Lack of training and support	We have not received enough training on how to use RMI effectively.
	Teachers and administrators are not familiar with the use of RMI tools.
	The lack of support makes it difficult to properly implement RMI in our school.
Lack of knowledge of the objectives and benefits of MRI	We do not fully understand the goals and benefits of RMI for our institution.
	The school community does not understand how RMI can contribute to improving educational quality.
	There is confusion about the purpose and usefulness of RMI among teaching and administrative staff.
	Some teachers show resistance to change and are reluctant to adopt RMI.

Resistance to change and lack of involvement	The lack of participation of the school community hinders the implementation of the RMI.
	Teaching managers find it difficult to involve all staff in RMI.
Time and resource limitations	The workload makes it difficult to dedicate sufficient time to the implementation of the RMI.
	The shortage of resources and materials affects our ability to carry RMI.
	The lack of administrative staff makes the proper management of the RMI difficult.
	We teach, which is our mission at school, or we dedicate ourselves to administrative processes.

Source: own elaboration based on field work

The above shows how the teaching directors expressed their concern about the lack of training on the effective use of RMI, as well as the absence of continuous support that provides them with the necessary support for its successful implementation. Furthermore, lack of knowledge of the objectives and benefits of RMI also emerges as a significant problem. Many members of the school community do not fully understand how RMI can contribute to improving educational quality, leading to confusion and lack of commitment to the process.

- The context of the RMI from the experience of the teaching manager.

The problems of the school context for the implementation of RMI are key aspects that influence the effectiveness of the improvement process [12]. In table number 4 below, five problems identified by the teaching managers participating in the focus group are described. First, inadequate infrastructure is identified, as many schools face challenges related to physical infrastructure and available resources. The lack of adequate classrooms, laboratories, technological equipment and teaching materials makes it difficult to implement improvement activities proposed by the RMI.

Table 4. List of problematic statements in the implementation of the RMI associated with the context

Category	"Statements from teaching managers in the focus group"
Inadequate infrastructure	The lack of adequate space makes it difficult to develop effective teaching practices.
	Given the precariousness of technological equipment, the capabilities to use digital tools and do a good job of institutional improvement are limited.
	It is difficult to achieve improvement with reduced financial resources, which motivates the community to dedicate itself to other improvement scenarios in the institution.
	The precarious socioeconomic conditions of some communities make it difficult for families to participate in the RMI.

Unfavorable socioeconomic context	Aspects such as violence in the community generate an environment of fear that affects the commitment of attendees to participate in other activities of the institution.
	Lack of access to resources outside of the school environment limits opportunities to more effectively involve families in school activities.
Institutional culture and resistance to change	Entrenched practices make it difficult to adopt new pedagogical approaches.
	There is a lack of confidence in the ability of the RMI to generate real improvements.
	The lack of recognition and appreciation generates demotivation among staff towards RMI.
	RMI processes are considered filler for teachers and administrators.
Disconnection with local needs	The proposed strategies do not always fit the needs of the community.
	Lack of participation generates a disconnection between initiatives and expectations.
	The implementation of standardized measures generates resistance and lack of commitment.
	The communities are not interested in participating in improvement actions, they want the schools to function as daycare centers while they do other activities.
Disarticulation with the institutional agenda	The school institution goes one way and the administrative management goes the other, and this lack of alignment generates conflict and confusion around the allocation of resources.
	The overload of activities hinders the effectiveness of the proposed activities.
	Lack of communication contributes to lack of coordination in the execution of actions.

Source: own elaboration based on field work

Secondly, the unfavorable socioeconomic context refers to the socioeconomic characteristics of the school community, which can influence the implementation of the RMI. In environments with high rates of poverty, violence, or inequality, teachers and administrators may face additional challenges in engaging the community in the improvement process. Lack of family and community support, as well as socioeconomic instability, can negatively impact the engagement and participation of students and their families in RMI activities [13]. Thirdly, the institutional culture and resistance to change is highlighted, because the organizational culture and practices rooted in the school institution represent a barrier to the effective implementation of the RMI.

Fourth, the disconnection with local needs evidenced in the lack of alignment between RMI strategies and the specific needs of the school community can reduce the relevance and

effectiveness of the improvement process. Finally, disarticulation with the institutional agenda, which translates into a lack of coherence between the activities proposed by the RMI and the institutional agenda of the school, can generate lack of coordination and difficulties in the effective implementation of improvement actions [14].

- Systematization of the RMI.

The document management of the RMI was carried out after finding in the COINCO rectory office, an AZ folder titled “Work by Management”, which is the simplified term in popular slang that is given to the RMI in the context school. Regarding Archival Studies, the following categories were identified, as shown in the following table number

Table 5. Summary of RMI documentary analysis categories in the archival dimension

Category	Description
Limited consultability	The file is not considered a direct input for decision making, mainly because it is not easily searchable.
Restricted access	It is not easily accessible to internal users, limiting its potential use and application.
Poor traceability	It does not show constant traceability for at least 5 years, which reduces its usefulness.
Absence in induction	The file is not used as material for new teacher induction.

Source: own elaboration based on field work

Now, with respect to the documentary content, the categories set out below in table number 6 were established, the documentary review of which offers a revealing perspective on the challenges and areas for improvement in terms of document management and the quality of the content, two fundamental aspects to ensure the effectiveness of any management model in the school environment, especially when approached from an integrated perspective with ICT. Firstly, in relation to document management, critical aspects that require attention are identified.

Table 6. Summary of documentary analysis of the RMI in the documentary dimension

Category	Description
Distorted reality	The documents do not adequately reflect the institutional reality.
Non-existent clarity	There is no clarity about how each of the phases of the RMI was developed, leaving significant information gaps.
Absent documentary support	No supporting documents were found that validate the evaluations and actions stipulated in the RMI.

ncomplete records	Incomplete records, which compromises the integrity and usefulness of the information.

Source: own elaboration based on field work

On the one hand, there is limited searchability of the archive, which means that it is not perceived as a direct tool for decision-making due to the difficulty of accessing it. Poor traceability over time is also highlighted as a major concern, as the lack of a complete historical record reduces its usefulness as a source of reliable and contextualized information. On the other hand, the distortion of institutional reality raises concerns about the objectivity of the information and therefore the phases of the RMI leave significant gaps [15].

- Execution of the RMI: Participant observation log to the Academic Council and semi-structured interviews.

Now, regarding the diagnosis of RMI in the COINCO Academic Council, the questions focused on discovering the degree of perception about the phases of RMI, the instruments used and the real impact they have on daily school life. From the responses obtained, six (6) significant categories were identified, as recorded in table number 7.

Table 7. Summary of analysis categories according to the COINCO Academic Council

Category	Description
Limited impact	The RMI is a process that does not directly impact daily school life.
discordant logic	RMI instruments are seen as a secondary activity that does not align with institutional logic and dynamics.
Subjectivity in phases	The different phases of the RMI do not reflect the reality of the institution, due to the subjectivity of those who evaluate them or execute instruments or develop improvement plans.
Absent traceability	The RMI lacks traceability, fading over time and with staff turnover.
Absent traceability	Lack of deep understanding regarding RMI, its phases, processes and components.
Disintegration with the PEI	The RMI does not show a clear integration with the Institutional Educational Project (PEI).

Source: own elaboration based on field work

These categories represent critical areas of perception and understanding about RMI within the Academic Council, offering valuable perspective for building an effective school management model. It is evident that there are significant challenges that require attention and action from

the educational community. Furthermore, it is important to highlight that many of these problems can be addressed effectively through the integration and use of ICT.

Firstly, the perception of a limited impact of the RMI on school daily life suggests the need to review and strengthen the connection between the objectives and actions of a school management model and the real needs of the institution; Furthermore, the identification of subjectivity in the RMI phases highlights the importance of establishing clear and objective criteria for the evaluation and monitoring of the process. Hence, the lack of deep understanding about the RMI and its relationship with the PEI highlights the need to improve communication and training in the educational community and, finally, the absence of traceability in the RMI process highlights the importance of implement effective monitoring and recording systems that allow maintaining a clear and accessible history of the actions and decisions taken within the framework of institutional improvement [16].

Returning to the information collected, in the diagnostic process for the formulation of a school management model that integrates ICT, clear directions emerge that can be conceptualized in two main dimensions: one of a technical/documentary nature and another of both a philosophical and administrative nature. That is, the first dimension, of a technical/documentary nature, mainly encompasses the categories of Consultability and Traceability. These components are essential to ensure that information is not only accessible to those who need it, but is also accessible in real time.

The second dimension, of a philosophical/administrative nature, addresses the capacity of the school management model to adequately reflect the institutional reality, with a special focus on the Self-Assessment phase, so this dimension also highlights the importance of the model, not only represents reality, but also has the ability to intervene and modify it, all aligned with a logic of continuous improvement in the context of the PEI. In this sense, ICT can play a vital role, not only in capturing and representing data, but also in formulating strategies based on accurate

analysis that drive institutional excellence. Finally, both dimensions, when considered together, in the design of the ICT integration model in school management, have the potential to revolutionize the way in which educational institutions access, interpret and act on their own information, positioning them on a more informed and effective path towards continuous improvement [17]

Phase II. Computer skills and use of ICT

- Research scenario.

In the continuous diagnostic process, it has been clearly identified that there are significant opportunities for improvement regarding the computer skills of the teaching managers and the teachers themselves, since this finding is based on the direct interaction carried out during two periods. specific: in 2019 with the COINCO teachers and in 2020 with the teaching managers of the focus group and compared with a closed Likert frequency survey [18]. These interactions and the application of the survey made it possible to discern gaps in the level of competence and comfort when using technological tools. These gaps in the domain of computer skills can directly influence the effectiveness with which ICT is incorporated into pedagogical and administrative processes and, for the purpose of study, the success in the implementation of a school management model mediated by these technologies [19].

The diagnosis of computer skills of teaching managers and teachers was structured based on three categories. These categories progressively emerged as the relationships with the researcher matured. Initially, it focused on competence with Office Software, evaluating skills in tools such as Word, Excel and PowerPoint; Subsequently, the need to explore skill in the Google Suite was detected, which led to examining mastery in applications such as Google Docs, Google Sheets, Google Meet, Google Forms and Data Studio, as recorded in the following table number 8 Finally, with the growing importance of mobile communication in the educational field, it was decided to investigate familiarity with Cell Phone Applications,

especially those focused on instant messaging, file-to-PDF scanning, photo taking, and video production [20].

Table 8. Diagnosis of skills of teachers and directors in the use of computers

Categories	Tools	Teaching managers	Teachers
Office Word office programs		High	High
	Excel	Low	Low
	PowerPoint	High	High
Google Suite	Google Docs	Low	Low
	Google Sheets	Low	Low
	Google Forms	Essential	Essential
	Google Explorer	High	High
	Data Studio	Not known	Not known
cell phone applications	Instant Messaging (WhatsApp)	High	High
	File Scanner	High	Essential
	Taking Photographs and Video	High	High

Source: own elaboration based on field work

The establishment of competency levels for each of the tools has as its main criterion its use in the context of reporting so that the following is considered: Superior mastery of code programming related to the tool, ability to intervene and make adjustments direct in the computer bases of the programs, ability to establish links and cooperation between various tools, integrating them for advanced or specific functions and optimization and advanced customization of reports and functions, with the following description of each level of skills.

High: mastery of basic and advanced functions of the tool, ability to generate complete reports with standard features without requiring external assistance, ability to customize and adapt reports according to specific needs and seeking self-help tutorials to improve their use*; Basic*: partial use of the tool's functions, need for constant tutoring or assistance to perform specific or advanced tasks, simple report generation with limitations for customizations or advanced functions, and, *Low:* basic knowledge about the existence of the tool, lack of practical skills to operate it efficiently and inability to generate reports without direct human assistance or mentoring.

Knowing the previous results, it is important to highlight that no significant correlations were found with the position they hold, whether they are teaching managers or teachers; Likewise, gender, as well as the area of training or the educational level achieved, do not determine the mastery of these tools either. However, a direct relationship was identified with the age of the professionals. Younger teachers and administrators show a higher level of competence in the use of technological tools, which could be attributed to their greater exposure and frequent use of these tools from an early age. This generation integrates technology in a more native and natural way into their daily and work activities, which gives them an advantage in their adaptability and versatility with digital tools.

Beyond these categories, each of them gives rise to a supra category that guides a particularity that the school management model must address. The competence category leads to the supra category of model usability, which refers to how intuitive and friendly the proposed model is for those with different levels of competence in technological tools. On the other hand, the training category leads to the supra category of self-training, which focuses on how managers and teachers can train and update their skills on their own, through resources such as tutorials immersed in the model, either with the intervention of human talent or with computer support, as seen in the following table number 9.

Table 9. Summary of skill categories of managers and teachers in ICT tools

Dimension	Subcategories	Categories	Description
Technique	Intuitiveness	Competencies	Level of skill and dexterity of professionals in the use of computer tools, from basic to higher.
	Self-training	Training	Preparation training for managers and teachers to face the use of the ICT integration model in the RMI.

Source: own elaboration based on field work

Although the ICT Integration model in school managementseeks to be a key tool for teaching managers and teachers, providing a framework that allows them to make the most of the advantages of these technologies, it faces challenges in achieving successful implementation, which is why It is essential to consider the technical dimension of the model, where the

importance of intuitiveness and training is highlighted to ensure that the model is not only accessible, but also offers development and continuous learning opportunities for human talent. In this sense, Intuitiveness refers to the characteristic designed in a way that takes into account the level of skills of the users, seeking to make its structure and tools easily understandable and manageable; next step, Self-Training, this characteristic must be a central element in the model, so that the institution must not only offer learning opportunities, but that human talent can, through the model, become familiar with the tools and train themselves its own rhythm [21].

- Technological furniture, connectivity and budget.

Another critical dimension to consider in the implementation of a school management model mediated by ICT is the availability of computer resources, that is, the presence and accessibility of these resources are fundamental to guarantee the success of the model and minimize possible barriers that may arise. arise during its execution. In the context of COINCO and INSCOMERCIAL, institutions under study, this dimension is broken down into two essential categories: technological furniture and connectivity [22], that is, the category of technological furniture refers to the availability and access to devices electronics, such as computers, tablets and Smartphones that teachers have. For its part, the connectivity category refers to the connection, which can be seen in table number 10 on the summary of categories of the diagnosis of technological resources.

Table 10. Summary of categories of the diagnosis of technological resources

Dimension	Subcategory	Category	Description
Resources	Lightness	Technological furniture	Computers
			Tablets
			Smart phones
		Internet connection	Connectivity offered by the Government
			Connectivity acquired by MinTic
			Connectivity contracted by establishments
			Internet hired by human talent
	Free	Cost	Limited budget

Source: own elaboration based on field work

Regarding the equipment category, which focuses on technological devices available in educational institutions, an exhaustive analysis has been carried out through interviews with teachers, direct observation and review of inventories of technological resources in COINCO and INSCOMERCIAL. Specifically, regarding tablets, it is necessary to highlight that these institutions do not have this type of devices, it is relevant to consider their potential application in other institutions as a supportive technological tool. On the other hand, smartphones also represent a significant component.

The second category within the resource dimension is connectivity, which refers to the availability of network access, which is essential to use online tools, access digital resources and participate in online activities for educational and administrative purposes. . In this category, four sources of connectivity are identified. Firstly, the connectivity granted by the Government of Santander in some institutions; Secondly, the connectivity acquired by the MinTic, providing access through initiatives such as Digital Kiosks aimed at offering free internet connectivity for this service.

Thirdly, the connectivity contracted by school establishments through the School Services Fund (FSE), represents a way of guaranteeing managerial and administrative operations, so its service is concentrated in the rectories and secretariats of the establishments and is exclusive use. Finally, the service contracted by human talent to carry out their activities is counted as a connectivity service; in other words, they can have access to the Internet by contracting these services for purposes related to their school work [23].

2.2.2 School Model Proposal

- Context:

The research carried out with various actors in the educational field in the department of Santander, Colombia, has extracted valuable guidelines that support the possibility of designing adaptive models for the management of educational institutions under similar conditions, hence

the initiative to develop a model of contextualized school management [24], emerges as an innovative response to the challenges identified in the centralized models proposed by national regulations. This observation is supported by different academics [25], who highlight the importance of adapting administrative approaches to the particularities of each educational context [26].

- Title of the Proposal.

Escolatio (Contextualized Strategy for ICT-mediated administration of official institutions): A school management model mediated by ICT and contextualized for the regions. • Description. Escolatio is a school management model that emerged in response to the needs of educational institutions in Colombia, where the PEI is executed through the RMI, which is the official School Management Model of the country. Although the PEI and, in particular, the RMI, guide educational work, they face challenges in their implementation, especially in dispersed areas, with reduced teaching teams, lack of access to connectivity, deficient technological infrastructure, among many other limitations. • Management axes. Escolatio presents three (3) management axes (Strategic, Training and Community), which are broken down into three (3) levels that make School Management a process integrated into the institutional logic, taking into account the characteristics of the context, such as It can be seen in table number 11.

Table 11. Management Axes

Management axes	Purpose	Features
Strategic	Define and articulate the global vision and long-term goals.	It includes policy implementation, complementary programs, overall strategic planning, governance and resource allocation.
Formative	Address aspects related to the curriculum, school coexistence, teaching, and learning.	The review and development of the curriculum, the incorporation of teaching methodologies, and the effective integration of ICT in the educational process.
Community	Strengthen the relationship between the school and the Learning Communities (CdeA) in the educational process.	Desarrollar programas que involucren a la CdeA en actividades escolares, que enriquezcan el entorno educativo.

Source: own elaboration

The coordinated and coherent implementation of these axes allows the educational institution to function in a more integrated manner, responding effectively to the needs of all participants in the educational process. It is important to highlight that the division into axes is conceptual and in practice, many of the aspects are intersectoral, providing fluidity and comprehensiveness to school functioning. This facilitates a more dynamic and holistic operation, where the borders between the axes overlap to comprehensively address the challenges and opportunities within the educational environment.

- Management levels.

Returning to the management model, the following table 12 establishes three levels: managerial, tactical and operational, which play complementary roles to ensure its effective implementation.

Table 12. Management Levels

Management Levels	Purpose	Features
Managerial	Define the vision, mission, and long-term objectives, general guidelines and policies.	High-level decision making, strategic planning and resource allocation, identifying opportunities and threats, as well as evaluating the strengths and weaknesses of the institution (SWOT MATRIX).
Tactical	Implement specific plans that align operations with strategic objectives.	Manage projects, plan activities, coordinate with work teams and supervise the implementation of short and medium-term strategies grouped into processes.
Operational	Execute activities, where policies and plans are transformed into concrete results.	Manage and implement ICT, as well as feedback to evaluate the effectiveness of policies and strategies.

Source: own elaboration from [27]

Each of these levels is essential to ensure that the institution functions as a coherent and effective system, where strategic objectives guide daily operations and the tactics used.

- Objectives of the proposal

Table 13. Objectives of the proposal

General objective	Specific objectives
Design a school management model mediated by ICT and for	Preliminary build the theoretical foundation of the model, which serves as a guide for its future implementation and as a reference for other educational contexts.
	Carry out a diagnosis of the needs of educational I.E located in the department of Santander, identifying their main challenges and opportunities.

institutions in dispersed areas.	Establish the components and management axes of the model, adapting them to the specificities of the context derived from the diagnosis.
	Determine the computer tools compatible with the reality of the online school context of model development.

Source: own elaboration • Action plan for specific objectives Table 14. Action plan for specific objectives

- Action plan for specific objectives

Table 14. Action plan for specific objectives

Goals	Actions/goals
Preliminary build the theoretical foundation of the School Management model	Process the information with a view to structuring the theoretical foundation of the model.
	Carry out a literature review on school management models, mediated by ICT as references.
	Prepare a preliminary document that synthesizes the theoretical foundations of the model as a guide for its future implementation.
	Share the preliminary document with experts and managers for their feedback and suggestions.
	Make adjustments to the preliminary document, ensuring its coherence and relevance for future implementation.
Carry out a diagnosis of the needs and characteristics of the educational institutions located in the department of Santander	Design data collection instruments (surveys, interviews, focus group) on the needs and characteristics of the EI under study.
	Implement the data collection instruments in the selected educational institutions, ensuring the participation of managers, teachers, students and other members of the educational community.
	Analyze information collected and prepare a report that identifies institutional challenges and opportunities.
	Present the results of the diagnosis to the educational community for review and feedback.
	Document the findings as a reference for the design and future implementation of the school management model.
Establish the components and management axes of the School Management Model	Organize work sessions with the Academic Council to define the components and management axes of the model.
	Develop conceptual documents that outline the components and management axes of the model.
	Provide feedback to validate and adjust the preliminary design of the components and axes of the model.
	Incorporate feedback comments into the final version of the design of the model components and axes.
	Prepare a document that describes components and management axes of the model, according to recommendations.
Determine the computer tools compatible with the reality of the online school context of the development of the Model	Review ICT to determine its compatibility with the school context in the department of Santander.
	Select ICT for the implementation of the model, according to accessibility, usability, scalability and cost-benefit.
	Carry out pilot tests of ICT, to evaluate its performance and its acceptance by users.
	Get feedback from users on the pilot ICT and make adjustments and improvements as necessary.
	Document the selected ICTs and their integration into the model design, as a guide for future implementation.

Source: own elaboration

- Principles in the design of the application

Schematically, the principles on which the current proposal is based on being are summarized: Consultable, Traceable, Contextualized, Integrable, Intuitive, Self-forming, Lightweight and Free.

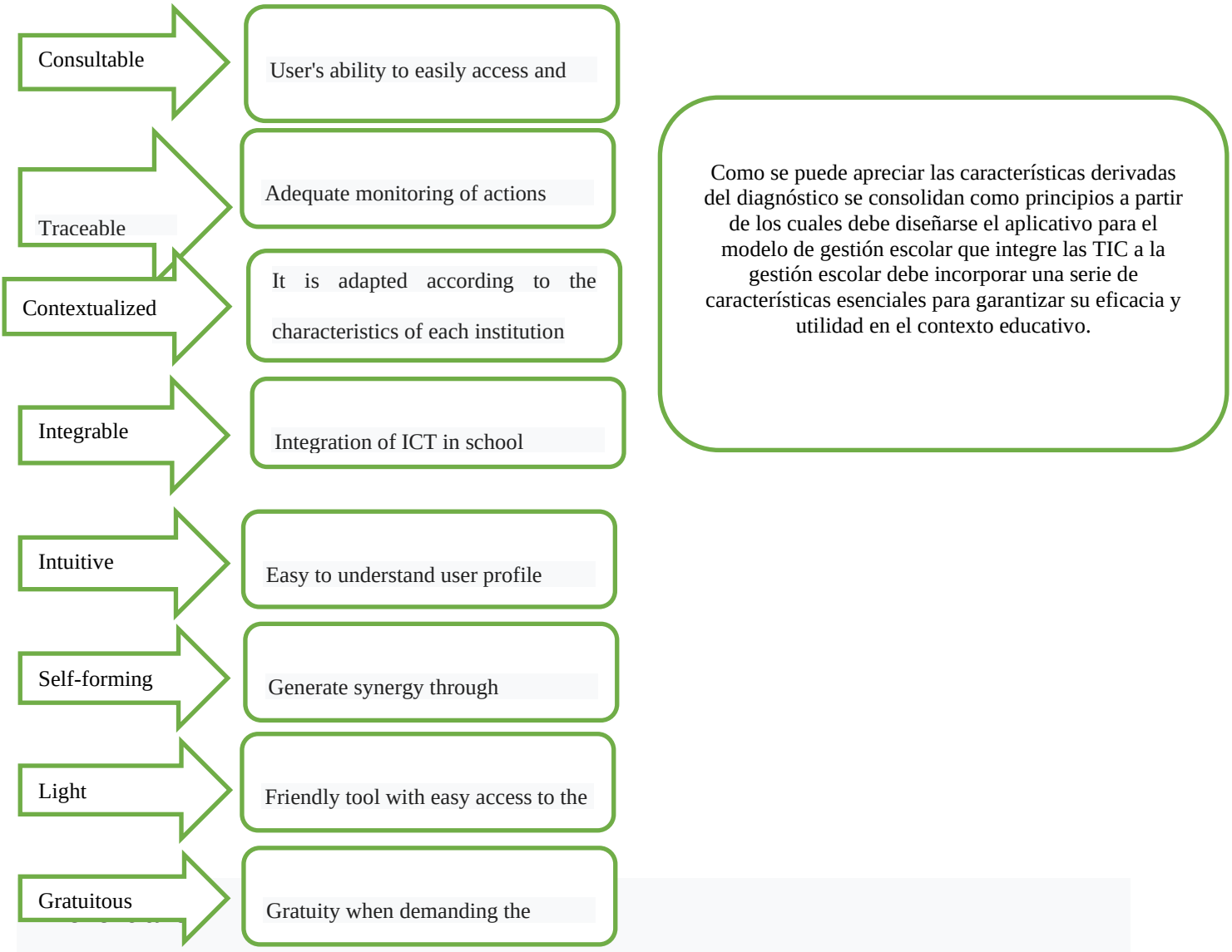


Figure 2. Educational institution reference

Preschool

Primary basic

Basic secondary and middle

Source: photo archive

The model is aimed at educational institutions at the preschool, basic and secondary levels in peripheral regions, both dispersed rural and urban, where the availability of computer resources and connectivity is limited, therefore, the objective is to improve administrative conditions in these communities, providing accessible and free technological tools so that efforts focus on the missional development of education rather than on the operation of large volumes of administrative information. In this understanding, Escolatio relies on free tools from the Google Suite and the connectivity available in school establishments, which makes it free and independent of sponsors.

For its administration, Escolatio requires the definition of the role of coordination or leadership, which naturally falls on the figure of the rector or rural director of the school institution, therefore, the director must have some basic competencies or participate in a training program that allows you to acquire the necessary skills to use the tools included in the model, such as email, Drive, Forms, Datastudio and in general those of the Google Suite.

- Products

The Escolatio platform uses tools from the Google suite, such as Sites, Drive and Database, among others, which guarantees that the tool is free and accessible to all educational institutions interested in implementing the model.

- Schedule

This section details the schedule of the different phases and activities planned for the development and implementation of the Escolatio model, in its search to integrate ICT in school management, in order to promote the comprehensive development of communities in local contexts. Each phase is designed to address specific aspects of the model, such as the identification of characteristics, the delimitation of axes and components, the integration of technological tools and the evaluation of their impact in the school context, as seen in the following Diagram of Gannt.

- Action plan for specific objectives

Tabla 15. Diagrama de *Gannt.*

		Cronograma					
Goals	Actions/goals	Mes 1	Mes 2	Mes 3	Mes 4	Mes 5	Mes 6
Build preliminary theoretical foundation model	Key participant information processing.						
	Theoretical framework review.						
	Preliminary elaboration of the theoretical foundation of the model.						
	Validate preliminary model with experts.						
	Make preliminary model adjustments						
Carry out diagnosis of institutional needs	I design diagnostic instruments.						
	Field work implementation.						
	Information analysis and diagnostic preparation.						
	Diagnostic presentation to the educational community.						
	Documentation of findings and final report.						
Carry out diagnosis of institutional needs	Organization of sessions with the academic council.						
	Development of conceptual documents and graphic schemes.						
	Feedback meetings.						
	Incorporation of suggestions into the final design.						
	Definition of components and management axes.						
Carry out diagnosis of institutional needs .	Review of computer tools available on the market.						
	Selection of computer tools.						
	Pilot test computer tools.						
	Feedback on tools.						
	Documentation selected computer tools.						

Fuente: elaboración propia

- Budget

The School Management Model, which will be implemented for the integration of ICT, should be highlighted mainly for two characteristics, namely, lightness and free of charge. Lightness refers to the ability of ICT to be light and easily accessible, even in environments with limited connectivity. Regarding the availability of technological tools and resources that do not generate significant additional costs, it is essential in the implementation of Escolatio. By opting for free technological solutions, the financial barrier is reduced and access to the resources necessary for the integration of ICT into school management is facilitated. This promotes the democratization of access to ICT, ensuring that all I.E have the same opportunity to benefit from ICT without incurring additional costs. In conclusion, the model will have no operation or maintenance cost and will work for free, ensuring that the tools and technological resources are easy to use.

- Continuous evaluation phase

In response to the dynamics inherent to school communities, which constantly evolve, it is imperative to incorporate a continuous evaluation phase in the ICT-mediated school management model. While the changing nature of educational environments demands constant adaptability of management models to remain aligned with the variations present in the context. Thus, the school, being a dynamic entity, requires a flexible management model that continuously adjusts to its evolution, taking into account that the absence of this adaptability could generate conflicts between the specific context of the educational institution and established school policies [28]. To mitigate this gap, and guarantee effective harmonization, a continuous evaluation phase is implemented in the school management model. In this sense, the permanent evaluation phase considers three essential axes to ensure the effectiveness and constant adaptation of the system, which fit into the institutional agenda so that this process is not conceived as an isolated or decontextualized activity.

Permanent evaluation of the user experience: in relation to the continuous evaluation of the user experience, which covers both teachers and teaching managers, an exhaustive collection of information is carried out based on feedback focused on usability, accessibility and general satisfaction with the application, which is why periodic surveys are strategically designed to capture the perceptions and experiences of users at different key moments. Therefore, the feedback collected not only serves as an indicator of the effectiveness of the management model, but is also used as an essential input to make continuous improvements in the interface and functionalities. Permanent evaluation of school dynamics: in a second dimension, a continuous evaluation of school dynamics is carried out, aimed at determining the ability of the application to adapt to the natural changes that the school experiences in its context. This evaluation is based on the premise that the school is a living entity, subject to constant transformations in response to various internal and external influences.

Permanent evaluation of the application of regional and national educational policies: thirdly, the management model is sensitive to modifications in the public educational policy of the department of Santander, especially with regard to the management indicators derived from the plans. national and departmental government, which are built every four years. The application is therefore subjected to continuous adjustments to ensure its alignment with the new guidelines and objectives that arise from educational policy.

In conclusion, continuous evaluation allows for agile adaptation of the application as the needs, policies and dynamics of the educational environment evolve. Constant feedback and active monitoring within the educational community, but especially the Academic Council, guarantee that the model remains relevant and effective over time.

2.2.3 Validation of the School Management Model

Finally, it is pertinent to return to the problematizing question through which it is questioned what should be the proposal of a School Management Model mediated by Information and

Communications Technologies to be implemented in the regional, rural and dispersed rural contexts of the department of Santander, Colombia?, which, after analyzing the research findings, shows the administrative, financial and operational viability of the Model, since effectively integrating ICT in School Management is a crucial challenge in the contemporary educational field, a challenge that moves to the intersection between the integration of ICT and a proposed school management model, but from overcoming it a unique opportunity emerges to promote progress and innovation in educational institutions.

Let it be said first that, to promote the effective integration of ICT in school management, it is crucial to develop comprehensive training programs aimed at directors, teachers and administrative staff. These programs must address both technical and administrative aspects, promoting a deep understanding of technological tools and their application in the educational process, especially as related to the administration of school processes. In this sense, it is essential to design specific programs that adjust to the needs and levels of competence of teachers in ICT, which must be flexible and customizable to address the different skills and previous experiences of educators in the use of technology.

Another important finding that validates this proposal is aimed at promoting the participation of the educational community (CdeA) beyond simply involving directors, teachers, students and families in the process of integrating ICT into the administrative processes of the school. so that it transcends towards the creation of spaces for dialogue and collaboration that allow genuine and significant participation of all the actors involved, this as one of the main Successful Educational Actions /EE).

In closing, it is appropriate to indicate that, in the challenge of effectively integrating ICT in School Management, it represents a crucial opportunity to promote progress and innovation in educational institutions, so this task, which is located in the The intersection between the integration of ICT into a management model requires a holistic and collaborative approach that

covers both technical and pedagogical aspects, as well as a deep understanding of the specific realities of each educational community.

Recognitions

The doctoral student makes special recognition to the teaching managers of Santander, the educators, students and school communities who gave meaning and inspiration to the research, with the expectation that, through their unanimous participation, the implementation of this proposal will be achieved.

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