RESEARCH ARTICLE

Technological Curricular Integration at the Manuel Uribe Angel Educational Institution.

Integración Curricular Tecnológica en la Institución Educativa Manuel Uribe Ángel

Integração Curricular Tecnológica na Instituição Educacional Manuel Uribe Ángel

*SANDRA PATRICIA OQUENDO ÁLVAREZ

**JORGE ALIRIO ECHEVERRY TAMAYO

*Teacher at Manuel Uribe Ángel Educational Institution, Medellín-Antioquia. Master in Education, Universidad Autónoma del Caribe. PhD Candidate in Education Sciences, Universidad Arturo Prat. Orcid: http://orcid.org/0000-0003-2523-9862.

**Directive at Institución Educativa Manuel Ángel, Medellín-Antioquia. Bachelor in Re-educational Pedagogy of the Universidad Católica Luis Amigó. Orcid: https://orcid.org/0000-0002-9968-0792.

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ABSTRACT

This article describes the process of Curricular Integration followed in the Manuel Uribe Angel Educational Institution towards a technological transition for access to knowledge, improving the motivation of students, and the continuation towards a professional and work experience. This curricular integration applies the model of composite intelligence 4.0 at all levels from the implementation of a new Technical High School with the program Technician in Multimedia Design and Integration in agreement with the National Learning Service - SENA. The process is carried out in six phases: recognition of protocols, diagnosis, collection, systematization, and analysis of information. The results show an improvement in the institutional educational quality and the continuity of the unique pedagogical model in the institution: "Learning for my evolution".

RESUMEN

El presente artículo describe el proceso de Integración Curricular seguido en la Institución Educativa Manuel Uribe Ángel hacia una transición tecnológicapara el acceso al conocimiento mejorando la motivación de los estudiantes, yla continuación hacia una experiencia profesional y laboral. Esta integracióncurricular aplica el modelo de inteligencia compuesta 4.0

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Author correspondence:

*sandra.oquendo@iemanueluribeangel.edu. co
**jorgealirio.echeverry@iemanueluribe.edu.co

en todos los niveles a partir de la implementación de una nueva Media Técnica con el programa Técnico en Diseño e Integración de Multimedia en convenio con el Servicio Nacional de Aprendizaje - Sena. El proceso se realiza en seis fases: reconocimiento de protocolos, diagnóstico, recolección, sistematización y análisis de la información. Los resultados evidencian una mejora en la calidad educativa institucional y la continuidad del modelo pedagógico único en la institución: “Aprendizaje para mi evolución”.

RESUMO

Este artigo descreve o processo de Integração Curricular seguido na Instituição de Ensino Manuel Uribe Ángel em direcção a uma transição tecnológica parao acesso ao conhecimento, melhorando a motivação, e a continuação parauma experiência profissional e de trabalho. Esta Integração Curricular aplica o modelo de inteligência composta 4.0 a todos os níveis a partir da implementação de um novo meio técnico com o programa ‘Técnico em Design e Integraçãode multimédia’ em acordo com o Serviço Nacional de Aprendizagem - Sena. O processo é realizado em seis fases: reconhecimento de protocolos, diagnóstico,recolha, sistematização e análise de informação. Os resultados mostram uma melhoria na qualidade educacional institucional e a continuidade do modelo pedagógico único da instituição “Aprender para a minha evolução".

Introduction

Humanity is undergoing a transition towards information and technological systems based on the fourth industrial revolution 4.0 (Route N, n.d.; WEF, 2020) coined by Klaus Scwab in the context of the World Economic Forum in Davos (O'Kuinghttons, 2016). The school must evolve towards these new paths by exhibiting approaches, theories, trends, differential educational models, which guide teachers to the development of new curricula, generating learning that allows the transit of humanity towards the digital revolution. It is necessary to reform curricula to teach young people and adults the handling of materials and issues of the latest times; and as "technology disrupts almost every accustomed field", educational systems must adapt to the dizzying changes, be agile and relevant to cope with modern technological advances, in addition they must have an individualized profile per student for the personal development of skills and obtaining sufficiently broad scopes in order to prepare them for planetary ethical challenges (Cuadro, 2019).

The educational community belonging to the Manuel Uribe Angel Educational Institution (EI MUA) located in Comuna 2, Andalucia La Francia neighborhood in Medellin is under a context in which there is evidence of a socio-economic problem marked by unemployment and the little possibility of continuing with a professional and labor development. These situations make it a community vulnerable to delinquency, drug addiction, gangs, violence and other social difficulties, so it is necessary to impact it towards a quality transformation.

In the institutional context, two problems related to the technical high school were found: student desertion and discontinuity in the labor field. Regarding the first problem, in 2018 out of a total of 120 students enrolled in 10th and 11th grades, only 25% graduated from the Technical High School in Accounting; this generated for the students the need for a change of institution or desertion because it was not an orientation that met their expectations and interests. In relation to the second problem, the institution conducted a follow-up of graduates in 2018, finding a not very encouraging picture in view of the fact that, of an annual average of professional continuity, only 2% continued at the technological or technical level, 98% were engaged in informal work or added to the unemployment statistics of the Dane.

In view of the above and according to the needs evidenced at the present time, the question arises: how to assume a curricular reform towards a technological transition in order to provide students and the community itself with access to knowledge of new information and communication technologies, which encourage the formation of skills and deepening of knowledge for the continuation of a professional and work experience? Thus, the IE MUA assumes this reform towards a technological transition for the technical middle school from the curricular integration whose objective is to improve the academic performance and motivation of students through the implementation of an institutional pedagogical model based on the composite intelligence 4.0.

For the fulfillment of this purpose, four specific objectives were set out, covering six phases through which the processes and actions carried out in the framework of this curricular integration for elementary basic education, basic secondary education and technical secondary education are made known. Such objectives were 1) to diagnose the status of the different components of the curriculum as of 2018; 2) to strengthen the processes and protocols for the implementation of the Curricular Technological Integration based on the composite intelligence 4.0 model in the technical middle school in an articulated manner in all areas of knowledge; 3) to evidence the results of the implementation; and 4) to favor the organization of the curricular management processes.

The curricular reform focuses on a type of integration defined as:

> [...] a modality of curriculum design, based on the concurrence/collaboration/interconnection of the contents of various disciplines, to address an aspect of school culture, through a model of cooperative work of teachers that affects, in turn, the methodology, the evaluation and the general climate of the center (Illán and Pérez, 1999, p. 20 cited by Illán and Molina, 2011, p. 21).

This curricular integration design modality seeks to contribute to the collective construction of knowledge and openness to both the professional and working world for students through the realization of events and exhibitions of projects that make known to the community the processes carried out in their favor. Visioning,

acting, developing and implementing of an integrative *curriculum* proposal is of great importance because it allows for the generation of a new profile of student, technical professional, and therefore a new citizen in the world of the digital era.

The curricular integration design has a constructivist approach because "an intuitive approach in education with new technologies that does not have a constructivist educational theory as a reference, ends up constituting an eclectic approach with elements that are not consistent with each other" (Martí, 2017, p. 66). The constructivist approach requires a critical orientation; therefore, it is also necessary to reach the training of researching, innovative and critical teachers, which lead to mobilize students' thoughts through technological innovations.

In this way, there is the possibility of making decisions that affect the monotonous school course and, in this way, the great walls that do not allow progress and social changes to collapse. Teachers must make the personal decision to improve their processes, since access to information is much easier nowadays and there are academic and learning communities that only require time availability and an open attitude. In a world in constant transformation and in the face of current challenges, teachers must be willing to innovate, to investigate, and also to be generators of impact in the various communities.

The IE MUA has been characterized by a comprehensive training and intends to continue in this line from a change in the curriculum in agreement with SENA, to train in values recognized by the sector and have sufficient basis to face the productive experience from the establishment of better interpersonal relationships, critical analysis in favor of the contribution of problem solving and creative attitude to address them. All this with the permanent updating of the elements of the environment that allow a collaborative work with proposed purposes towards the collective realization of projects.

After a review of sources, it is concluded that there are few studies that expose processes similar to the one carried out by the administration of the IE MUA, hence the relevance of carrying out the processes described in the methodological design of the presentation of this significant experience of curricular integration. In this order of ideas, studies on experiences in this subject are presented.

Monestel (2018) from Costa Rica, in the framework of educational administration, describes a professional project carried out with tenth level students, with the purpose of implementing a technological tool in the teaching and learning processes of natural sciences as a way to improve the curriculum. The results are presented by Monestel (2018) according to four variables: in the teaching and learning methodology, teacher training is necessary; in needs and expectations of teachers, it is not only about the gradual implementation of the proposal but also about leaving a traditional school still in force; in the use of the technological tool *Google* Sites, its use is sought from the use of social networks and in the learning process; in learning experiences, a change of teaching methodology with students is necessary; and in the importance of active methodologies, these are key for pedagogical renewal.

The work of Navarro, Guzmán and García (2019), from Mexico, is part of a broader project that aimed to highlight the meanings and attributions that high school students establish in relation to technological integration in the classroom and the learning processes facilitated by such technology, using an ethnographic methodology, 128 students are taken as a sample. The results show a diagnostic perception of the integration of technology in the classroom, in three levels: mobile learning and traditional media, mobile learning and audiovisual technologies, and audiovisual technologies and traditional media. The importance of integration between traditional and technological methods is highlighted, and a favorable inclination towards technological integration. Arbeláez (2020), however, criticizes the technical curricular rationality, warning of the distance from the pedagogical, social, cultural and political dimensions that education should also promote.

Siabato's research (2013), in Bogotá, emphasizes an integral management focused on comprehensive educational quality, the use of human talent and the creation of an adequate institutional climate with a strategic direction, process management, leadership and cultural transformation. In this valuation line, any type of curricular integration must consider the correspondence between curricular principles and the possibilities for their realization in the family and social environment (Quiceno, Betancur, Rojas, 2020).

Bedoya, Betancourt and Villa (2018) in the context of teaching a foreign language, start from the problem sustained by recent research citing Koehler, Mishra, Kereluik, Shin and Graham (2014), according to which teachers do not have sufficient knowledge that allows them to integrate technology with their teaching practices to achieve an effective integration of information and communication technologies (ICT) as a tool to support learning and teaching. Using the TPACK (*Technological, Pedagogical and Content Knowledge*) model, the authors find a positive impact on the interest and appropriation of ICTs in the core members and some of the active members, and a constant challenge from the community to integrate members of the peripheral group in face-to-face and virtual activities.

Illán and Molina (2011) present their model of design, development and evaluation of Integrated Didactic Units (UDI) and explore its potentialities in the construction of a curriculum based on Curricular Integration. This model arises from a research process carried out in different educational centers, in order to reach a larger number of teachers, professors and educators who are able to use and implement it in different scenarios.

For Gauthier-Umaña (2020), society is going through a moment of transformation and adaptation to the new technological reality with unstoppable advances; therefore, teachers and people involved in education run the risk of being observers and consumers if they do not make decisions as actors of this revolution. The passive reproduction of traditional models originates a digital gap that generates greater social inequality, poverty, and alienation among Colombians.

Regarding these transformations Dr. Inés Aguerrondo (2017) in her conference "Why innovate in education?" points out that "we are living a phenomenal change between the industrial society and the knowledge society, but education has not accompanied it". This statement makes us reflect on the importance of thinking about educational problems before making a list of actions with possible solutions, and who is responsible for them. The dispute that seeks culprits for the situations observed, such as governments, state policies, ministries of education, teachers, families, society and students, indicates that we are all responsible for education, and it is up to all of us to participate in the changes that must be implemented to improve quality and offer better results that have an impact on society as a whole.

It is also important to highlight that the proposals of supranational organizations could be made effective with concrete and joint actions between school, state and society. For example, the 2021 goals of the OEI propose more participation of society, more equality and less discrimination, more supply and of a greater educational nature, better access to primary and secondary education, better quality education, favoring the connection with employment, continuing education throughout life, strengthening the teaching profession, strengthening scientific research, investing more and better and evaluating the education system (OEI, 2017). These are proposals aimed at improving education with a vision of development and adequate training for society.

In view of the above, it is of utmost importance to think that the MUA seeks to face a latent reality in terms of the difficulty of the immediate environment to be part of technological changes. It is important to consider, however, that the institution assumes a new proposal of curricular integration in which it is necessary the implementation of educational policies by the government that lead to equity before the possibility of accessing a fourth-generation technological infrastructure for all.

For this, complete computer classrooms are required where students can not only learn the elementary tools to defend themselves in the use of computers, but also make use of ICT as a technology for learning and knowledge. Such tools include programming language, the use of algorithms, block language from elementary school, game development, web development, artificial intelligence and robotics, *machine learning* in elementary school, and implement knowledge in *software* development and operations, make prototypes of these, test them, have notions of network programming, also notions of computer graphics and mobile application development. The above allows the apprehension of knowledge and the acquisition of competencies in the different areas of knowledge, covering the needs of students, with school equipment so that teachers have the conditions for teaching.

The EI MUA in the development of the curricular transition must also consider that the work of teachers cannot be left out of the sum of efforts for the contribution of educational advances, since it is a guide in the training

process. Thus, a new mission and vision (Table 1) is built with a clear objective in the teaching and learning processes, to develop new capabilities, skills, and competencies of students so that their training processes are relevant and permanent.

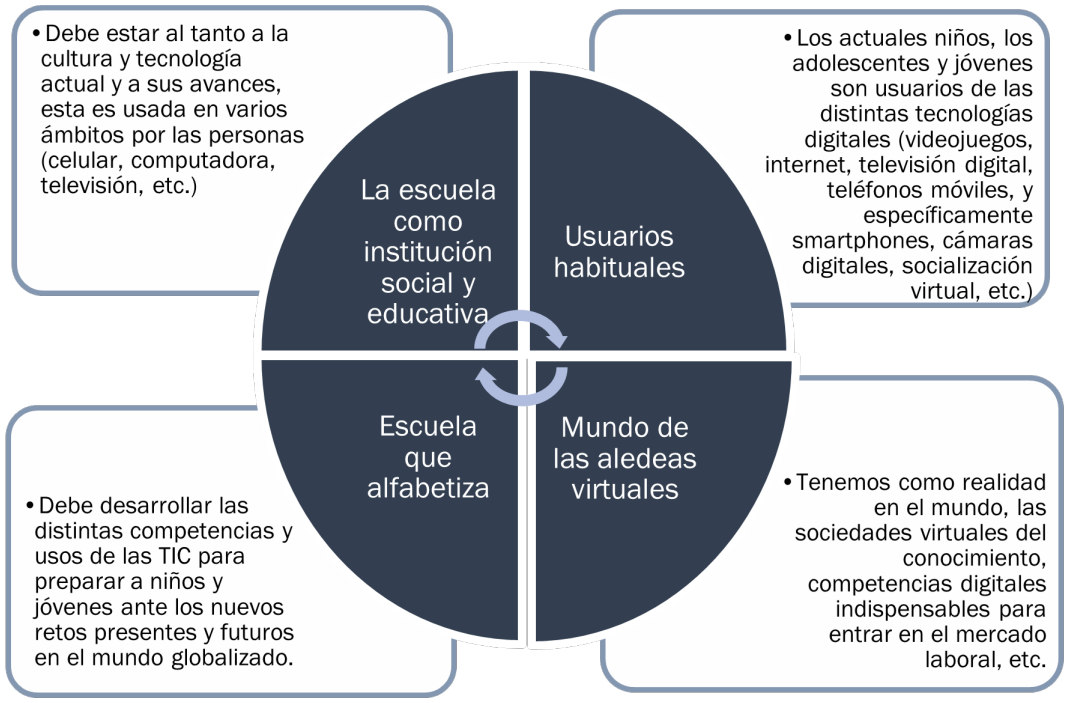
Table 1. Mission and Vision E.I. Manuel Uribe Angel

Mission	Vision
The educational institution Manuel Uribe Angel of the city of Medellin provides a public service of excellence from preschool to 11th grade. We recognize in the new information and communication technologies a potential to raise the economic income and therefore, the quality of life in our educational community.	The educational institution Manuel Uribe Angel of the city of Medellin, will be in the year 2025 recognized in the educational field for its leadership in the formation of students with high academic, ethical, human profile and spirit of social service as a sign of a correct education, in the new learning that the transit of humanity towards the fourth industrial revolution 4.0 will allow us.

Note: Translated from PEI 2021.

Ramas (2015) defines the realities that the school must assume in relation to the use of technological resources in the daily life.

Figure 1. The school and the use of technological resources.



Note: adapted from Ramas (2015, p. 102).

Both within the program 'Technician in Multimedia Design and Integration' from the link with the National Learning Service - SENA; as well as the agreement entity has the proposal to "provide the national productive sector related to the communication and related industries, the possibility of incorporating personnel with high labor and professional qualities that contribute to the economic, social and technological development of their environment and the country" (CDTI SENA, 2015, para. 3), with the purpose of potentiating on the mentioned aspects and at the same time using methodologies to effectively develop technology oriented towards the productive sector according to the demands of the global environment. The training program is offered by SENA for a duration of 24 months, distributed between one academic year and one internship year; instructors for each subject must have a professional background according to the requirements of this and preferably with international certification in Multimedia Product Development on Adobe, Microsoft, or Corel platforms.

To reach this point, the activities carried out by managers, teachers, and students that since 2018 have been carried out in an articulated manner with municipal and external entities were taken as a reference.

The company's business activities include Ruta N (Innovation and Business Center), the *Software* Incubator, Parque Explora, Eafit University and the University of Antioquia through technological innovation projects, a diploma in Ruta Steam 20K and the sophistication of some programs that favor learning with proposals for sustainability in favor of the community.

Students in the learning process can build *storyboards in* a creative way following the structure proposed by their instructors and the guiding technical script; they can also recognize the typology of multimedia after analyzing information, and identify the elements of graphic design applied in the development of multimedia; they can learn to create multimedia prototypes, develop the elements of multimedia and design interfaces, characters and objects, and also establish standards of accessibility and usability. Instructors support their knowledge in the development of audio, video, multimedia resources, audio and video formats, image formats, *Javascript* programming, *Actionscript*, event-driven programming, *Snippets*, service consumption, XML, Web Service, RSS, HTTP requests.

Within the technical media program generated in the process of curricular integration and offered by the IE MUA, there is also the strengthening of the technical English language for students to handle a new vocabulary and precise lexicology related to *software* in multimedia projects and other elements that computer science and technology use and require for their knowledge and correct identification.

Methodology

The curricular integration process is framed in rigor, as required by all educational and pedagogical dynamics, under scientific parameters, for which six phases articulated to the research objectives were established and each one had its own methodological organization (Figure 2).

The curricular integration process aimed at the entire educational community had the greatest impact on 1,470 students and 50 teachers from preschool to 11th grade. Specifically, to four intact potential target groups of 10th and 11th grade, a census sample or focus group of 170 students, enrolled and not enrolled in technical high school, with whom a multimedia solution design was carried out.

The first phase, initial diagnosis and problem identification aimed to diagnose the different problems with the curriculum in 2018. The main problems that hindered the improvement in the academic performance of students, and a contextual reading was made about the reality found before 2018. From the selection of the problems a delimitation was made from which emerged the questions and the object of the research, which focuses particularly on the need for curricular change. Then, some short- and medium-term work purposes were proposed, and foundations according to the concepts of curricular integration, technology, industrial revolution 4.0. This phase was carried out from the administrative management using the technique of observation of the organizational context of the institution, as well as the curricular revision in its different components of the SIEE (Evaluation System), and of the functions and procedures manuals. A systematization of the grades obtained in 2018 by the students was also carried out.

The second phase, design and approval of the curricular reform, had the purpose of strengthening the curricular processes of the IE MUA, through the design of the proposal "Ser Mejor 2020, Learning for my evolution", presented to the Secretary of Education of Medellin, through which actions were taken to investigate and obtain information on the protocol, as well as the corresponding documentation required for the implementation of the technical media. In this phase, the systematization of information was used for the design of the curricular reform through different pedagogical strategies.

The third phase, implementation and rethinking of processes, follows the process initiated with the first objective. In it, another contextual reading is made according to what was reformed during 2019, as well as the tracking of background information found in secondary sources in indexed journals, databases, specialized libraries, among other sources of information; and the systematization of data obtained from information sources related to the academic performance of students.

In the fourth phase, follow-up of the curricular integration, another sub-process was initiated with the purpose of evidencing the results of the implementation, through the techniques of information gathering, systematization and participant observation, beginning with the selection of the spaces, moments, and frequency of the observations. This follow-up used a qualitative ethnographic methodological design with participant observation, interviews, surveys and

field diaries. Rodríguez, Meneses and Fàbregues (2014) mention this technique as one that allows direct access to what people do and say in their respective contexts. In addition, they consider participant observation as the union of different strategies, processes, techniques and principles with the following qualities:

> In a social group, organization or community, they are observed from their contexts, having a special interest in understanding. This allows the researcher to enter systematically and periodically into the everyday life of the context under investigation, taking part in the experiences, changes and events along with the other participants. (Rodríguez et al., 2014, p. 163).

As for the interviews and surveys through the ethnographic approach, the research team collected a series of significant descriptive data, as mentioned by Murillo and Martinez (2010) with the purpose of:

> ... to carry out an effective intervention in terms of curricular integration, through direct observation in the classroom and in teachers' work in their area of knowledge in relation to technological innovations, through the collection of records, direct observation, pedagogical diaries, formative evaluation results, interviews, review of activities and delivery materials, audiovisual records. This is supported in a theoretical way in order to explain the findings found in this new curricular intervention (Murillo and Martínez, 2010, p.7).

Through participant observation, teachers obtained a better interpretation of their students' processes, because they give greater meaning to the actions carried out in the classroom, thus being able to verify a true integration of the curriculum. To confirm the above, it is argued that:

> Thanks to ethnography it has been possible to learn more about the internal functioning in the classroom, about the causes of school failure, about the strategies of the students and it is very appropriate in studies on integration in the classroom, for example. It is a way of understanding the non-apparent reality, that which is created in the coexistence of groups (Murillo and Martinez, 2010, p. 8).

Informed consents were requested from the families and students in order to obtain data and allow access to audiovisual material for analysis. The researchers created a climate of trust to integrate themselves in the observation process and generate a first positive impact on them. The decision to carry out a participant observation was made because the teachers themselves are the researchers and, from their interaction, they could have a better approach to the research context. In addition, observations were carried out with continuity in order to know the students' perception of the new curricular implementations, from the technological immersion in an articulated manner in all the areas of knowledge and in the specific subject of the technical high school.

The EI MUA has designed since 2019 the format of weekly pedagogical reflection of teachers, from which information is collected from the observations obtained, the ideas and assumptions and difficulties that emerge during the interactions between teachers and students. This input is very useful for the construction of theories and results. The information obtained is classified and categorized for proper organization through *Excel*, *Word*, ATLAS-Ti tools. Finally, the reflective descriptive notes were organized in a coherent manner with the observation categories referring to the curricular integration from the management of Composite Intelligence 4.0, taken from the activities, classroom processes, formative evaluation, delivery of inputs and those resulting during the process.

The next two phases continue with the process of evidencing the results of the implementation. In the fifth phase, we proceed to the systematization with the generation of an analysis matrix in each category from the use of some tools based on the Annual Operational Plan (Manuel Uribe Angel Educational Institution, 2020), also topics for reflection (interpretation close to what the observers wish to express, in a concrete, concise and coherent way with the object of research) were added; then these matrices were tabulated; and finally all the results were triangulated, in order to describe and give interpretation to the findings found. These were validated from current theorists and authors, who effectively support the reflections and results obtained.

In the sixth phase, conclusions and recommendations, the research team, after all the process carried out, raises new perspectives, generates conclusions resulting from the analysis made, and recommendations for the improvement of actions that present difficulties within the educational community investigated, according to the purposes of the design and implementation of the technical middle school from the proposal of curricular integration.

Results

From the application and its theoretical support, it can be said that the process has followed a series of phases corresponding to specific objectives set in accordance with the purpose of improving all the components of the curriculum and, consequently, the different institutional management. The results of the first three phases are presented in detail; the other phases are described in their methodological design phase and their results will be the subject of a later publication. Figure 2 summarizes the process delimited by the six phases, considering the methodology followed in each one and the results obtained so far.

In the first phase, the results of an initial diagnosis are obtained, described, and developed by the management team where the real situation before 2018 is presented. In the years prior to 2018, there was a grading system of 16 subjects with the difficulty of making a follow-up and relevant assessment in the processes. There were difficulties in understanding the SIEE (Evaluation System), functions manual and procedures manual. There were groups called "floating" without direction, without a classroom, without physical presence in the institution, it was necessary to standardize the academic load according to the guidelines of the MEN and the Secretary of Education of Medellin. The groups were irregularly distributed in the two sites, for example: four sixth grades, two in one site and two in the other, in different shifts, which did not allow for an articulation in curricular planning and classroom and cross-cutting projects. Also, as previously mentioned, there was a Technical High School in Accounting, with a problem of desertion and little academic and labor continuity.

Figure 2. Phases, methodology and results of Curricular Integration at the MUA.

Note: Own elaboration

The results of the second phase showed that starting in 2018, an improvement plan for academic quality and institutional organization will be carried out, through a hard, joint and oriented work based on the quality standards proposed by the Ministry of National Education, the proposals of the Secretary of Education of Medellin as *Expedición Currículo*, the work of the evidence-based model as proposed by the ICFES, and thus improve the results in the Saber 3, 5 and 9 °, and Saber 11 ° tests and the guidelines of the Program *Todos a Aprender* (PTA). In this phase, the processes strengthened in the IE MUA were identified, such as the proposal submitted to the Secretary of Education for the recognition Ser Mejor 2020, "Learning for my evolution" (Educational Institution Manuel Uribe Angel, 2020) with the development of four strategies in a cross-cutting manner to grades 0° to 11°:

- Diary of our school quarantine;
- Households, inheritance and knowledge;
- Learning self-care and care for others;
- Learning for my evolution.

In each strategy, adaptations were generated for the levels. The adaptations, together with the initial processes of curricular integration, were evaluated by a peer evaluator in a qualitative perspective, positively in terms of the pertinence of the experience, its development, social relevance, and possibility of application in other educational establishments, as well as with respect to the results of scalability and sustainability. With a final quantitative score of 95 points on a scale of 1 to 100. Actions were also carried out to obtain the documentation and protocols required for the implementation of the technical media:

- Minutes of the Board of Directors approving the Technical Average.
- Agreement of the Board of Directors approving the technical middle school, the pertinent adjustments to the Institutional Educational Project, the Coexistence Manual and the creation of the technical middle school area.
- PEI adjusted with the insertion of technical media as an area.
- Act of sensitization to the educational community about the occupational opportunities offered in the technical high school in the educational establishment.
- Rector's letter to the Accreditation Unit informing of the projected start date of classes. in the technical average, February 10, 2021.

Thus, a formal and evident executive process was generated for the implementation of the technical average through protocols. The Board of Directors met in plenary to approve this implementation at the institutional level. In turn, from the curricular point of view, new proposals were initiated where each teacher implemented a class plan based on this curricular design for each level with the necessary actions and processes for learning and academic improvement. In addition, the proposal of general cross-cutting curricular axes for the application in all areas and subjects organized and approved was initiated. The school year was established in four periods of ten school weeks with four units of thematic groupings for the construction of textbooks from preschool to eleventh grade, integrated in each area of knowledge. These four axes are as follows:

- Advances in communication and language technologies.
- Advances in bioethics and society.
- Progress in biotechnology and the environment.
- Improvement in robotics learning and creativity.

Then the board issued the agreement for the approval of the technical high school. Based on this agreement, the pertinent adjustments were made to the Institutional Educational Project (PEI), the Coexistence Manual and the curricular structure to include the technical high school area, leading to the implementation of the curriculum and area plan. Subsequently, the PEI was digitalized to adjust the insertion of the technical high school as an area and at the same time the initial process of curricular integration was generated through the work of teachers by areas.

Afterwards, the educational community was made aware of the occupational opportunities offered in the technical high school at the educational establishment. This environment was developed in a motivational way to teachers, students, parents, and community to initially show the proposal, the linkage and transfer in agreement with the *Servicio Nacional de Aprendizaje Sena* (National Learning Service). Finally, the normalization of the rector's letter to the Accreditation Unit was carried out, informing the projected date for the start of classes in the technical high school, which was approved.

In the third phase, the implementation was carried out and the institutional processes with respect to the curriculum were rethought. Strategies were implemented that transcend the context, to strengthen learning environments from an inclusive education, efficiency, and healthy school coexistence; in addition, progress was made in academic processes and educational quality references were strengthened. From the Academic Council, Board of Directors, in meetings of the Educational Development Nucleus, human talent of the Secretary of Education, meetings with parents, strategies were sought to change the academic assignment, assign groups by day, level, grade, changes that occurred for the year 2019. In this way, the integral performance was improved both internally and in external results, which were reflected in the entry of graduates in 2019 to the university for technical, technological, and professional careers, with an increase of 12%. Graduates had excellent reception in the different public and private institutions due to the good results in Saber 11° Tests (table 2). In 2019 for the eleventh grade the classification was B, a higher score than the two previous years.

Table 2. Icfes saber 11 test rankings in the last three years, at the E.I. MUA.

Año	Clasificación	Matemáticas	Sociales y ciudadanas	Lectura Crítica	Inglés	Total
2019	B	0.7006	0.6707	0.7282	0.6649	0.6859
2018	C	0.6669	0.6586	0.7117	0.6513	0.6693
2017	C	0.6335	0.622	0.6784	0.6198	0.6406

Note: obtained from comparative results of saber tests 2017-2019 (I.E. M.U.A., 2020).

The cut-off points define the categories in which the educational establishments are placed (Table 3).

Table 3. *Categories and ranks:* It is proposed to reach a higher level as shown in Table 4.

Categorías	Rango de puntajes
A+	$0.77 \leq X \leq 1$
A	$0.72 \leq X \leq 0.77$
B	$0.67 \leq X \leq 0.72$
C	$0.62 \leq X \leq 0.67$
D	$0 \leq X \leq 0.62$

Note: made by the authors.

Table 4. *2019 score and goals to achieve 2020.*

Promedios 2019	Puntaje	Propósito 2020 para alcanzar	Puntaje
Promedio total	0.6859	categoría A (0.72)	0.0341
Promedio matemáticas	0.7006	categoría A (0.72)	0.0194
Promedio Sociales y ciudadanas	0.6707	categoría A (0.72)	0.0493
Promedio Lectura Crítica	**0.7282**	**categoría A+ (0.77)**	**0.0418**
Promedio ingles	0.6649	categoría A (0.72)	0.00551

Note: obtained from comparative results of saber tests 2017-2019 (E.I. MUA, 2020).

For the year 2020, despite being an exceptional year in all areas, due to the Covid-19 pandemic, the EI MUA did not falter in terms of progress and results. A series of curricular, pedagogical, and didactic strategies were implemented that led to an evolution for learning, which has allowed the institution to be a benchmark of transformation in the Andalucía la Francia neighborhood and in the city of Medellín. One of the visible results is the improvement in Saber 11° Tests (table 4) and the increase towards 25% of enrollment for university entrance, technical, technological, and professional careers, some with the participatory budget resource and with access to scholarships for formal education. In this same year, because of the collaborative action of all the actors that make up the educational community, it was possible to achieve educational contexts in line with reality, which improved the results in external tests. Once the mandatory quarantine was determined by the National Government, with the progress in the guides and with the resources allocated for homework, we proceeded to print the textbooks "Learning for my evolution", which allowed us to develop a work from the academy in the year 2020 and projected for 3 more years.

According to the above, it is possible to observe an improvement in quality at the institutional level in the last three years, which is reaffirmed with the opening in 2021 of the Technical High School in Multimedia Design and Integration with a pre-enrollment of 57 students. To achieve this, vocational orientation tests were conducted during the previous two years with students from 9th to 11th grade, surveys, and orientations from the *Software* Nursery where the results showed a general tendency to a taste for computer science and technology. After an infrastructure study and after analyzing all the requirements, the National Learning Service (SENA) and the Secretary of Education of Medellin were asked to give their approval to start the technical high school. From the realization of a learning, unlearning and relearning path that arose after the implementation of the technical high school, the need was generated to merge the previous results with the curricular integration, so that it permeates the entire institution to strengthen new constructs based on current technological advances. Subsequently, the search for a new pedagogical model unique to the institution "Learning for my evolution" based on composite intelligence 4.0 was carried out. This model is focused on the theoretical foundation of neuroscience, artificial intelligence, robotics, internet of things, nanotechnology, biotechnology, communications technology, and bioethics.

The background research and search for specialized information and its subsequent selection, resulted in three international research, Monestel (2018) in Costa Rica and Navarro et al. (2019) in Mexico; the first one conducts a study of curricular improvement delimiting four variables: teaching and learning methodology; in needs and expectations of teachers; use of the technological tool Google Sites; learning experiences. The second study, using an ethnographic methodology, highlights the importance of integration between traditional and technological methods; and a favorable inclination towards technological integration. The third research by Illán and Molina (2011) develop a model of Integrated Didactic Units (UDI) and explore their potential in curricular integration.

At the national level, Siabato (2013) relates integrated educational management to process management. In Antioquia, Bedoya et al. (2018) use the TPACK model with a positive impact on core members and some of the active members, and a constant challenge from the community to integrate new members. In this way, a theoretical support has been made on the object of study in order to deepen, find relevant research at regional, national and international level that contribute and allow to know other processes carried out and also define the categories of study for its understanding.

For the fourth phase, in the development of the research, the data obtained from: 1) the participant observation of the students at the technical middle school, as well as those of elementary and high school; 2) the pedagogical reflections of Master 2000 that 50 teachers carried out, 3) interviews and surveys to parents, students and teachers will be triangulated. This triangulation is still in process; however, some of the data from the surveys conducted are presented in the institutional website (Institución Educativa Manuel Uribe Ángel, 2020a). The first survey was answered by 421 students of which 48.9% consider excellent and 46.1% good the materials used by the educational institution for the four strategies of the proposal "Learning for my evolution" (Institución Educativa Manuel Uribe Ángel, 2020); and 94.8% are satisfied with the management that I have had the IE MUA during 2019-2020. According to one of the voices of the parents of their perception of the proposal "Learning for my evolution" states that their child has strengthened "care at home and learn to value life more and to value teachers and the institution more".

This positive assessment of the strategies is confirmed by the results of the survey answered by 360 parents, of whom 57% consider the materials used in the strategies to be excellent and 36.6% good (Manuel Uribe Angel Educational Institution, 2020), and 90.6% are satisfied with the institutional management in 2019-2020. For their part, the 40 teachers who responded to the survey maintain that 38.5% of the students make weekly deliveries of the activities proposed through the "Evolution" experience.

For the fourth, fifth and sixth phases, the results are currently in the process of organizing the participant observation technique and structuring the compilation and organization of the categories of the teachers' pedagogical diaries. At the same time, some protocols necessary for the continuation of the project are being developed in order to advance in the research and generate impact results for the entire educational community, thus completing the following phases.

Discussion

According to the question on how to assume a curricular reform, the process followed confirms what Sanchez (2003) affirms is not curricular integration: acquiring computers without training teachers in their use and curricular integration and carrying out activities and strategies related to ICT without specifying their curricular articulation and in the educational project. Also, it is a matter of ICT curricular integration and not technological integration into the curriculum, so that it is the curriculum that guides ICT and not the other way around (Sánchez, 2003). However, curricular integration in the MUA IE is carried out from the change of the technical middle school, and with the articulation of curricular planning, and classroom and transversal projects and not only from the subjects as stated by Sanchez (2003), which indicates a process carried out in accordance with the problems encountered and that gave rise to this reform.

One of the results of the second phase is the elaboration of the proposal of general transversal curricular axes for the application in the areas and subjects organized and approved to carry out a work in each area plan and curricular mesh with four integrated units in each area of knowledge, according to four axes: communication technologies and language; bioethics and society, biotechnology and the environment, and learning Robotics and creativity. A work of integrated didactic units is developed in Illán and Molina (2011), emphasizing the process rather than the components as in the case of IE MUA, the authors consider four phases: training and collaborative work of the teacher around the design of UDI; presentation of the UDI to students and final design; implementation of the UDI from the analysis, synthesis and transfer of knowledge; and evaluation as a source of improvement (Illán and Molina, 2011).

On the other hand, the phases of the present project: diagnosis of curriculum components; strengthening of processes and protocols for the implementation of curricular technological integration; evidence of the results of implementation from participant observation; and organization of curricular management processes. specify an approach similar to that of Illán and Molina (2011). A gap in approach is also evident: from the teaching-learning process to that of a technological perspective in the context of the fourth industrial revolution (WEF, 2020).

Research by Navarro et al. (2019) and Monestel (2018) consider the importance of teacher training to achieve curricular integration, which is equally a relevant concern in the MUA IE. Along the same lines, Siabato (2013) demonstrates the importance of leadership from bioethics, a discipline in line with the approach of the Pedagogical Model "Learning for my evolution". Innovation is therefore evidenced from different aspects in this integrative curricular and technological process.

Conclusion

The curricular reform is assumed considering technology as a means to facilitate the acquisition of skills and cognitive deepening that allows the continuation of studies and access to the world of work; and it is carried out starting from a diagnostic phase that identifies the problem of the lack of articulation between curriculum, planning, classroom and transversal projects, as well as a technical media that failed to reduce desertion and promoted academic and employment discontinuity.

The strengthening of processes and protocols of the technical high school from the directive, pedagogical and administrative management achieved its implementation, which oriented the curricular design for each level

and the integration of the areas of knowledge articulated to the transversal axes and four thematic units. With the transition from classroom environments arising from the traditional school to technological environments that transform not only the reality of the students but also the curricular reality, the present proposal, from a twist in the disciplines considered, Biotechnology, Bioethics, Communication Science, achieves the design of a curricular management model requested by the city and the educational centers.

The phases developed, although the last three are in process, show results both from the curriculum and from the improvement of the students' learning and therefore of their educational quality. The results are an indication of the importance of the proposal generating an environment of security in the students for their future work, professional and formative future.

The institutional organizational structure has produced a significant change through the curricular reform in the educational community. Based on this research, a follow-up of the processes that were based on the work and implementation of the new curricular designs, their execution and progress at all levels, including the resulting observation of the hidden curriculum, was carried out.

It is important to consider that the technological approach involves an essential element, which is self-learning, the management of knowledge through appropriate technological tools, so that the training of teachers and students is a self-management issue as long as the possibilities of technological resources are provided.

The pedagogical model proper to our institution contributes to the development that humanity is experiencing, of a transition towards computer and technological systems, which start from the so-called digital revolution, towards which the school must evolve taking new paths, exhibiting approaches, theories, trends, differential educational models, which allow to guide teachers to the development of new curricula, generating learning that allow the transit of humanity towards the fourth industrial revolution 4.0.

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