

Work design factors in educational programs during COVID-19: An analysis of their relationship with implementation

Factores de diseño del trabajo en programas educativos durante la COVID-19: Un análisis de su relación con la implementación



RESEARCH ARTICLE

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Received: 31-10-24
Accepted: 13-11-25
Published: 01-01-26

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Abstract

Introduction: Work Design is associated with processes and results within organizations because it identifies and predicts some of the conditions such as the effectiveness of social programs.

Objective: This article will explore the relationship between organizational factors such as work design and effectiveness in socio-educational programs in the Colombian Caribbean, during the COVID-19 pandemic.

Method: The method applied was quantitative and exploratory, with comparisons between clusters. Participants were the applicators of the program in 72 educational institutions, for a total of 105 people.

Results: It is pointed out that the implementation processes of educational programs were affected by the pandemic. Programs that have accompaniment only from the State show lower application fidelity. The support of senior management in the schools was affected, as was teamwork.

Discussion: The observed effects on implementation, application fidelity, leadership support, and teamwork occurred during the COVID-19 pandemic and are related to organizational factors such as work design and the type of accompaniment.

Conclusions: The relationship between work design, the nature of accompaniment, and program effectiveness is evident in the pandemic context examined.

Keyword: Work Design, Educational Institutions, Programs, COVID-19, Work Design Factors, Organizations.

Resumen

Introducción: El Diseño del Trabajo está asociado con los procesos y resultados dentro de las organizaciones porque identifica y predice algunas condiciones, como la efectividad de los programas sociales.

Objetivo: Este artículo explorará la relación entre factores organizacionales, como el diseño del trabajo, y la efectividad en programas socioeducativos en el Caribe colombiano durante la pandemia de la COVID-19.

Método: El método aplicado fue cuantitativo y exploratorio, con comparaciones entre clústeres. Los participantes fueron los aplicadores del programa en 72 instituciones educativas, para un total de 105 personas.

Resultados: Se señala que los procesos de implementación de los programas educativos se vieron afectados por la pandemia. Los programas que cuentan únicamente con acompañamiento del Estado presentan menor lealtad de aplicación. El apoyo de la alta dirección en las escuelas también se vio afectado, al igual que el trabajo en equipo.

Discusión: Los efectos observados en la implementación, la lealtad de aplicación, el apoyo directivo y el trabajo en equipo ocurrieron durante la pandemia de la COVID-19 y se relacionan con factores organizacionales como el diseño del trabajo y el tipo de acompañamiento.

Conclusiones: La relación entre el diseño del trabajo, la naturaleza del acompañamiento y la efectividad del programa es evidente en el contexto pandémico analizado.

Palabras claves: Diseño del trabajo, Instituciones educativas, Programas, COVID-19, Factores del Diseño del Trabajo, Organizaciones.

How do I cite this article (APA):

Polo-Vargas, J.D., Maya-Jariego, I. & Muñoz-Alvis, A. (2026). Work design factors in educational programs during COVID-19: An analysis of their relationship with implementation. *Psicogente* 29(55), 1-16. <https://doi.org/10.17081/psico.29.55.7723>

1. INTRODUCTION

The implementation of programs in organizational contexts is mediated by a multiplicity of factors that influence their effectiveness; therefore, it is essential to have clear and concrete methods that allow the construction of a scheme that supports the fulfillment of goals and objectives. This is because they depend on various interactions, from the personal, labor, systemic and political levels, that demand a grade of inspection for which there are currently no methods.

Organizational factors are essential in these contexts as programs are usually developed by concrete and active organizations, from the perspective of the social actor (Šorytė, 2020; Lupova-Henry et al., 2021), where the system complicates the process. From our perspective, the organizational factors are the institutional circumstances that determine or condition processes and, at the same time, the goals of the program applied by the establishment that uses it.

However, within the range of organizations managing programs, training institutions are highlighted, such as colleges, schools, technical or technological institutions, and universities; because they have in their role one of the most preponderant variables in the progress of a nation: Education.

It should be noted that a wide range of organizational factors that are associated with the implementation of managing programs such as the support of senior management (Cyprian & Omwoyo, 2019), the workload of the applicators (Magtalas & Eduvala, 2024), and the structure of the organization (Rosati & Faria, 2019).

Nevertheless, the reviewed academic literature has not pointed to the working conditions of those who implement them in basic education institutions. Therefore, our contribution is focused on identifying the conditions of work design that might influence the implementation of transversal programs in schools.

1.1. Work design

Work Design (WD) is the group of factors with the greatest preponderance in studies within organizations (Parker et al., 2017). This is because WD aims at the study, creation and modification of the composition, content, structure, and environment of both positions, and work roles (Dierdorff et al., 2025), therefore, it is a macro variable and different from the workplace design (WPD) that specifies the position that the person has.

The contemporary perspectives of Work Design (Bakker et al., 2020; Parker & Jorritsma, 2021; Wang et al., 2020) point to the improvement of people conditions in their work roles -workers- and for organizations, as complex systems. Within this commitment, the characteristics or factors of the WD must be considered to guarantee optimal conditions in the effective development of the tasks within the work role.

For this research, it is studied the proposal of the WD, and its context in the organization (Dierdorff et al., 2025; Parker et al., 2017) as a scheme with a comprehensive view of the activity; therefore, it gives us an almost holistic approach to the processes that compose it.

Within the proposal, the WD has macro-factors such as: motivational, social characteristics, and contextual or workplace characteristics (See table 1).

Table 1.

Factors of Work Design

MOLAR FACTORS OR MACRO-FACTORS		
MOTIVATIONAL CHARACTERISTICS	SOCIAL CHARACTERISTICS	CONTEXTUAL OR WORKPLACE CHARACTERISTICS
Task Characteristics • Autonomy • Autonomy in work planning • Autonomy in the work • Autonomy in decision making • Variety of Tasks • Task Meaning • Task Identity • Feedback from work Knowledge Characteristics • Work Complexity • Information Processing • Problem Solving • Variety of Skills • Specialization	• Started Interdependence • Received interdependence • Feedback from peers • Social Support • Interaction outside the organization	• Physical demands • Ergonomic Conditions • Use of Equipment

Compiled by author based on [Humphrey et al. \(2007\)](#); [Morgeson & Humphrey, \(2006\)](#).

Therefore, this model has 21 factors, among which are autonomy, information processing, social support, the meaning of the work, the complexity of the work, and the physical demands, which allows a deep reflection regarding its implications in the implementation of programs on educational institutions

It should be remembered that the work design factors are variables related to well-being ([Kirillova et al., 2020](#)), coping with life ([Lamovšek et al., 2022](#)) and job performance ([Peiró et al., 2020](#)); however, the nature of its relationship with variables associated with social programs such as implementation has not been studied. This situation becomes even more relevant if it is considered that the implementation of programs depends on a series of factors, such as the structure of the work of the person who implements it.

1.2. Implementation of social programs

One of the contributing factors to the improvement of social circumstances and the prosperity of communities is social programs, particularly those that cover environments in which social exclusion has been present and levels of economic development are lower. These circumstances demand

the presence of timely social support to improve people's living conditions.

In this sense, those programs focused on education become essential, because they encompass a fundamental right, and simultaneously constitute a pillar for development ([Lundy & O'Lynn, 2019](#)). Therefore, the commitment to education is an investment towards the future and social transformations, as long as, there are optimal conditions that facilitate the contribution, such as the capacity for change and work context.

In Colombia, the National Ministry of Education (MEN in Spanish) is the government entity in charge of establishing, executing, and evaluating policies and action frameworks structured around basic, secondary and higher education. Besides, it also leads research to identify the areas with the greatest need for intervention.

According to what was stated in the last report of this entity ([MEN, 2019](#)), it is committed to, among other areas, to the intervention in early childhood corresponds to the life cycle between 0 and 6 years. This government project aims to integrate various programs that protect children and mediate their development and learning. In this effort, "The

Preschool is a Note" (Preescolar es una Nota) program is implemented, whose objective is to "provide guidelines, lines and provisions related to the implementation of comprehensive preschool for early childhood within the framework of the *Zero to Forever Strategy (Estrategia de Cero a Siempre)* in educational establishments" (Instituto Colombiano de Bienestar Familiar [ICBF], 2017, p. 8).

To this end, the program seeks to articulate the participation of various actors involved in the education of children, from caregivers and instructors present in schools to parents or guardians, and students as protagonists. In this sense, MEN intend to carry out three global actions on interventions in early childhood: the promotion of initial education, educational coverage, and inspection and vigilance (MEN, 2019). These are the reasons supporting its direction of the implementation of complementary programs that allow the fulfillment of such actions.

In this line, educational programs have a wide range of topics to be reviewed. In this case, the focus will be on socio-affective education and the method adjustment in vulnerable contexts, in which the enrichment of the participants' educational process would be necessary, and where educational tools are characterized by being contextualized and revolve around the quality of learning.

The program to improve the conditions of this population is articulated directly by the National Ministry of Education, in conjunction with the implementation of didactic learning strategies, through pedagogical modules adapted from the contextualization of the state of vulnerability of people as the target population (MEN, 2021). This program is mediated through a series of learning modules structured around the student and the professor. Besides, program development is subject to the supervision of operators, which generally correspond to private entities that verify compliance with the implementation of modules.

On the other hand, there is a psycho-affective education and development program aimed at fostering self-knowledge, emotional expression, and sound conflict management in children and their families, using techniques such as psychodrama, games, and experiential storytelling (Berghs et al., 2022). Program structure covers different aspects of historical moments of children, such as their emotional construction, evolutionary development, and how the context influences them. This program has been implemented for more than 20 years, showing important results in emotional regulation with the construction of a protective affective state for personality development.

The implementation method focused on the execution of playful activities, is developed in suitable spaces with information to be mediated, which leaves a significant mark. Even though life situations addressed by the program tend to be common to all children, in most cases, the program is implemented in populations with situations of vulnerability, characterized by the insufficiency or absence of factors protectors for the emotional development of children.

Theoretical contributions of the implementation expose that the quality of obtained results from the program depends on how it has been implemented and the distribution in the target population. It is important to note that the latter depends on several factors. At following, (see figure 1) a series of factors that have been identified in the theoretical context as relevant elements in an intervention. Figure 1 shows factors such as:

- Fidelity, which is a term defined from the educational field as fidelity is the degree to which instructors and other agents implement a program in line with its developers' intentions (Century et al., 2017).
- Frequency is the count of occasions on which participants receive the program incentive (Lemire et al., 2023).

- Dose, which refers to the **quantity of the intervention** that participants receive (Lemire et al., 2023).

Such factors support the implementation in a different tone, due to the central character developed in the process. These elements will be analyzed empirically in this research.

Both programs have been implemented in favor of improving the quality of life, by understanding the psycho-social situations of the context, to provide spaces that allow the construction of new learning for children. However, no program is exempt from the need to have a team of quality implementers, whose jobs are designed to efficiently implement what is structured.

It should be noted that the above was presented during an atypical context at the global level, due to the contingency that COVID-19 implied for society, considerably affecting millions of people and causing the death of thousands more. Understandably, this situation made the reality of the program and their applicators teams more complex, by taking them to an extreme situation, where people's resilience and adaptability were put to the test.

To what extent are work design factors, autonomy, role clarity, feedback, leadership support, and team coordination, associated with the fidelity of implementation (adherence to protocols, planned dosage/frequency, and procedural consistency) of educational programs during COVID-19, and do these associations vary by the type of institutional accompaniment and by work-design profiles (clusters)?

1.3. Hypotheses

- H1 (global). Higher levels of enriched work design will be positively associated with implementation fidelity.
- H1a. Greater autonomy → higher adherence to protocols.

- H1b. Greater role clarity → higher procedural consistency.
- H1c. More operational feedback → higher dosage/frequency compliance.
- H1d. Stronger leadership support → higher adherence to guidelines and timelines.
- H1e. Better team coordination → higher overall implementation quality.
- H2. Institutions with exclusively state accompaniment will show lower implementation fidelity than those with mixed accompaniment (state + partners).
- H3. Greater COVID-19 constraints (logistical closures, absenteeism) will be negatively associated with dosage/frequency and procedural consistency.
- H4. High work-design clusters will exhibit higher implementation fidelity than medium or low cluster.

2. METHOD

This research was approached in two stages. The first was exploratory, considering the need to identify and describe the underlying typologies of work design factors (Dierdorff et al., 2025; Fernández-Ríos et al., 2017; Parker et al., 2017). Then, it was determined the existence and magnitude of differences between these and socio-demographic and labor variables observed in public educational institutions in the city of Barranquilla (Colombia), which were implementing socio-educational programs for the vulnerable population. This is with the purpose of characterizing them and planning the intervention in required cases, based on the diagnosis of the work design and focusing on the characteristics of the cases, rather than the variables.

2.1. Participants

This research was developed from an intentional sampling carried out at 72 public educational institutions in the city of Barranquilla - Colombia, which at the time of the suspension of face-to-face classes

in Colombia due to COVID-19 (24 March 2020), were implementing socio-educational programs for the vulnerable population.

At least one professor and a maximum of ten participated per institution, with one as the mode. In total, 105 people participated by completing the research instruments. Each professor received instructions about the information provided to be analyzed in a disaggregated manner, preserving its confidentiality. After review, it was determined that 102 participants had filled out the three instruments correctly, so these instruments were eligible for the final sample.

The obtained results showed that 36% of professors implement the psycho-affective program, while 64% apply learning methods. The average time of service of professors in the educational institution was 2.59 years, the majority had between 2 and 4 years of service (34.3%), followed by those who had up to two years (26.5%), over 10 years (22.5%), between 5 and 7 years (15.7%) and between 8 and 10 years (1.0%). The majority of the participants were women (87.3%) while the 12.7% were men. It is possible that this higher participation of women is because in Colombia, the profession of school professor is more common in women than in men (Montoya-Palacio, 2013).

Regarding the experience in the implementation of the program, 54.9% of professors had no previous experience with a psychosocial approach, while 45% did have experience. On the total number of professors who reported having experience -46 professors-, the average of this was 7.3 years, but the mode was 2 years.

2.2. Instruments

For the WD variable was used the Work Design Questionnaire (WDQ), (Morgeson & Humphrey, 2006). The questionnaire is made up of 77 items answered using a Likert-type scale of five alternatives, where 1 corresponds to "totally disagree" and 5 corresponds to "totally agree". Some of the

items in the questionnaire are: "My job allows me to make my own decisions about how to plan my work over time", "I receive feedback from other people about my performance in my organization (such as directors and colleagues)", or "I have the opportunity to meet other people in my work" (Fernández-Ríos et al., 2017). In its original version, it has an internal consistency of the categories that range between 0.80 and 0.95. In this study, 21 factors were observed. We used the Spanish version referenced in Fernández-Ríos et al. (2017). No additional construct-validity analyses were conducted in this study; therefore, we do not make new validity claims beyond those reported in the WDQ's original publication. Any internal consistency estimates specific to our sample are not reported here.

A questionnaire related to the program implementation was also applied, with these variables: a) Dose; b) fidelity; c) Frequency; d) Senior management support; e) Teamwork; f) Workload; g) Effectiveness, which were designed for this project. The questionnaire is made up of 42 items; of these 29 are Likert-type responses of five points (ordinal measure). For instance, to the statement: I believe that the program was implemented, or is implemented as planned in its design, the following response options are assigned: 1= Totally disagree, 2= Disagree, 3= Neither agree nor disagree, 4= Agree, 5= Totally agree.

Another two items have a dichotomous response option (nominal measure). For instance, the question: Has the program continued to be implemented after the confinement of students due to COVID-19? The following response options are assigned: 1=Yes; 2=No. Then, seven items have a numerical response option (scale measure). For example, the question: How many hours per month do you implement the program? You must answer with a number that represents the value requested in the question. The questionnaire also has three items that have an open response option (measured by categorization), in which the partic-

participant expresses the idea and the researcher writes it, to later categorize it. For example: What strategies have you put in place to continue program implementation amid COVID-19? To this question the participant answers spontaneously what he considers pertinent.

This generates a better understanding of implementation during the pandemic. In addition, providing arguments that can be analyzed based on how the person responds to the other items of the instrument. This “questionnaire related to program implementation” was authored for the present project (i.e., it is not derived from the WDQ). No separate validation study or reliability testing is claimed here; the instrument was used to document the above variables for descriptive and associative purposes within this sample.

2.3. Procedure

For the development of this research two databases were structured to access the participants. The first database was obtained from the information provided by the Secretary of Education from Barranquilla, which has data of professors who implement or have implemented the program methods. Also, the second database was provided by a private university and includes the information corresponding to those professors who apply or have applied to the psycho-affective program. The database contained a figure of 232 professors.

In addition to databases provided by these institutions, a snowball sampling was used, which extended the population range to 114 additional professors, by inquiring about whether participants knew another trainer who also was an implementer of programs studied in this research. Regarding the contact established with professors, made via email, in those cases in which the electronic address was available; and by WhatsApp or telephone call, for those situations in which there was no access to it.

The circumstances of home confinement caused by the COVID-19 pandemic forced the researcher to apply the questionnaires virtually; 70 were recorded through video calls because in 32 cases one or more of the following situations occurred:

a) The professor did not give his consent for the interview to be recorded; b) The registration of the call caused deficiencies in the communication; and c) The professor stated that he could not turn on his video option, because he did not have enough mobile data and possibly would not have connected for virtual classes.

Regarding the selection of the population sample, the following exclusion criteria were established:

a) The professor was implementing the program without having a job relationship with any educational institution; b) The professor had entered the institution after the suspension of classes due to COVID-19. The participants signed consent for the disaggregated data analysis so that both their privacy and their dignity were preserved and respected.

2.4. Analysis

A cluster analysis was developed with the Bayesian Information Criterion (BIC) of [Cho et al., \(2024\)](#) and the Akaike Information Criterion (AIC) ([Sutherland et al., 2023](#)), which are closely related ([Zhang et al., 2023](#)), to then validate the final solution through the silhouette measurement of cohesion and separation between clusters ([Bhat-Kapu & Kiruthika, 2024](#)), to determine the contribution of each work design factor to that segmentation. Also, its importance as a predictor was analyzed from the Vli coefficient ([Fuchs & Wang, 2024](#)). For the description and denomination of the final solution, the error bar graph was used. Subsequently, the statistical comparison between clusters and several sociodemographic, educational, and labor variables developed.

3. RESULTS

Figure 1 determines the quality of the segmentation obtained by using the 18 factors underlying the work design, finding a solution of two clusters whose cohesion and separation silhouette measurement was sufficient, having a value of 0.4 and being above the 0.2 criterion.

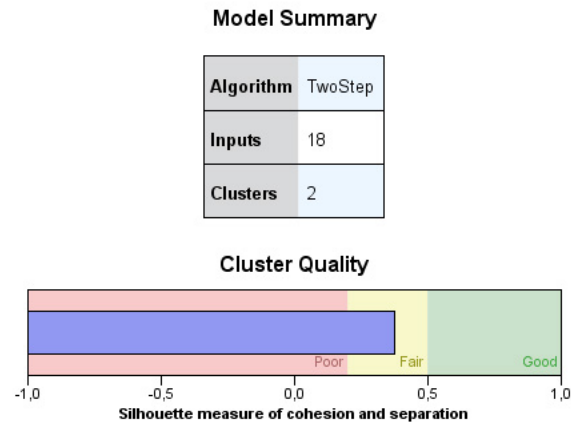


Figure 1. Silhouette measure of cohesion and separation between clusters based on the 18 factors underlying the work design.

However, Figure 2 reports on the relevance of using only 5 of the 18 work design factors: Feedback from work, Work Specialization, Variety of Work Skills, Ergonomics, and Work Information Processing;

having a Vli value greater than 0.50 points; which improves the segmentation quality to a good level, as it is also above the 0.5 criterion, as can be seen in Figure 3.

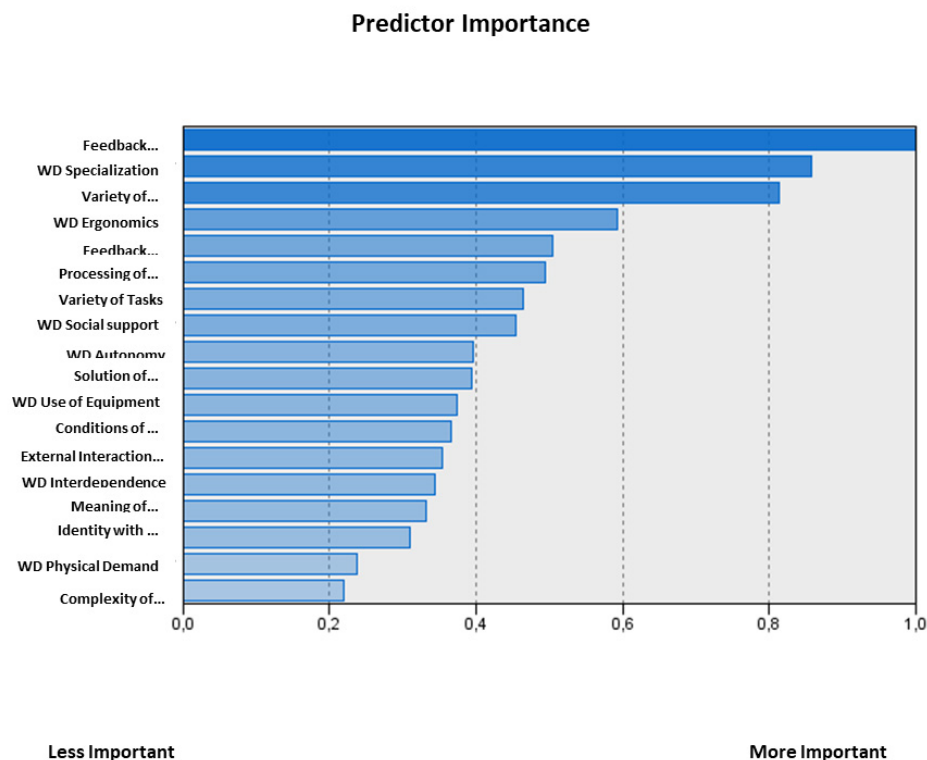


Figure 2. Measure of Predictor Importance.

Such segmentation supposed the existence of two clusters, where the first grouped 56.9% of participants ($n_1=58$) did not have a significant nor powerful difference ($p=0.17$), ($1-\beta=0.28$), concerning the 43.1% of participants who were

grouped in the second cluster ($n_2=44$), although it can be noted that this had an intermediate effect size ($\omega=0.14$); consequently, it could be concluded that they were statistically balanced.

It was determined that in Cluster 2, all factors underlying the work design were significantly ($p=0.000$, in all cases), concerning to the Cluster 1, with a large and powerful effect size in favor ($d_{\text{Feedback}}=0.92$; $d_{\text{Ergonomics}}=0.92$; $d_{\text{Specialization}}=1.99$; $d_{\text{Variety}}=1.91$ and $d_{\text{Procedure}}=1.50$) ($1-\beta$, in all cases). Therefore, the typology that represents Cluster 2 was called high and Cluster 1 was called low. The most precise description of what this represents will be presented in the discussion section.

About the comparative analysis for the socio-demographic and labor variables, the results are presented only for the variables that registered a significant difference ($p<0.05$) between both clusters; for this reason, the results of their comparison are not presented for: Time of service in the Institution ($p=0.513$), Workload ($p=0.118$), Number of enrolled students ($p=0.702$), Number of attended students ($p=0.147$), Previous experience in the application of programs ($p=0.205$), Time implementing the program ($p=0.762$), Gender ($p=0.716$), Age ($p=0.693$) and Percentage of Process Advance ($p=0.194$).

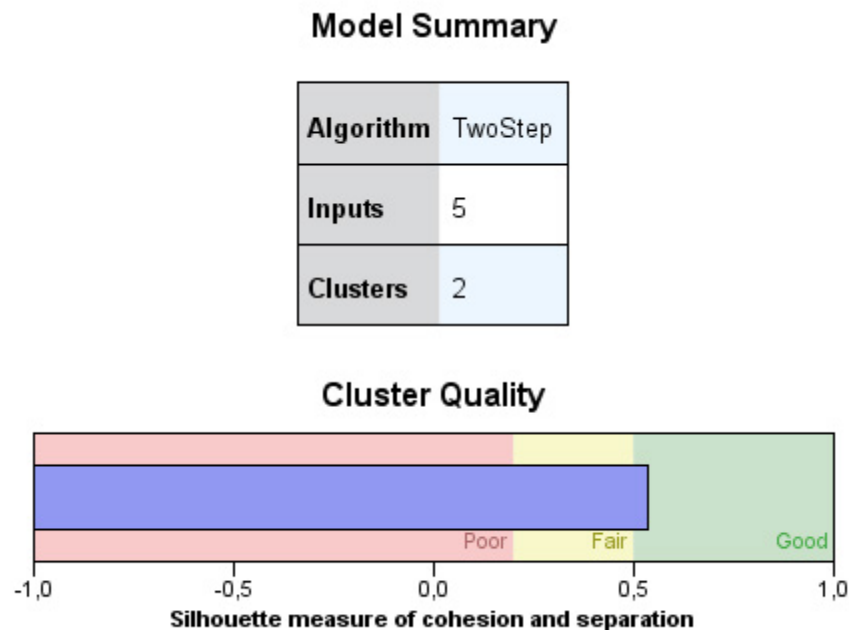


Figure 3. Silhouette measurement of cohesion and separation between clusters based on the 5 factors underlying the work design.

It was determined for the course and the program, that clusters 2 and 1 were significantly different ($p=0.012$), since the number of participants (see Figure 4) who taught flexible methodological acceleration classes (Program of Learning Acceleration Methodologies), was greater in the Cluster 1 ($P1=25.49\%$) for Cluster 2 ($P2=10.78\%$), while the

number of participants who taught preschool classes (Pisotón Program) was greater in the Cluster 2 ($P2=22.55\%$) concerning Cluster 1 ($P1=13.73\%$) and the number of participants who taught flexible methodological compass classes (Compass Program), was greater in the Cluster 1 ($P1=17.65\%$) in comparison to Cluster 2 ($P2=9.80\%$).

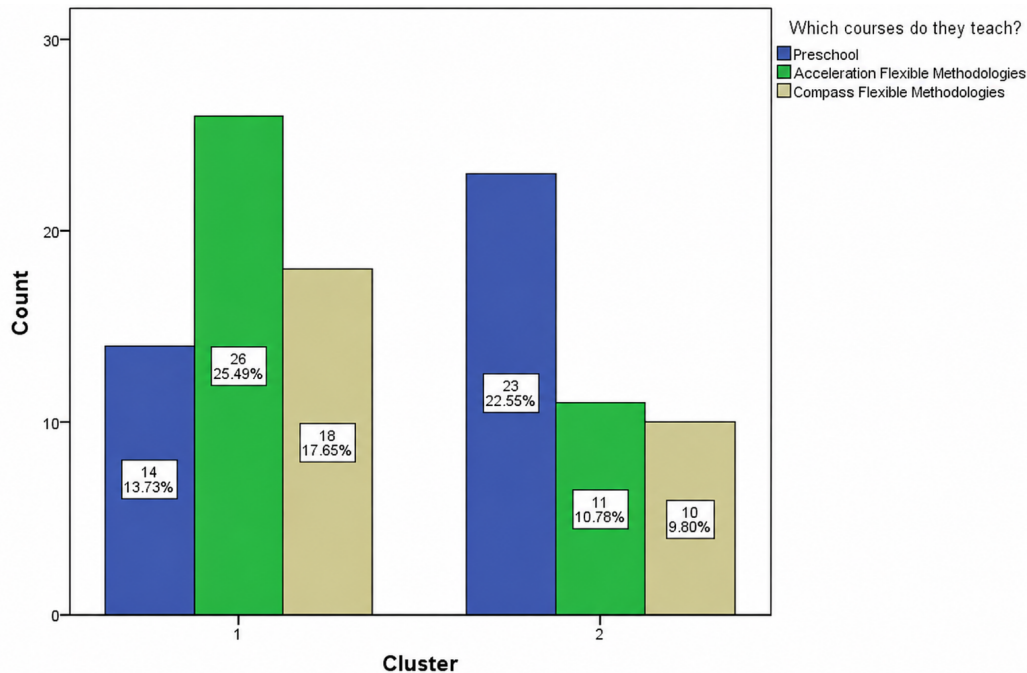


Figure 4. Bar Chart: Clusters x Courses (and Programs)

In Figure 5, it can be seen that before the confinement of the pandemic, the fidelity towards the program was significantly higher (with 95% confidence) in the Cluster 2 ($M_2=4.39$; $D_2=0.52$; $n_2=44$), in comparison to Cluster 1 ($M_1=4.00$; $D_1=0.66$; $n_1=58$), but that difference is subsequently lost due to confinement ($M_2=3.22$; $D_2=0.80$; $n_2=44$; $M_1=2.96$; $D_1=0.81$; $n_1=58$); this is the reason why in the 2x2 Factorial ANOVA neither a significant nor a powerful effect is observed in the interaction between the clusters and the moment of the evaluation on the fidelity towards the program ($p_{\text{Inter-action}}=0.556$; $1-\beta_{\text{Interaction}}=0.090$); however,

it applies in the effect and main power, for each of these variables separately ($p_{\text{Clusters}}=0.002$; $1-\beta_{\text{Clusters}}=0.892$ and $p_{\text{Moment}}=0.000$; $1-\beta_{\text{Moment}}=1.000$), the main effect of the time of evaluation being greater ($\eta^2_{\text{Moment}}=37.54\%$), than clusters ($\eta^2_{\text{Clusters}}=4.91\%$) and their interaction ($\eta^2_{\text{Interaction}}=0.17\%$). Therefore, it can be concluded that the pandemic had a greater effect on the fidelity of the participants of Cluster 2, although it also reduced the fidelity of the participants of Cluster 1, to the point of making them statistically similar after the pandemic confinement.

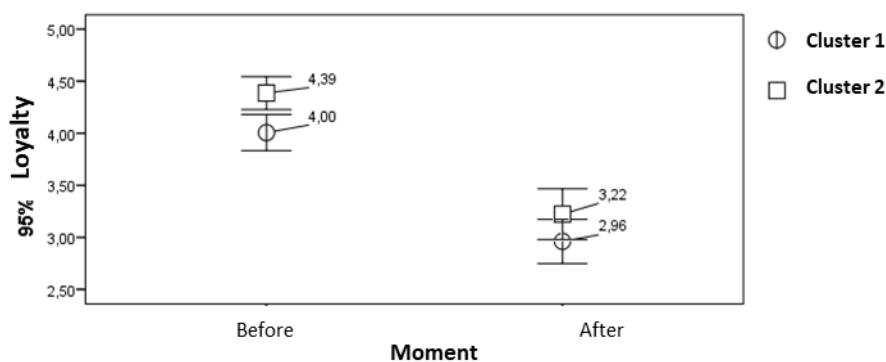


Figure 5. Error bars: fidelity Assessment Time x Clusters.

Figure 6 shows that before the confinement of the pandemic, the effectiveness to the program was significantly higher (with 95% confidence) in the Cluster 2 ($M_2=4.48$; $D_2=0.45$; $n_2=44$), concerning Cluster 1 ($M_1=4.18$; $D_1=0.56$; $n_1=58$), but that difference is subsequently lost due to confinement ($M_2=3.49$; $D_2=0.82$; $n_2=44$; $M_1=3.36$; $D_1=0.93$; $n_1=58$); this is the reason why in the 2x2 Factorial ANOVA neither a significant nor a powerful effect is observed in the interaction between clusters and the moment of the evaluation on the effectiveness towards the program ($p_{\text{Interaction}}=0.404$; $1-\beta_{\text{Interaction}}=0.132$); however, it applies in the

effect and main power, for each of these variables separately ($p_{\text{Clusters}}=0.036$; $1-\beta_{\text{Clusters}}=0.557$ and $p_{\text{Moment}}=0.000$; $1-\beta_{\text{Moment}}=1.000$), being greater the main effect of moment of the evaluation ($\eta^2_{\text{Moment}}=28.35\%$), than clusters ($\eta^2_{\text{Clusters}}=2.19\%$) and their interactions ($\eta^2_{\text{Interaction}}=0.35\%$). Therefore, it can be concluded that the pandemic had a greater reducing effect on the perception of effectiveness of the participants of Cluster 2, although it also reduced the perception of effectiveness of the participants of Cluster 1, to the point of making them statistically similar after the pandemic confinement.

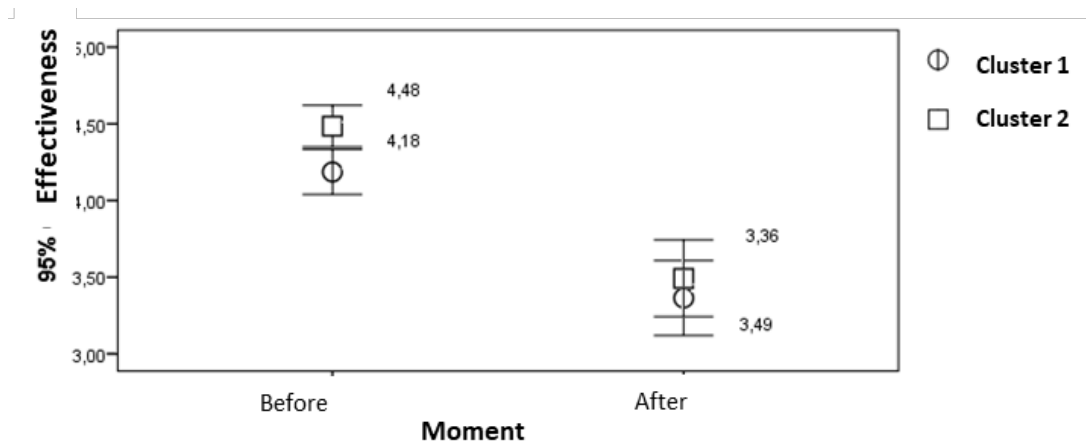


Figure 6. Error bars: Effectiveness Assessment Time of x Clusters.

In Figure 7, it can be seen that before the confinement of the pandemic, Senior Management Support for the program was significantly higher (with 95% confidence) in Cluster 2 ($M_2=4.40$; $D_2=0.79$; $n_2=44$), in comparison to Cluster 1 ($M_1=3.83$; $D_1=1.07$; $n_1=58$), but that difference is subsequently lost due to confinement ($M_2=3.87$; $D_2=0.97$; $n_2=44$; $M_1=3.59$; $D_1=1.17$; $n_1=58$); this is the reason why in the 2x2 Factorial ANOVA, neither a significant nor a powerful effect is observed in the interaction between clusters and the moment of evaluation on the perception of Senior Management Support towards the program ($p_{\text{Interaction}}=0.300$; $1-\beta_{\text{Interaction}}=0.179$), however, it is appreciated in the main effect and potential for clusters ($p_{\text{clusters}}=0.004$;

$1-\beta_{\text{clusters}}=0.831$) and only in significance, but not in the main power of the moment ($p_{\text{Moment}}=0.009$; $1-\beta_{\text{Moment}}=0.749$). This time, the main effect of clusters ($\eta^2_{\text{clusters}}=4.12\%$) is greater than that of the moment of the evaluation ($\eta^2_{\text{Moment}}=3.38\%$) and its interaction ($\eta^2_{\text{Interaction}}=0.54\%$), although in all cases this effect is small. For this reason, it can be concluded that the pandemic had a slight, although greater, reducing effect on the perception of Support from the Senior Management of the participants of Cluster 2. However, it also reduced the perception of the effectiveness of Cluster 1, to the point of making them statistically similar after confinement due to the pandemic.

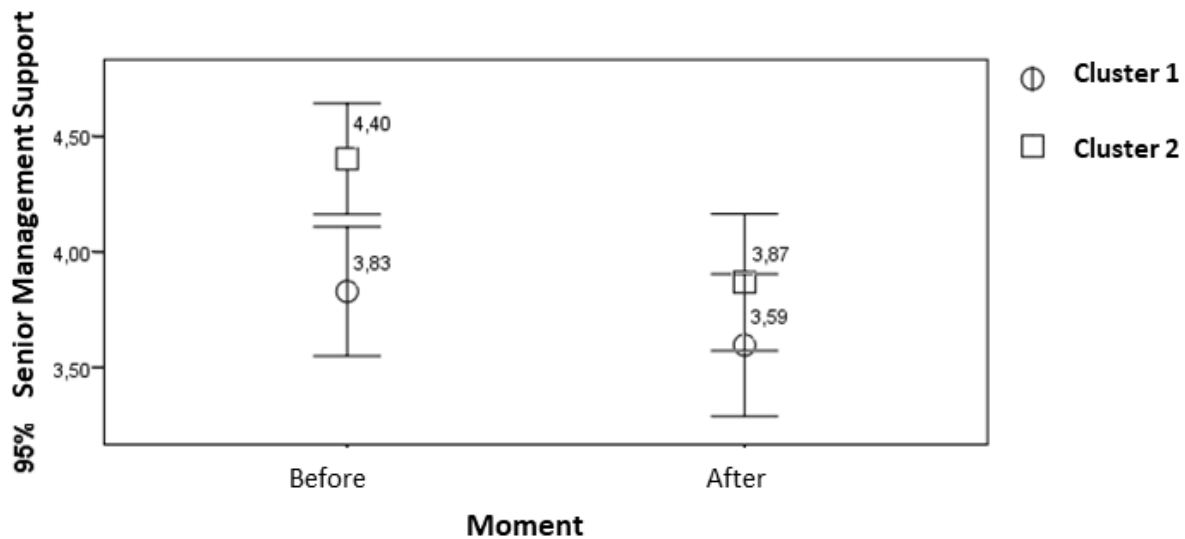


Figure 7. Error bars: Assessment Time of Senior Management Support x Clusters.

Figure 8 shows that before the confinement of the pandemic, the perception of Teamwork towards the program was significantly higher (with 95% confidence) in Cluster 2 ($M_2=4.20$; $D_2=0.71$; $n_2=44$), concerning to Cluster 1 ($M_1=3.84$; $D_1=0.72$; $n_1=58$), but that difference is subsequently lost due to confinement ($M_2=3.69$; $D_2=0.83$; $n_2=44$; $M_1=3.39$; $D_1=0.75$; $n_1=58$); this is the reason why in the 2x2 Factorial ANOVA, neither a significant nor a powerful effect is observed in the interaction between clusters and the moment of the evaluation on the perception of Teamwork in the program ($p_{\text{Interaction}}=0.791$; $1-\beta_{\text{Interaction}}=0.058$), however, it is appreciated in the effect and main

power both for clusters and for the moment of the evaluation ($p_{\text{Clusters}}=0.002$; $1-\beta_{\text{Clusters}}=0.871$; $p_{\text{Moment}}=0.000$; $1-\beta_{\text{Moment}}=0.994$), being greater the effect of the moment of evaluation ($\eta^2_{\text{Moment}}=9.25\%$), than the moment of clusters ($\eta^2_{\text{Clusters}}=4.60\%$) and their interaction ($\eta^2_{\text{Interaction}}=0.04\%$), although in all cases this effect is small. For this reason, it can be concluded that the pandemic had a slight, although greater reducing effect on the perception of Teamwork of the participants of Cluster 2, although it also reduced the perception of effectiveness of the participants of Cluster 1, to the point of making them statistically similar after the pandemic confinement.

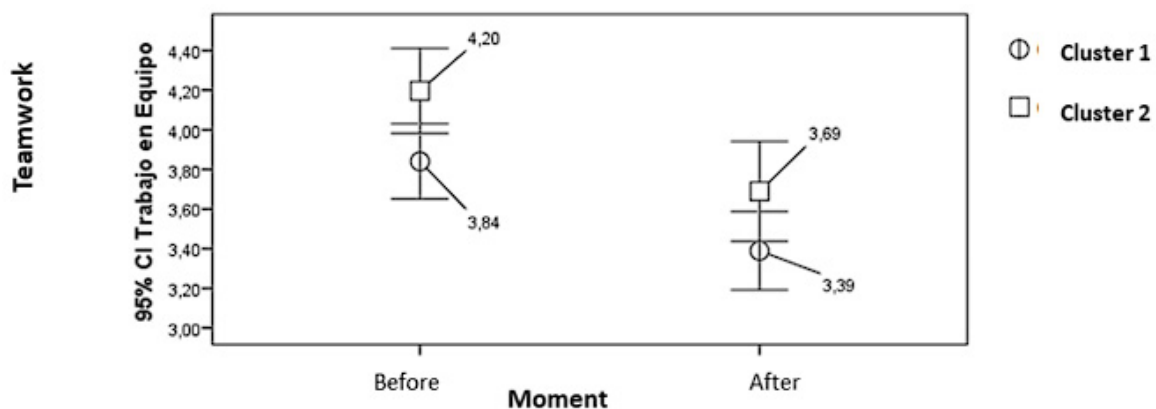


Figure 8. Error bars: Teamwork x Cluster evaluation on moment.

4. DISCUSSION

Complementary programs to educational processes have an important role, particularly in contexts of poverty and social exclusion, because they support all the gaps presented in formal education. However, the analysis to define their effectiveness is insufficient and restrictive, which generates a great gap in educational research, and it is not clarification about the role of professors as workers, the implications of pandemics i.e. COVID-19, and its contribution to the development of public policies.

When reviewing the program developed and accompanied by a private institution, it is found that before the pandemic, there was a higher level of fidelity around the program and it implies that sometimes the programs fidelity to which the State is following up, is low due to the saturation that professors perceive in their work; which was aggravated by the COVID-19 pandemic (Lizana et al., 2021). This leads to a review of the accompaniment processes that exist by the State implementation agencies, recognizing their limitations, which must improve this condition of fidelity (Quinn & Kim, 2017).

This leads us to propose that there must be greater precision in the fidelity of the programs if the objectives would be achieved. Therefore, it will be a negotiation between sections of the State that are responsible for these programs, their operators, and the schools where they were applied, which will ensure accuracy within the process.

The support of senior managers in educational programs is essential (Tingle et al., 2019) and without it, most programs are doomed to fail. In our research, it was clarified that before the pandemic there was support from senior management. However, the pandemic affected both the physical and occupational health of managers and professors who applied the programs; but without the administrator's support, many professors felt unsupported and isolated from the current situation in schools.

The aforementioned points out the fact that there must be support for managers by State entities, and in cases such as the pandemic, it is important to have or design a protocol that allows the support. It can be difficult in places where there is little access to technology because most educational follow-ups needed this tool to be implemented correctly (Van der Spoel et al., 2019).

As can be inferred from the confinement rules that were implemented throughout the world, one of the weakened main factors was teamwork. Our data suggests that during the confinement, the people interaction in programs was affected. This implies that effective strategies could not be enabled to maintain the team's interaction (Whillans et al., 2021), which invites us to close the existing technological gaps in public institutions. Active strategies can be generated, trying to relate academic and private sectors to support.

Consequently, our original input is in terms of showing specific areas (fidelity, Management Support, and Teamwork) that have become difficult to address within the context of pandemics such as COVID-19. Many of these can be reduced using technology tools, but this is only possible if the current lag in the acquisition of technology is reduced.

5. LIMITATIONS AND RECOMMENDATIONS

This study elucidates the relationship between work design and the implementation of educational programs during the COVID-19 pandemic in the Colombian Caribbean. Its findings, however, are contextualized by specific methodological limitations. The sampling strategy and cross-sectional design constrain generalizability, while self-reported data presents potential for bias.

Consequently, future research should pursue longitudinal and mixed-methods approaches across diverse contexts. The development of validated instruments for implementation fidelity is also paramount. Further inquiry should dissect the

operational components of effective institutional support models.

The analysis confirms work design as a critical predictor of implementation fidelity, even amidst systemic crises. Programs with exclusively state accompaniment demonstrated lower application fidelity compared to mixed-support models. The pandemic eroded key organizational supports, effectively homogenizing outcomes across clusters.

Ultimately, these findings highlight the necessity of addressing technological disparities and reinforcing organizational protocols. Building resilient support systems is essential for sustaining educational quality in future crisis scenarios.

6. HIGHLIGHTS

- The study identifies typologies of work design among school-based implementers and shows their association with implementation fidelity during the pandemic, providing applied evidence for public contexts in Colombia's Caribbean region.
- It integrates the WDQ with implementation variables (managerial support, teamwork, workload, perceived effectiveness) and offers operational definitions that facilitate measurement and cross-program comparisons.
- It shows that programs with exclusively state-provided accompaniment report lower fidelity, underscoring the role of school leadership and feedback in sustaining execution quality.
- It proposes avenues for intervention: redesigning the implementer's role (tactical autonomy, formative feedback), technological support for information processing, and leadership training to strengthen organizational support.

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