



Alfredo Guzmán Rincón ^{1,2,*}, Sandra Barragán ² and Favio Cala Vitery ²

- ¹ School of Economic and Administrative Sciences, Corporación Universitaria de Asturias, 110221 Bogotá, Colombia
- ² Faculty of Natural Sciences and Engineering, Universidad de Bogotá Jorge Tadeo Lozano, 111711 Bogotá, Colombia; sandra.barragan@utadeo.edu.co (S.B.); favio.cala@utadeo.edu.co (F.C.V.)

* Correspondence: alfredo.guzman@asturias.edu.co; Tel.: +57-321-254-0363

Abstract: As part of the 2030 Agenda, higher education has been conceptualised as one of the ways to overcome the social disparities experienced in rural areas in Colombia. Thus, in concordance with the benefits of this level of education, the state has been designing public policies during the last few years, in order to facilitate access to undergraduate programmes to these populations, focusing mainly on the implementation of the virtual modality. In this context, it is recognised that access itself is not enough, but that continuance and timely graduation are required to materialise the benefits obtained along with a higher education degree; hence, dropout is a subject of interest for study, especially due to the high rates existing in the rural student population. Therefore, the event of dropout becomes an obstacle to social change and transformation in rural areas. Thus, this article aimed to identify which individual, institutional, academic and socio-economic characteristics influence rural student dropout in virtual undergraduate programmes in Colombia. For this purpose, an exploratory, quantitative and cross-sectional study was proposed, with a sample of 291 students to whom a student characterisation instrument and a classroom evaluation instrument were applied. With these data, it was proceeded to establish which of them had deserted, constituting the extraction of the sample of the study, which were 168. With the information, an exploratory factor analysis, hierarchical cluster analysis and descriptive statistics were used to establish which explanatory variables are involved in the dropout of this type of student. The results showed that the academic variables analysed do not have an impact on the event, while marital status (associated with family obligations), age, social stratum, work obligations, parents' level of education and type of work, income and type of employment relationship of the student, and, finally, the number of people who depend on the family's income do.

Keywords: dropout; higher education; rural population; virtual education; public policies; Colombia

1. Introduction

In Colombia, rural populations have been characterised by social disparities resulting from the armed conflict, drug trafficking, unequal access to land, corruption and state negligence, among other factors [1–4]. This has led to the fact that, from 9,512,141 people located in the rural areas [5], 47.5% live in monetary poverty and 19.3% in extreme monetary poverty or destitution [6]. Hence, the State recognises that Higher or Tertiary Education is a central axis to overcome social inequalities in the country [3,4], especially in rural areas, so that, since the signing of the Peace Agreement and the Agreement for Higher Education, and in articulation with the commitments made in the framework of the 2030 Agenda, public policies have been designed to facilitate access to this educational level, focusing on the implementation of adaptable educational models, among which undergraduate programs in virtual mode stand out [4,7].

In this context, it is necessary to recognise the role of higher education as an agent of development and social transformation in rural areas as it enables the improvement of



Citation: Guzmán Rincón, A.; Barragán, S.; Cala Vitery, F. Rurality and Dropout in Virtual Higher Education Programmes in Colombia. *Sustainability* **2021**, *13*, 4953. https:// doi.org/10.3390/su13094953

Academic Editors: Aurélien Decamps, Benoit Martimort-Asso and Carine Royer

Received: 29 March 2021 Accepted: 26 April 2021 Published: 28 April 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https:// creativecommons.org/licenses/by/ 4.0/). average incomes [8,9], the increase in the productivity of the economy [10,11], a decrease in crime [12–14] and the growth in life expectancy [15,16], etc. However, facilitating access to higher education for this type of population is not enough to transfer the individual and collective benefits or rewards of the educational level. It is also necessary to guarantee the permanence and timely graduation of this student population. For that reason, the event of dropout is one of the main barriers for the fulfilment of national public education policies, and of the 2030 Agenda itself, as it prevents the elimination of poverty, hunger, improves health and gender equality, among others. This has led the State to enact public policies to achieve permanence and timely graduation as a strategy for the elimination of social asymmetries in these areas [17,18]. Thus, these policies contemplate the intervention of the various protagonists of the education system, focusing on the role of the State and Higher Education Institutions (IES) [4].

That said, the state has followed its conservative line, through the financing of tuition and other expenses associated with the educational level [19], which were represented in the form of credit lines and scholarship credits for these populations. An example of this is the "More Colombian than Ever", which facilitated access to higher education, in virtual programmes, for citizens located in the areas with the highest rurality indexes [20]. Another example is the "Generation E" programme, which allowed students located in or coming from rural areas to access high quality accredited HEIs through the figure of scholarship credits covering the student's tuition and living expenses, and which were exempted from payment of the financial obligation if the participants covered satisfactorily their training process [21]. In the case of HEIs, the public policy has focused on strengthening and developing student competencies [3,4], in addition to the development of the Early Warning Systems (known in Spanish as SAT) and the Permanence and Timely Graduation Plans (PyGO for its Spanish acronym) in order to identify students at risk of dropping out due to individual, institutional, academic and socio-economic variables, and intervene in a timely manner through tutoring, vocational guidance, credit fairs and housing search, among others [22,23].

Notwithstanding the strategies implemented from the public policy for the prevention and mitigation of student dropout in rural populations, it was estimated by the Ministry of National Education (MNE) [4] that the rate of ceasing at the undergraduate level is close to 50% for this population; there are indications that other characteristics present in the individual, in the same educational system, in the academic and social context influence student dropout, and these features have not been taken into account for the development of policies, resulting in ineffective prevention and mitigation in the event of dropout.

In this context, the lack of analysis of new explanatory variables of the event in this type of population derives, on the one hand, from the way in which the information of the System for the Prevention of Dropout in Higher Education, (SPADIES in Spanish) is structured; this organization consolidates and organises the information for monitoring students who have entered the educational level in the country. However, it does not contemplate the rural condition as an explanatory variable of dropout, as well as other variables associated with it [24]. On the other hand, the lack of previous research developed by the academic community in the country results in the impossibility of appropriating the findings of the event of dropout in higher education in rural areas for the development of public policies.

The latter situation is not very different from the international level, where efforts to understand desertion were concentrated at earlier educational levels (e.g., [25–27]) and the few studies developed at the tertiary level were carried out with the aim of comparing dropout levels between rural and urban students and their characteristics (e.g., [28–30]), and in the identification of some variables that have an impact on dropout in these populations, such as: the effect of the tuition fee subsidy [18,28,31], parental expectations, academic burden, the effect of late entry to higher education, GPA and social connectedness [30], as well as academic capital prior to higher education entry [28].

It is important to highlight that these studies were carried out in contexts of developed countries or with social realities that do not include such marked disparities as those of the Latin American context, and specifically the Colombian one (e.g., [18,29–32]). In new scenarios, these may lack any significance, not only for reasons of location, but also because the analysis is limited to the face-to-face modality, leaving aside the virtual modality, which was incorporated as the basis for access to higher education in rural areas by the Colombian state, and in various developing countries such as South Africa and India.

Due to the lack of studies that simultaneously address dropout, higher education, rural populations and the virtual modality, the aim of this article was to identify the individual, institutional, academic and socio-economic characteristics that influence rural student dropout from undergraduate programmes in the virtual modality in Colombia, in order to complement the elements of the judgment of those who formulate educational public policy for the Colombian rural student population, to provide a new panorama for the academic community of this situation in the country, and to strengthen this line of research at international level; especially in the disruptive scenario experienced by the pandemic of COVID-19, in which it is expected that dropout levels increase in a generalised manner in higher education, mainly in areas with high levels of inequality, as is the case of rural areas [33].

Thus, this article is structured in four main sections. The first section presents the literature review, the conceptualisation of dropout and the theoretical reference model of MNE; the second section describes the methodology developed to fulfil the research objective; the third section presents the main findings; the fourth and fifth sections present the discussion, the limitations of the study, the conclusions and the public policy implications of the study.

2. Literature Review and Theoretical Framework

2.1. Literature Review

Dropout in higher education in rural populations has not been a regular subject of study by the academic community, or by states in general. As argued by Gibs [34], Snyder and Dillow [32] who highlighted that the studies developed in understanding the unequal scenario in this type of population are scarce, and the progress made was limited to the identification of some explanatory variables of the event (e.g., [30]) and the comparison with their counterparts (e.g., [28,30]), leaving aside some transcendental aspects for the understanding of dropout such as the modality in which education is provided and what this implies. Thus, the review of the literature in this article is based on general advances in the field of study, those related to the virtual modality and those concerning the rural population.

In this sense, research carried out on the individual determinant has shown that the variables grouped together in this determinant can explain to a large extent the event of dropout, due to the fact that they consider personal and unique aspects of the student [12,35]. Thus, in the case of the gender variable, the studies were contradictory in explaining dropout in higher education. An example of this is Ghignoni's findings [36], which expressed that women were more likely to drop out, while Cochran et al. [37] and Van Bragt et al. [38] stated that men are more likely not to complete their higher education studies. This contradiction stems from the nature of the studies carried out, which were observational and limited to very specific student populations, so their results are not generalisable. In this context, the limitations of the variable should be acknowledged, and it is often related to other variables to explain the dropout event, such as age, family and personal obligations, among others [39].

On the other hand, in relation to age, it was established that older students are more likely to drop out of higher education [40], however, like gender, this is related to other variables, especially family and work obligations that hinder their educational process [37,39,41,42]. It was found that students increased family obligations by taking on roles other than that of a child, which increase the likelihood of dropping out (e.g., [39,43]).

In the case of work obligations, students with financial difficulties often develop work activities that compete in time with academic activities, which can hinder the academic training process [43,44].

Another explanatory variable related to student dropout, in the individual determinant, is associated with family educational background, since the higher the educational level of the mother is a positive influence on the academic performance of the student, which generates a positive effect on both the emotional and cognitive aspects that leads to permanence and academic achievement, which is in line with the theory of educational capital [36]. Similarly, in relation to parental employment, it was found that the less qualified the parents are, the higher the probability of the student dropping out during the first years of study, due to both the instability of family income and the lower economic availability to cover additional items required by the student in their educational process [45,46]. However, the literature has shown that students with more siblings with a professional degree are less likely to drop out [47]. In addition, there is another set of individual determinant variables that can influence the completion of professional studies, such as health status [47,48], ethnicity [30,37,42], digital competencies and skills [49,50].

In relation to the explanatory variables of the socio-economic determinant, these were the subject of analysis due to the inequality experienced in societies, which generates an educational disadvantage that has a direct impact on dropout rates [12]. Studies on this type of variable were divergent, as there are two trends. The first indicates that socio-economic variables do not influence dropout in higher education (e.g., [51,52]), which gives greater relevance to other determinants to explain the dropout event [53]. The second indicates which of these socio-economic variables contribute directly to dropout in concordance with those of the other determinants [53].

In the latter line, it was found that both households and students with low income tend to be more likely to drop out [54] due to the lack of subjective well-being of the student, as argued by Soons et al. [55]. Similarly, financial insecurities stemming from the student's unstable job may lead to non-completion of studies [56]. Regarding research that relates the variable of social stratum, understanding this as a classification of the property or dwelling occupied by the student and their family that accounts for the socioeconomic condition of these, the employment situation, the economic income of the family nucleus and the student, showed that students with lower income levels have several disadvantages when entering higher education, given that the accumulated social and cultural capital is usually lower than that of people with higher incomes [53], which directly influences the academic determinant variables that can lead students to drop out.

However, with regard to the academic determinant, multiple studies have identified that the academic capital achieved by students at levels prior to higher education constitutes one of the main risks of dropping out, given the academic demands of the educational level [50,57,58]. Therefore, in general, students with low grades in secondary school are at a higher risk of dropping out [44]. Similarly, academic performance during the first years [58] of higher education, as well as the resulting performance during their formative process, has a direct impact on dropout [58]. On the other hand, the explanatory variables of an academic nature are usually related to various psychological aspects of the student, such as self-efficacy, self-management, self-education, autonomy and critical thinking, which are required throughout the training process and whose absence especially affects students in virtual mode [49].

A more recent perspective in the analysis of dropout due to academic aspects is related to the policies of access to higher education for vulnerable populations, in which it has become evident that these populations may have similar qualifications to those students who do not present vulnerabilities. However, they present a greater probability of not completing their studies due to the influence of socio-economic variables that prevent the development of the training process under equal conditions, for example, the lack of access to a computer or the internet [49,59–61].

Finally, studies relating to institutional variables have focused on the characteristics of HEIs, such as their size, as represented by the number of students, the quality of training programmes and administrative processes [50,62]. Thus, it was found that flexible admissions policies and the lack of student support through university welfare plans are related to higher drop-out rates [46]. In the case of the latter, it was established that higher investments in these plans result in higher retention rates, especially in private HEIs, as well as in graduation rates across the board at the educational level [63].

On the other hand, the role of teachers has a direct impact on the event of dropout. Thus, the lack of communication with them, especially due to the structure of the virtual pedagogical models, transgresses the student's perception, leading them to drop out [61]. Another variable of this determinant is the configuration of the number of students per teacher, where the higher the ratio, the greater the possibility of early termination of the training process due to the lack of personalisation of education [49].

2.2. Dropout and Theoretical Framework

Student dropout was approached from both the academic community and public policy actors [64], thus its conceptualisation was developed according to context-specific criteria, ranging from dropout in a specific course [65], university programmes to the tertiary education system [66]. In this sense, this article is framed at the level of university programmes, in which two types of perceptions are evident. The first one obeys a construction from the research advances, in which the authors make conceptualisations based on the analysis of the event in a delimited context. An example of this is the definition of dropout, in which this event is understood as the student's decision to terminate their educational process before its culmination [67] due to the influence of various explanatory variables, whose interaction establishes causes that precipitate the non-completion of his or her higher education studies [47]; alternatively, the one caused by various projects such as ALFA GUIA, in which dropout is defined as "an event of a complex, multidimensional and systemic nature, which can be understood as a cause or effect, failure or reorientation of a training process, choice or forced response, or as an indicator of the quality of the education system" ([68], p. 6).

The second type of perception has an operational nature, being developed from public policies to facilitate the measurement of dropout at the higher education level, as well as the evaluation and monitoring of some variables. For the Colombian case, the MNE [23] establishes dropout as a function of the time in which a student was not linked to an HEI, being considered a dropout if they did not register to enrol in the training programme in two consecutive periods (semesters), and is not a graduate, or withdrawn for disciplinary reasons.

Having stated the concepts, it is important to highlight that these definitions of dropout are not mutually exclusive, but rather have specific purposes of analysis, having as a meeting point the understanding of the explanatory variables, the causes and effects of the event, as well as the development of strategies for its prevention and mitigation, hence they have the capacity to feed back into each other. Therefore, the models suggested by academia were appropriated by states for the development of public policies related to dropout, as in the case of Colombia, where the MNE adopted the Tinto Interaction Model and Cox's Proportional Risk Model [69] as a framework for the discernment of this event, and, consequently, national HEIs according to their autonomy.

This model, in its original version, was developed by Tinto and Cullen [70] and then further developed by Tinto [71,72], who took as a point of reference the student's emotional and intellectual background, which involves their individual characteristics, academic record and family background, all of which have a direct impact on their permanence in the HEI by allowing, or not, their integration into the academic and social system, so that the relationship with both systems together with the initial commitment will result in the student's permanence or desertion. Thus, from a broader perspective, student dropout in

HEIs is the result of a longitudinal process between the interaction of the above-mentioned systems [73,74].

In a generalised way, the model was of great academic value and was used in many works (e.g., [73,75–78]). However, the model was evolving and incorporating new perspectives by various authors, including Heublein et al. [79] and Heublein et al. [80], who had considered the initial limitations of the model by including explanatory variables external to the academic and social system and treated them as direct variables of dropout. Thus, these authors addressed pre-university, inter-university and external variables to the student's academic environment to complement the original model and explained it holistically.

Based on the new version of the model proposed by Tinto [71,72], and having considered its flexibility to include new variables that explain dropout, according to the educational modalities and realities of the students, as well as its potential for the development of explanatory and predictive statistical models that allow for a better understanding of the event in higher education in Colombia, the MNE adopted this conceptual model. Thus, in the version developed by the country's public policies, the interactions between the variables were grouped into four determinants: individual, socio-economic, academic and institutional. It is in this model of dropout that the present article is based. Table 1 conceptualises the determinants and gives examples of some of the explanatory variables associated with them.

Determinant	Concept	Associated Explanatory Variables
Individual	These are the characteristics associated with the student and their personal environment that directly influence the decision to leave the learning process unfinished.	Age, gender, marital status, position in the number of siblings, health problems at the time of entering HEI, family environment, fulfilled expectations, family and personal obligations, conscientiousness, intrinsic motivation, etc.
Socio- economic	They refer to the influence of the social and economic context in which the student is involved and which may lead them to not complete their higher education process.	Social status, employment situation, household and student income, economic dependency, the macroeconomic environment of the country, etc.
Academic	They are the achievement of learning outcomes, competence development, student performance and other factors that influence the teaching and learning process at all levels of education.	Previous academic performance, courses taken prior to higher education, secondary school leaving exams, results of entrance exams to higher education, teaching qualifications, levels of satisfaction with the academic programme, etc.
Institutional	These are the characteristics of HEIs which allow the proper development of the educational process.	Institutional policies, funding facilities, pedagogical resources, level of interaction between teachers and students, academic support, political support, etc.

Table 1. Conceptualisation of the determinants of dropout, Tinto's Iteration Model adapted by MNE.

Source: MNE [23].

3. Methodology

3.1. Sample

In order to fulfil the objective proposed in this article, an exploratory, quantitative and cross-sectional study was carried out. For this purpose, a non-probabilistic sample of 291 rural students, enrolled in undergraduate programmes in the virtual modality of an HEI in the city of Bogotá, was taken. The enrolment status of these students was monitored during the period from 2018 to 2020, detecting that 123 students continued their formative process while 168 dropped out, which formed the sample considered to be representative in accordance with the exploratory nature of the research, based on the parameters established by Patton [81], as well as being similar to that of the studies developed by Contreras [52], Oasi et al. [82] and Guzmán and Rodriguez-Canovas [24]. Table 2 summarises some of the individual characteristics of the sample extraction.

Characteristics	Results
Caralan	Feminine: 54.2%
Gender	Masculine: 45.8%
	17–18: 4.2%
	19–25: 35.7%
	26–30: 20.8%
A co	31-35: 16.1%
Age	36-40: 10.7%
	41-45: 4.8%
	46–50: 4.2%
	51–more: 3.6%
Circula fath an an math an	Yes: 31.5%
Single lather of mother	No: 68.5%
Currently working	Yes: 79.2%
Currently working	No: 20.8%
	Single: 53%
	Married: 16.7%
Marital Status	Free Union: 25%
	Divorced: 3%
	Other: 2.4%
	1: 41.1%
	2: 35.7%
Social Stratum	3: 19.6%
	4: 3.0%
	5: 0.6%

Table 2. Characteristics of the sample under study.

3.2. Instruments

For data collection, an institutional self-reporting instrument called student characterisation was used, which was aligned with the individual, socio-economic and academic determinants of Tinto's Interaction Model [71,72] adapted by the MNE. This was applied to the students in the sample at the time of entering the institution. The instrument consisted of 38 items, distributed into 17 explanatory variables corresponding to the individual determinant, 12 to the socio-economic determinant and 9 to the academic determinant. Table A1 shows the items with their respective response options.

In the case of the institutional determinant, it was not asked directly because it was applied when entering the institution, so the data from the virtual classroom evaluation was used for the study. This second instrument was composed of eight items that related aspects of subject content, tutoring and academic mentoring. Given the possibility of students dropping out early before the survey was completed, the student data were marked as zero. Table A2 shows the items assessed in the instrument.

3.3. Data Analysis

With the data collected, an exploratory factor analysis (EFA) was carried out to determine whether the explanatory variables of dropout assessed in both instruments were associated with each of the determinants proposed by Tinto's Interaction Model [71,72] adapted by the MNE. For this purpose, the Kaiser-Meyer-Olkin (KMO) statistic, Bartlett's test of sphericity (BTS) and the anti-image matrix were used to check whether the data were suitable for this type of analysis. Based on the parameters of Godfred et al. [83], variables with partial correlations of less than 0.5 in the anti-image matrix were removed from the factor analysis. Subsequently, using the criteria established by Cronbach [84], Godfred et al. [83] and Comrey and Lee [85], the EFA was carried out using the principal factor method with Varimax rotation, eliminating items with factor loadings of less than 0.10. With the conformation of the factors, the analysis of internal consistency was carried out for each of these, using Cronbach's alpha statistic (α), in addition to each of the variables. Thus, α was considered moderate when the value was between 0.40 and 0.60, acceptable between 0.60 and 0.80, and high when it was above 0.80 [84]. In the case of variables where their elimination would improve the value of the statistic, they were eliminated from the factors.

With the factors formed, a hierarchical cluster analysis was applied to subdivide the individuals in the sample into groups with homogeneous characteristics. This type of analysis does not use any kind of underlying statistical model, so no supervision is required to carry out the classification process. This type of exploratory analysis is appropriate when the purpose of the study is to identify distinctive traits in a population and is widely used when variables with d descriptors are observed, as in the case of Likert-type or multiple-choice scales [86]. It is important to note that, because of the hierarchical nature of the analysis, it is based on a tree structure that allows the number of clusters into which the sample can be subdivided to be determined; for that reason, no prior knowledge of how the individuals under study could be classified is required [86]. However, compared to the various algorithms used in this type of statistical analysis, in this study we chose to use Ward's method, given that it minimises the sums of squares of the deviations from the mean of each variable, which allows us to have homogeneous groups of individuals. In addition, the squared Euclidean distance interval was used to establish similarities and dissimilarities between observations, and the normalisation of data values to eliminate the effects of the scales of the instruments used.

However, the differences between clusters were established using the Mann–Whitney U statistic, because the data did not fit a normal distribution, so the difference was considered statistically significant if the *p*-value was less than 0.05. Finally, descriptive statistics were used to identify the individual, institutional, academic and socio-economic characteristics that influence dropout in groups of rural students in online programmes. Finally, the information was analysed using SPSS software.

4. Results

This section is divided into three parts. The first corresponds to the results of the EFA that show how the variables are agglomerated for the sample; the second presents the conformation of the clusters and their statistically significant differences; the third shows the characteristics of the clusters.

4.1. EFA

In the initial conditions of the EFA, in which all instrument variables were included, the KMO statistic was 0.78, indicating that the variables were partially correlated. In the case of the BTS test, the value obtained was 4463.63 Chi-Square with a *p*-value of 0.00, so that the items of the study were adjusted for this type of analysis, as explained in the factors extracted in the present EFA. However, the analysis of the anti-image matrix showed that some variables were not strongly correlated, so we proceeded to eliminate those with values lower than 0.5.

With the elimination of variables A1, A4, A5, A6, I2, I8, I10, I11, I12, I13, I14, S2, S8 and S11 from the EFA, the new values of the KMO statistics and the value obtained from the Approx. The Chi-Square of the BTS were 0.85 and 3999.63 with a *p*-value of 0.00, respectively. Based on the above, we proceeded to the rotation of the variables for the conformation of the factors, identifying that these manage to explain 41.31% of the variance.

However, with respect to the conformation of the four factors, items A7, I7, A3, I1, and I6 do not load on any of them. Thus, in the first, all the variables related to the institutional determinant loaded; in the second, four of the individual and five of the socio-economic (I4, I9, I3, I1, S1, S12, S4, S9 and S11); in the third, five of the socio-economic and one of the academic (S2, S3, S6, S5, S8 and A2); and in the fourth, three of the individual and one of the academic (I16, I17, I6 and A8), that said, the grouping of the variables contemplated in this study differs from the grouping proposed by the MNE Model [23]. Table 3 presents the matrix of the rotated factors and the loading of each of the items of the instruments.

Code	Factor 1	Factor 2	Factor 3	Factor 4
IES6	0.98			
IES1	0.98			
IES2	0.97			
IES4	0.97			
IES7	0.97			
IES8	0.97			
IES5	0.95			
IES3	0.95			
I4		0.69		
S1		0.55		
S2			0.10	
I9		0.41		
S12		0.38		
I3		0.37		
S4		0.36		
S3			0.72	
S6			0.66	
S5			0.64	
S9		0.14		
S8			0.27	
I1		0.15		
I16				0.62
I17				0.44
I6				0.40
S11		0.25		
A2			0.16	
A8				0.18

Table 3. Matrix of rotated	factors under	varimax	technique.

Regarding the reliability of the factors, factor one was considered high ($\alpha = 0.99$), and factors two, three and four were considered moderate with $\alpha = 0.54$, $\alpha = 0.54$ and $\alpha = 0.40$, respectively. However, as shown in Table 4, these values for factors two, three and four can be improved by removing items S9, S2, A2 and A8. Thus, the new values for Cronbach's alpha were 0.55, 0.56 and 0.53, respectively.

Table 4. Values of Cronbach's Alpha statistic if items are removed from the factor.

Code	Values of α Factor 1	Values of α Factor 2	Values of α Factor 3	Values of α Factor 4
IES6	0.99			
IES1	0.99			
IES2	0.99			
IES4	0.99			
IES7	0.99			
IES8	0.99			
IES5	0.99			
IES3	0.99			

Code	Values of α Factor 1	Values of α Factor 2	Values of α Factor 3	Values of α Factor 4
I4		0.39		
S1		0.49		
S2			0.56	
I9		0.53		
S12		0.49		
I3		0.51		
S4		0.52		
S3			0.48	
S6			0.35	
S5			0.36	
S9		0.55		
S8			0.49	
I1		0.54		
I16				0.19
I17				0.22
I6				0.34
S11		0.52		
A2			0.55	
A8				0.53

Table 4. Cont.

Factor one groups the explanatory variables IES6, IES1, IES2, IES4, IES7, IES8, IES5 and IES3; factor two I4, S1, I9, S12, I3, S4, I1 and S11; factor three S3, S6, S5 and S8; and factor four I16, I17 and I6.

4.2. Hierarchical Cluster Analysis

Taking the EFA as a reference, we proceeded to the development of the hierarchical cluster analysis, where the entire sample was processed as valid cases. Thus, the cut-off was made at the re-scaled distance 10 of the dendrogram (see Figure 1), defining two clusters; the first grouped 94 dropouts, while the second grouped 74.



Figure 1. Dendrogram. Note: The X-axis represents the sample dropouts, and the Y-axis represents the combination of rescaled distance clusters.

11 of 21

With regard to the statistically significant differences between the clusters, it was identified that these are only present in the explanatory variables of factor one, as summarised in Table 5 and presented graphically in Figure 2.

Table 5. Ma	ann–Whitney	Us	tatistical	results
-------------	-------------	----	------------	---------

Code	Mann-Whitney U	<i>p</i> -Value	Code	Mann-Whitney U	<i>p</i> -Value
IES6	1.50	0.00	I3	3237.00	0.39
IES1	2.50	0.00	S4	3001.00	0.078
IES2	5.00	0.00	I1	3471.00	0.97
IES4	35.00	0.00	S11	3214.50	0.37
IES7	1.50	0.00	S3	3261.00	0.32
IES8	44.00	0.00	S6	3299.00	0.55
IES5	52.50	0.00	S5	3086.00	0.19
IES3	81.00	0.00	S8	3369.00	0.70
I4	3470.00	0.97	I16	3233.00	0.39
S1	3179.00	0.30	I17	3395.50	0.77
I9	3273.00	0.39	I6	3299.00	0.51
S12	3388.50	0.766			



Figure 2. Diagram of dispersion by factor. 1 (cluster one) and 2 (cluster two).

4.3. Cluster Characteristics

4.3.1. Cluster One

This cluster was made up of 51 women and 43 men who stated, with respect to the variables clustered in factor one, that the academic programme in which they were enrolled met their expectations (89.4%). In this case, 84.1% of the dropouts considered that the contents, materials and resources provided were useful and sufficient for their learning process. In turn, 70.2% said that tools such as academic forums allowed them to interact with tutors (teachers) and other classmates, and 85.1% considered that the synchronous recorded classes helped them to clarify subject concepts. Concerning the resolution of doubts by the tutors, 76.6% said they were satisfied with their answers; additionally, 86.2% considered that the teachers had the necessary knowledge for the development of the course. Regarding the access and navigation facilities of the virtual learning environment, 84% reported being satisfied and very satisfied, while only 73.4% were satisfied with the role of the academic mentor, who is the person in charge of clarifying doubts and general concerns about the administrative processes with which the student is related. Finally, in this group, only one student dropped out early before completing the instrument.

Regarding the individual explanatory variables of factor two, 50% of the dropouts claimed to be single, 18.1% married, 25.1% living in union with their partner, 3.2% divorced and 3.2% reported another marital status. With regard to the age of this cluster, 37.2% said they were under 25 years old, 41.1% between 25 and 35 years old, 17.0% between 35 and 45 years old, and 4.6% over 46 years old. In the case of the population vulnerability variable, 12.8% said they were displaced, 6.4% belonged to ethnic communities, 4.3% were victims of the armed conflict, and 76.6% did not present any condition of vulnerability. In the case of the socio-economic variables grouped in this factor, 38.3% of the dropouts reported belonging to stratum one, 36.2% to stratum two, 20.2% to stratum three and 4.3% to stratum four. In turn, 54.3% were looking for job offers, while 55.7% were not. On the other hand, regarding the occupation of their parents, 1.1% stated that the mother worked and studied, 9.6% worked occasionally, 24.5% worked permanently, 3.2% were pensioners, 46.8% worked at home, 12.8% were unemployed and 2.1% did not know her or she had died. One percent did not know or passed away; while 19.1% said the father worked temporarily, 36.2% worked permanently, 6.4% were pensioners, 6.4% worked at home, 3.2% were unemployed and 28.7% did not know or were dead.

In the case of factor three, 81.9% of the students who dropped out said they worked, and 10.6% earned less than the minimum wage, 17% the minimum wage, 27.7% between 820,858 to one million pesos (224 USD to 273 USD), 17.9% between one million to two million pesos (273 USD to 547 USD), and 8.5% more than two million pesos, while 4.3% had no income at all. With regard to the length of time they were employed, 30.9% had been employed for less than one year, 9.6% for one to two years, 10.6% for two to four years, 33% for more than four years and 16.0% had no employment relationship. Regarding the relationship between family income and the people who depend on it, 39.4% reported that they depended on this income between one to two people, 45.7% between two to four people, 13.8% between five to six people and more than seven people, 1.1%.

Finally, for factor four and the explanatory variables associated with it, 1.2% of the clustered dropouts considered their ICT skills to be poor, 24.5% fair, 33.9% good and 12.8% excellent. In the case of the parent's level of education, 55.3% said that their mother had primary school or lower, 28.7% had high school, 7.4% had a technical or technological degree and 7.4% had a vocational qualification; while 58.5% said that the father had primary school or lower, 25.5% had high school, 5.3% had a technical or technological degree, 6.4% had a vocational qualification and 2.4% had postgraduate training.

4.3.2. Cluster Two

This cluster was made up of 40 women and 34 men, with the majority of the students who dropped out early (70). Considering what was previously stated, the student characterisation instrument was completed by all the dropout students, while the classroom evaluation instrument was completed by only four students as a result of the observed phenomenon of early dropout. Given the above, for factor one, the analysis describes the particularities of the four dropouts, and for the descriptive analysis of factors two, three and four, all individuals clustered in this cluster were included.

Thus, the deserters were characterised by being very dissatisfied with the totality of the explanatory variables associated with factor one, whereby, the academic programme did not meet their expectations; the content, materials and resources provided were not useful and sufficient. On the other hand, they considered that the academic forums did not allow interaction with tutors and students, and that the synchronous classes did not support their learning process. In the case of the resolution of doubts by tutors and mentors, they expressed that these were not clarified, as well as evaluating the virtual learning environment negatively.

In the case of the explanatory variables of factor two, the dropouts in this cluster reported that 56.8% were single, 14.9% were married, 24.3% lived in union with their partner, 2.7% were divorced and 1.4% reported another marital status. With regard to age, 43.2% said they were under 25 years old, 31.1% between 25 and 35 years old, 6% between

35 and 45 years old, and 19.7% over 46 years old. In the case of the variable of population vulnerability, 18.9% said they were displaced, 6.8% belonged to ethnic communities, 2.7% were victims of the armed conflict and 71.6% did not present any condition of vulnerability. On the other hand, the dropouts indicated that 44.6% belonged to stratum one, 35.1% to stratum two, 18.9% to stratum three and 1.4% to stratum five. In turn, 40.5% were looking for a job offer, while 59.5% were not. Concerning their parents' occupation, 2.7% stated that the mother worked and studied, 9.5% worked occasionally, 18.9% worked permanently, 2.7% were pensioners, 45.9% worked at home, 6.8% were unemployed and 13.5% did not know her or she had died. In the case of fathers, 1.4% studied and worked, 20.3% worked occasionally, 29.7% worked permanently, 6.8% were pensioners, 5.4% worked at home, 2.7% were unemployed and 33.8% did not know him or he had died.

For factor three, 75.7% of the dropouts were working, where 4.1% earned less than the minimum, 17.6% earned the minimum, 24.3% earned between 820,858 and one million pesos (224 USD to 273 USD), 8.1% earned between one million and two million pesos (273 USD to 547 USD), and 6.8% earned more than two million pesos, while 8.1% did not earn any income. With regard to the length of employment, 24.3% had been employed for less than one year, 13.5% for one to two years, 14.9% for two to four years, 27% for more than four years, and 20.3% had no employment at all. With regard to family income and the people who depended on it, 37.8% reported that they depended on one to two people, 44.6% on three to four people, 14.9% on five to six people, and 2.7% on more than seven people.

In relation to factor four, 2.7% of the dropouts in this cluster considered that their command of information and communication technologies was bad, 23% average, 55.4% good and 18.9% excellent. In the case of the parent's educational level, 48.7% said that their mother had a primary school or lower level, 37.8% a high school diploma, 8.1% a technical or technological diploma, 1.2% a vocational diploma and 1.2% a postgraduate diploma; while 51.2% said that the father had a primary school or lower level, 29.7% a high school diploma, 9.5% a technical or technological diploma, 6.8% a vocational diploma and 1.4% a postgraduate diploma.

5. Discussion

As shown in the results section and based on the type of study developed in this article, there are several findings on the event of dropout that were found in relation to rural students enrolled in virtual undergraduate programmes. Firstly, the EFA revealed that, for this student population, the explanatory variables of dropout analysed are associated with four factors that do not necessarily respond to the model proposed by the MNE [23], as individual and socio-economic variables are combined in factors two and three, and academic variables are not linked in any of them. In the latter case, indications were generated that the variables explored in the instruments (e.g., knowledge of the study plan, time of transition between secondary and higher education, completion of virtual courses, etc.) may not have an impact on dropout in this type of population, which allows us to discuss previous research related to the educational modality, such as Choi and Kim [50], Stewart et al. [58] and Orellana et al. [49] who considered these variables critical for understanding student dropout. However, it is necessary to recognise that part of the limitations of the study in this determinant was the non-inclusion of variables such as the academic average prior to entering higher education, the average obtained in the semesters taken, the results of the state tests for entry to the educational level, as well as various psychological aspects related to the teaching and learning process. Therefore, future research should develop these aspects to have a holistic view of the event, and thus determine whether the academic explanatory variables do not affect student dropout in this type of students and modality.

Secondly, with respect to the hierarchical cluster analysis, the existence of two clusters was determined. The first one related to students who attended at least one semester before dropping out; the second one to those who dropped out early before finishing their

first academic semester. Considering what was previously stated, the dropouts who filled out the virtual classroom evaluation instrument stated that they were satisfied or very satisfied with the institutional conditions evaluated, such as course content, interaction with tutors and classmates, and the role of the mentor, among others. Thus, in the first instance, the event of desertion in rural students enrolled in virtual programmes cannot be directly associated with the variables of the factor, so this result generates new perspectives complementary to those raised by Guzmán et al. [61] or Webber and Ehrenberg [63], who recognised the influence of these variables in the non-completion of the students' training process. However, further research is needed on the reasons for early school leaving, as there is a general lack of knowledge as to whether institutional variables play a key role in this group.

Finally, given that there are no other statistically significant differences in the other items of the instruments, the students who dropped out were characterised by being single, although part of the student population claimed to have a nuclear family. Furthermore, dropouts reported working part-time or full-time, so dropout is influenced by students' family and work obligations as supported by previous studies (e.g., [39,43,44]). On the other hand, the age of entry into higher education is late for both clusters one and two, as they entered undergraduate education after the age of 25 and may be more likely to drop out [40,68].

In relation to the conditions of vulnerability, such as armed conflict or forced displacement, the majority of deserters reported that they did not have such a condition. However, it is a variable that has been little explored in the literature, so it should be studied in greater depth in both rural and urban populations, given that when associated with other variables it can be a catalyst for dropout in higher education, as Yasmin [42] argues. However, the variables related to the parents of the dropouts showed that they tend to have low levels of education, concentrating on primary and secondary school, as well as unpaid jobs, such as housework or part-time work. This could have an impact on rural student dropout in virtual undergraduate programmes, as supported by the relationships found by Ghignoni [36] regarding the educational level of parents, and by Li and Carroll [45] regarding the economic instability derived from poor working conditions.

With regard to socio-economic variables, and specifically related to the student's income, these were characterised as being less than one million pesos per month (equivalent to 284 USD), which, when associated with the student's family obligations, can lead them to drop out. This is also directly related to the strata reported by the sample, most of whom were in the first and second strata. That said, this type of variable influences dropout in the rural population enrolled in undergraduate programmes in virtual mode as it is a common characteristic of students, as stated by Adrogué and García [54].

Finally, the results presented here should be analysed from the perspective of the limitations of the study, given its exploratory nature and the cross-sectional nature of the data, which do not allow us to evaluate changes in the values of the explanatory variables at different points in time apart from the first entry to the institution. However, the size of the sample and its restriction to a single HEI may lead to results that differ from those presented in this article when applying the instruments in other scenarios. In addition, there are other issues expressed throughout this discussion, which, if complemented in future research, could provide a more complete picture of dropout involving higher education, rural populations and the virtual modality.

6. Conclusions

The study presented here aimed to identify the individual, institutional, academic and socio-economic characteristics that influence rural student dropout in virtual undergraduate programmes in Colombia. In this sense, it was determined that students share common characteristics that affect the decision to end their educational process early, such as marital status (associated with family obligations), age, stratum, work obligations, educational level, type of work performed by parents, income, the type of employment relationship of the student, and finally, the number of people who depend on the family income.

Under this scenario, we have a new perspective of dropout in this population and modality in the country, finding divergences with studies conducted at the international level, and providing elements of judgment for decision-makers in terms of public policy for the prevention and mitigation of the event of dropout. In this sense, it is necessary to recognise that the current public policy in Colombia has focused mainly on the economic problems of students and on some academic and social aspects dealt with by HEIs. However, this type of strategy is not sufficient to effectively control dropout levels in this type of student population, given that it does not address some of the explanatory variables identified here.

Taking what was previously explained into consideration, the state must implement various policies that are directly or indirectly related to education, to complement existing ones. An example of this would be the subsidising of family income in order to alleviate the economic pressure that forces students to work, or lowering the entry age to higher education, which goes beyond the policies of the educational level and requires a link with previous levels and with the realities of each region. Despite these suggestions for public policies, it must be recognised that some of the variables identified can only be dealt with over time, given that their change is complex in the short or medium term, such as the educational level of the parents, the work they do or the social stratum linked to the student's living conditions.

Based on these elements of judgment, which should be addressed by the State, it would be expected to have a positive impact on the permanence and timely graduation of rural students enrolled in virtual undergraduate programmes, thus achieving the benefits of the educational level, making a significant contribution to the fulfilment of the 2030 Agenda, and most importantly, overcoming the social disparities that exist in rural areas.

Author Contributions: Conceptualization, A.G.R. and S.B.; methodology, A.G.R. and S.B.; software, A.G.R. and S.B.; validation, A.G.R. and S.B.; formal analysis, A.G.R. and S.B.; investigation, A.G.R. and S.B.; resources, A.G.R. and S.B.; data curation, A.G.R.; writing—original draft preparation, A.G.R. and S.B.; writing—review and editing, A.G.R., S.B. and F.C.V.; visualization, A.G.R. and S.B.; supervision, S.B. and F.C.V.; project administration A.G.R. and S.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Institutional Review Board of University Corporation of Asturias (protocol code 02-2021 and date of approval 15 February 2021).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to the current Colombian laws that require the signing of a data transfer contract between the Corporation of Asturias and the applicants.

Acknowledgments: To Cecilia Carabajal who, with her unconditional support, made the style correction and translation of this article, and Ester Martín-Caro Álamo who with your support allowed access to institutional data.

Conflicts of Interest: The authors declare no conflict of interest.

16 of 21

Appendix A

Table A1. Self-report instrument of initial student characteristics.

Code	e Item	Response Option
A1	Do you know the syllabus of the degree course you are going to start?	1: yes, I do, 2: I have looked at it, but I do not understand it, 3: I have seen it, but I have not studied it in depth, 4: I only know the subjects of the first semester, 5: I know it moderately and 6: I do not know it.
A2	After graduating, you:	1: you studied and completed a university degree, 2: you studied and did not complete a university degree, 3: you have not studied and 4: you are a recent graduate.
A3	From the time you graduated from high school, how much time elapsed before you enrolled in a Higher Education Institution?	1: less than three months, 2: between three and six months, 3: more than six months and up to one year. 4: more than one year and 5: do not remember.
A4	If you have studied and did not finish your studies, why did you not complete these studies?	 was not of my interest, 2: did not meet my expectations, due to poor academic performance, 4: family pressure, work obligations, 6: difficulties with the educational institution, 7: financial difficulties, 8: personal commitments, 9: I did not like the mode of study and 10: not applicable.
A5	Of the following factors, which do you consider to have been the most important in your career choice?	1: skills and abilities, 2: your vocation, 3: family, 4: school orientation, 5: income of professionals in this career, 6: low cost of tuition, 7: friends, 8: none in particular and the way it was offered.
A6	Was the institution where you completed your high school education bilingual?	1: yes and 2: no.
A7	What was the main reason you chose to study online?	1: I don't have time to do it in any other way, 2: I consider myself a self-taught person, 3: I consider it the best option for my current way of life, 4: I find it the best way to learn and 5: I have no other option.
A8	Starting your professional training in the virtual modality generates:	1: fear because I think I lack time organisation, 2: fear because I don't know how the modality works, 3: fear because I don't handle ICTs well, 4: happy because I want to evolve professionally, 5: anxious but convinced that it was an excellent decision and 6: calm because I know that I will do very well.
A9	Have you ever taken virtual courses?	1: yes and 2: no.
I1	Gender	1: feminine y 2: masculine.
I2	Are you a single parent?	1: yes and 2: no.
I3	What is your marital status?	1: single, 2: married, 3: free union, 4: divorced, 5: widowed, 6: other.
I4	Your age is between:	1: 16 or less, 2: 17 and 18, 3: 19 to 25, 4: 26 to 30, 5: 31 to 35, 6: 35 to 40, 7: 41 to 45, 8: 46 to 50 and 9: 51 or more.
I6	How would you rate your IT skills?	1: poor, 2: bad, 3: fair, 4: good and 5: excellent.
17	Do any of the following situations currently exist in your family?	1: poor family relationships, 2: death of a relative, 3: domestic violence, 4: sexual abuse or violence, 5: chronic illness of a relative, 6: separation of parents, 7: alcoholism or substance addiction, 8: forced displacement, 9: economic difficulties of the family and 10: none of the above.

Table A1. Co	nt.
--------------	-----

Code	Item	Response Option
I8	How many siblings have a higher education degree?	1: I have no siblings, 2: 1, 3: 2, 4: 3 and 5: 4 or more
I9	Please indicate if you belong to any of the following communities:	1: displaced persons, 2: ethnic communities, 3: victims of armed conflict, 4: terminally ill, 5: disability (sensory, motor or cognitive) and 6: none of the above.
I10	Which of the following situations have you encountered that have been affecting your living conditions?	1: alcohol consumption, 2: psychoactive substance use, 3: eating disorders, 4: promiscuity, 5: gambling or video games, 6: sexually abusive situation and 7: none of the above.
I11	Which of the following supports have you needed during your life, even if you have not received attention for them?	1: help to improve behaviour and school coexistence, 2: learning supports, 3: mental health support or counselling, 4: occupational therapy, 5: movement therapy or physiotherapy, 6: speech, hearing or speech therapy, and 7: none of the above.
I13	Do you suffer from any chronic or permanent illness for which you need specialised care?	1: yes and 2: no.
I14	Would you like to receive support to learn how to manage your time better, acquire habits or improve your study skills?	1: yes and 2: no.
I15	Do you have any disability?	1: yes and 2: no.
I16	What is your mother's level of schooling?	1: primary or lower, 2: high school, 3: technician or technologist, 4: professional, 5: postgraduate and 6: not applicable.
I17	What is your father's level of schooling?	1: primary or lower, 2: high school, 3: technician or technologist, 4: professional, 5: postgraduate and 6: not applicable.
S1	What socio-economic stratum does your household belong to?	1, 2, 3, 4, 5 or 6.
S2	Type of affiliation to the General Social Security Health System:	1: contributory scheme, 2: subsidised scheme, and 3: no scheme
S3	Are you currently working?	1: yes and 2: no.
S4	Are you looking for a job offer?	1: yes and 2: no.
S5	What is your salary range?	1: less than the minimum, 2: the minimum (\$820,857), 3: between \$820,858 and \$1,000,000, 4: between \$1,000,001 and \$2,000,000, 5: between \$2,000,001 and \$4,000,000, 6: more than \$4,000,001 and 7: not working.
S6	How long have you been working?	1: no work, 2: 0–6 months, 3: 6–12 months, 4: 1–2 years, 5: 2–4 years and 6 more than 4 years
S7	El ingreso económico aproximado de su grupo familiar es:	1: less than the minimum, 2: the minimum (\$820,857), 3: between \$820,858 and \$1,000,000, 4: between \$1,000,001 and \$2,000,000, 5: between \$2,000,001 and \$4,000,000, 6: more than \$4,000,001 and 7: not working.
S8	How many people depend on this household income?	1: between 1 and 2, 2: between 3 and 4, 3: between 5 and 6 and 4: more than 7.

Table A1. Cont.

Code	Item	Response Option
S9	Who pays for most of your studies?	1: spouse, 2: parents, 3: other relatives or third parties, 4: scholarship, 5: credit and 6: own salary.
S10	Your home is:	1: own or family fully paid, 2: own or family in debt, 3: rented and 4: loan or encroachment.
S11	What is your mother's main occupation?	1: studying, 2: studying and working, 3: working occasionally, 4: working permanently, 5: pensioner, 6: working at home, 7: unemployed and 8: not known or deceased.
S12	What is your father's main occupation?	1: studying, 2: studying and working, 3: working occasionally, 4: working permanently, 5: pensioner, 6: working at home, 7: unemployed and 8: not known or deceased.

Appendix **B**

Table A2. Self-report scale of initial student characteristics.

Code	Item ¹
IES1	To what extent does the academic programme meet your training expectations?
IES2	To what extent were the contents, materials and resources provided useful and sufficient for your learning process?
IES3	To what extent does the forum facilitate interaction with the tutor and other colleagues?
IES4	To what extent have the recorded synchronous classes helped you to clarify key concepts of the subject and to face the assessments with greater confidence?
IES5	To what extent does the tutor respond in a timely manner to academic concerns related to the subject?
IES6	What is your assessment of the tutor's technical knowledge and clarity of answers?
IES7	To what extent does the virtual platform facilitate access and navigation to the contents and resources provided for your learning?
IES8	To what extent does the academic mentor respond in a timely and clear manner to the concerns and situations presented during the development of the subject?

¹ items were evaluated on a scale of 0 to 5. Where 0 corresponds to "no response" representing desertion before the application of the instrument, 1 "very dissatisfied", 2 "dissatisfied", 3 "neither one nor the other", 4 "satisfied" and 5 "very satisfied".

References

- 1. De Ochoa, G.A. Cobertura e Inequidad. Educación Superior En Colombia. Educ. Educ. 2002, 5, 9–20.
- 2. United Nations Development Programme. ODS en Colombia: Los Retos Para 2030; UNDP: New York, NY, USA, 2015.
- 3. Ministry of National Education. *Plan Especial de Educación Rural: Hacia el Desarrollo Rural y la Construcción de Paz;* Ministry of National Education: Bogotá, Colombia, 2017.
- 4. Ministry of National Education. *Plan Rural de Educación Superior: Estrategias de Fortalecimiento de Capacidades Para el Desarrollo Territorial;* Ministry of National Education: Bogotá, Colombia, 2018.
- Rural Population. World Bank: Washington, DC, USA, 2019. Available online: https://data.worldbank.org/indicator/SP.RUR. TOTL.ZS?locations=CO (accessed on 15 January 2021).
- 6. Necesidades Básicas Insatisfechas (NBI)—Censo Nacional de Población y Vivienda (CNPV) 2018; National Department of Statistics: Bogotá, Colombia, 2018.
- 7. National Council of Higher Education. *Acuerdo por lo Superior 2034: Propuesta de Política Pública Para la Excelencia de la Educación Superior en Colombia en el Escenario de la Paz;* Ministry of National Education: Bogotá, Colombia, 2014.
- Cristia, J.; Pulido, J. Education in Latin America and the Caribbean: Segregated and unequal. In *The Inequality Crisis: Latin America and the Caribbean at the Crossroad*; Busso, M., Messuna, J., Eds.; Inter-American Development Bank: Washington, DC, USA, 2020; pp. 159–184.

- 9. Montenegro, C.E.; Patrinos, H.A. *Comparable Estimates of Returns to Schooling around the World*; Banco Mundial: Washington, DC, USA, 2014.
- 10. Atchoarena, D.; Holmes, K.; Atchoarena, D.; Holmes, K. The Role of Agricultural Colleges and Universities in Rural Development and Lifelong Learning in Asia. *Asian J. Agric. Dev.* **2005**, *2*, 15–24. [CrossRef]
- 11. McMahon, W.W. The External Benefits of Education. In *International Encyclopedia of Education*; Peterson, P., Baker, E., McGaw, B., Eds.; Elsevier: Amsterdam, The Netherlands, 2010; pp. 260–271.
- 12. Chalfin, A.; Deza, M. The Intergenerational Effects of Education on Delinquency. J. Econ. Behav. Organ. 2019, 159, 553–571. [CrossRef]
- 13. Callender, C.; Dougherty, K.J. Student Choice in Higher Education—Reducing or Reproducing Social Inequalities? *Soc. Sci.* 2018, 7, 189. [CrossRef]
- 14. Lance, L. Nonproduction Benefits of Education: Crime, Health, and Good Citizenship. In *Handbook of the Economics of Education;* Hanushek, E.A., Welch, F., Eds.; Elsevier B.V.: Amsterdam, UK, 2006; Volume 14, pp. 183–282.
- 15. Smith-Greenaway, E. Does Parents' Union Instability Disrupt Intergenerational Advantage? An Analysis of Sub-Saharan Africa. *Demography* **2020**, *57*, 445–473. [CrossRef] [PubMed]
- 16. Currie, J.; Moretti, E. Mother's Education and the Intergenerational Transmission of Human Capital: Evidence from College Openings. *Q. J. Econ.* **2003**, *118*, 1495–1532. [CrossRef]
- 17. Allmendinger, J.; Kleinert, C.; Pollak, R.; Vicari, B.; Wölfel, O.; Althaber, A.; Antoni, M.; Christoph, B.; Drasch, K.; Janik, F.; et al. Adult Education and Lifelong Learning. In *Education as a Lifelong Process*; Blossfeld, H.-P., Roßbach, H.-G., Eds.; Springer Fachmedien Wiesbaden: Wiesbaden, Germany, 2019; Volumn 3, pp. 325–346. [CrossRef]
- 18. Kim, D.; Kim, S. Sustainable Education: Analyzing the Determinants of University Student Dropout by Nonlinear Panel Data Models. *Sustainability* **2018**, *10*, 954. [CrossRef]
- Moreno, W.; Segovia, N.G.; Grillo, M.C.; Dworaczek, H.O.; Coy, H.V. Naturaleza del endeudamiento como base de la propuesta de política pública para la educación superior en Colombia desde 2013. In *Innovación Docente e Investigación en Ciencias Sociales*, 1st ed.; Belmonte, L.J., Vázquez, J.J., Simón, M.M., Soriano, N.F., Oropesa, A., Barragán, A.B., Eds.; Dykinson, S.L.: Madrid, Spain, 2019; pp. 25–36.
- 20. Colombian Institute of Educational Credit and Technical Studies Abroad. Crédito Educativo más Colombiano que Nunca. Available online: https://portal.icetex.gov.co/mascolombianoquenunca/index.html (accessed on 1 February 2021).
- 21. Colombia Learns. Generación E. Available online: https://especiales.colombiaaprende.edu.co/generacione/ (accessed on 1 February 2021).
- 22. Ministry of National Education. *Plan Estratégico Institucional y Plan de Acción Institucional*; Ministry of National Education: Bogotá, Colombia, 2019.
- 23. Ministry of National Education. *Guía Para la Implementación del Modelo de Gestión de Permanencia y Graduación Estudiantil en Instituciones de Educación Superior;* Ministry of National Education: Bogotá, Colombia, 2015.
- Guzmán, A.; Rodriguez-Canovas, B. Identificación de Estudiantes Rurales Con Intención de Desertar En Programas de Pregrado En Modalidad Virtual: Análisis de Clústeres Caso Colombia. In *Innovación Docente e Investigación en Educación: Avanzando en el* Proceso de Enseñanza-Aprendizaje; Dykinson: Madrid, Spain, 2020; pp. 519–532.
- 25. Bilige, S.; Gan, Y. Hidden School Dropout among Adolescents in Rural China: Individual, Parental, Peer, and School Correlates. *Asia-Pac. Educ. Res.* **2020**, *29*, 213–225. [CrossRef]
- Mughal, A.W. Secondary School Students Who Drop out of School in Rural Pakistan: The Perspectives of Fathers. *Educ. Res.* 2020, 62, 199–215. [CrossRef]
- 27. Ibarrola, M. Los Centros de Bachillerato Tecnológico Agropecuario y la producción agrícola escolar en la formación para el trabajo. *Rev. Mex. Investig. Educ.* 2020, 25, 91–119.
- 28. Lewine, R.; Manley, K.; Bailey, G.; Warnecke, A.; Davis, D.; Sommers, A. College Success Among Students From Disadvantaged Backgrounds: "Poor" and "Rural" Do Not Spell Failure. *J. Coll. Stud. Retent. Res. Theory Pract.* **2019**, 1–13. [CrossRef]
- 29. Bungău, C.; Pop, A.P.; Borza, A. Dropout of First Year Undergraduate Students: A Case Study of Engineering Students. *Balk. Reg. Conf. Eng. Bus. Educ.* 2017, 2, 349–356. [CrossRef]
- 30. Byun, S.; Irvin, M.J.; Meece, J.L. Predictors of Bachelor's Degree Completion among Rural Students at Four-Year Institutions. *Rev. High. Educ.* **2012**, *35*, 463–484. [CrossRef] [PubMed]
- 31. Yunhua, Q. Research and Application of Diversified Model in Yardstick of Higher Education Tuition. In 2009 International Conference on Test and Measurement; IEEE: New York, NY, USA, 2009; Volume 2, pp. 319–322. [CrossRef]
- 32. Snyder, T.D.; Dillow, S.A. *Digest of Education Statistics*, 2009. NCES 2010-013; National Center for Education Statistics: Washington, DC, USA, 2010.
- 33. UNESCO. Education Post-COVID-19: Extraordinary Session of the Global Education Meeting (2020 GEM); UNESCO: New York, NY, USA, 2020.
- 34. Gibbs, R.M. College Completion and Return Migration among Rural Youth. In *Rural Education and Training in the New Economy: The Myth of the Rural Skills Gap*; Swaim, P.L., Teixeira, T.R., Eds.; Iowa State University Press: Ames, IA, USA, 1998; pp. 61–80.
- 35. Georg, W. Individual and Institutional Factors in the Tendency to Drop out of Higher Education: A Multilevel Analysis Using Data from the Konstanz Student Survey. *Stud. High. Educ.* **2009**, *34*, 647–661. [CrossRef]

- Ghignoni, E. Family Background and University Dropouts during the Crisis: The Case of Italy. *High. Educ.* 2017, 73, 127–151. [CrossRef]
- Cochran, J.D.; Campbell, S.M.; Baker, H.M.; Leeds, E.M. The Role of Student Characteristics in Predicting Retention in Online Courses. *Res. High. Educ.* 2014, 55, 27–48. [CrossRef]
- Van Bragt, C.A.C.; Bakx, A.W.E.A.; Teune, P.J.; Bergen, T.C.M.; Croon, M.A. Why Students Withdraw or Continue Their Educational Careers: A Closer Look at Differences in Study Approaches and Personal Reasons. J. Vocat. Educ. Train. 2011, 63, 217–233. [CrossRef]
- 39. Arias-Velandia, N.; Rincón-Báez, W.U.; Cruz-Pulido, J.M. Desempeño de Mujeres y Hombres En Educación Superior Presencial, Virtual y a Distancia En Colombia. *PANORAMA* 2018, 12, 57–69. [CrossRef]
- 40. Beck, H.P.; Milligan, M. Factors Influencing the Institutional Commitment of Online Students. *Int. High. Educ.* 2014, 20, 51–56. [CrossRef]
- 41. Stoessel, K.; Ihme, T.A.; Barbarino, M.-L.; Fisseler, B.; Stürmer, S. Sociodemographic Diversity and Distance Education: Who Drops Out from Academic Programs and Why? *Res. High. Educ.* **2015**, *56*, 228–246. [CrossRef]
- 42. Yasmin, D. Application of the Classification Tree Model in Predicting Learner Dropout Behaviour in Open and Distance Learning. *Distance Educ.* 2013, 34, 218–231. [CrossRef]
- Packham, G.; Jones, P.; Miller, C.; Thomas, B. E-learning and Retention: Key Factors Influencing Student Withdrawal. *Educ. Train.* 2004, 46, 335–342. [CrossRef]
- 44. Rice, J.; Rojjanasrirat, W.; Trachsel, P. Attrition of On-Line Graduate Nursing Students Before and After Program Structural Changes. J. Prof. Nurs. 2013, 29, 181–186. [CrossRef] [PubMed]
- 45. Li, I.W.; Carroll, D.R. Factors Influencing Dropout and Academic Performance: An Australian Higher Education Equity Perspective. J. High. Educ. Policy Manag. 2020, 42, 14–30. [CrossRef]
- 46. Park, J.-H.; Choi, H.J. Factors Influencing Adult Learners' Decision to Drop Out or Persist in Online Learning. *Educ. Technol. Soc.* **2009**, *12*, 207–217.
- 47. Giovagnoli, P.I. Determinantes de la Deserción y Graduación Universitaria: Una Aplicación Utilizando Modelos de Duración; Universidad Nacional de la Plata: La Plata, Argentina, 2002.
- Vera Cala, L.M.; Niño García, J.A.; Porras Saldarriaga, A.M.; Durán Sandoval, J.N.; Delgado Chávez, P.A.; Caballero Badillo, M.C.; Rueda Pablo, J.N. Salud mental y deserción en una población universitaria con bajo rendimiento académico. *Rev. Virtual Univ. Catol. Norte* 2020, 60, 137–158. [CrossRef]
- 49. Orellana, D.; Segovia, N.; Cánovas, B.R. El abandono estudiantil en programas de educación superior virtual: Revisión de literatura. *Rev. Educ. Super.* 2020, 49, 45–62.
- 50. Choi, H.J.; Kim, B.U. Factors Affecting Adult Student Dropout Rates in the Korean Cyber-University Degree Programs. J. Contin. High. Educ. 2018, 66, 1–12. [CrossRef]
- 51. Schmitt, J.; Fini, M.I.; Bailer, C.; Fritsch, R.; de Andrade, D.F. WWH-Dropout Scale: When, Why and How to Measure Propensity to Drop out of Undergraduate Courses. *J. Appl. Res. High. Educ.* **2020**, ahead-of-print. [CrossRef]
- 52. Contreras, C. Rendimiento académico de los alumnos de último año de Licenciaturas presenciales e Ingeniería de la Facultad Multidisciplinaria de Ilobasco durante el ciclo I-2017. *Anu. Investig.* **2018**, *7*, 125–139.
- Palacio, L.E.; Vargas, J.D.; Monroy Toro, S.L. Análisis bibliométrico de estudios sobre factores socioeconómicos en estudiantes universitarios. *Educ. Educ.* 2020, 23, 355–375. [CrossRef]
- 54. Adrogue, C.; García de Fanelli, A.M. Gaps in Persistence under Open-Access and Tuition-Free Public Higher Education Policies. *Education Policy Analysis Archives* **2018**, *26*, 126. [CrossRef]
- Soons, J.P.M.; Liefbroer, A.C.; Kalmijn, M. The Long-Term Consequences of Relationship Formation for Subjective Well-Being. J. Marriage Fam. 2009, 71, 1254–1270. [CrossRef]
- Erdogan, B.; Bauer, T.N.; Truxillo, D.M.; Mansfield, L.R. Whistle While You Work: A Review of the Life Satisfaction Literature. J. Manag. 2012, 38, 1038–1083. [CrossRef]
- 57. Heidrich, L.; Victória Barbosa, J.L.; Cambruzzi, W.; Rigo, S.J.; Martins, M.G.; dos Santos, R.B.S. Diagnosis of Learner Dropout Based on Learning Styles for Online Distance Learning. *Telemat. Inform.* **2018**, *35*, 1593–1606. [CrossRef]
- 58. Stewart, S.; Lim, D.H.; Kim, J. Factors Influencing College Persistence for First-Time Students. J. Dev. Educ. 2015, 38, 12.
- 59. Cerezo, R.; Bernardo, A.; Esteban, M.; Tuero, E. Programas para la promoción de la autorregulación en educación superior: Un estudio de la satisfacción diferencial entre metodología presencial y virtual. *Eur. J. Educ. Psychol.* **2015**, *8*, 30–36. [CrossRef]
- 60. Choi, H.J.; Park, J.-H. Testing a Path-Analytic Model of Adult Dropout in Online Degree Programs. *Comput. Educ.* **2018**, 116, 130–138. [CrossRef]
- Guzmán, A.; Quecano, L.I.; Segovia-García, N.; Rodríguez-Cánovas, B. Abandono estudiantil en Educación Superior y su relación con la comunicación en programas de modalidad virtual: Colombia. In *La Comunicación Especializada Del Siglo XXI*; McGraw-Hill Interamericana de España: Madrid, Spain, 2020; pp. 939–957.
- Armstrong, S.N.; Early, J.O.; Burcin, M.M.; Bolin, K.; Holland, N.; No, S. New Media Tools Impact on Online, Health Science Students' Academic Persistence and Support: Lessons Learned from Two Pilot Studies. *TechTrends* 2018, 62, 266–275. [CrossRef]
- 63. Webber, D.A.; Ehrenberg, R. Do Expenditures Other than Instructional Expenditures Affect Graduation and Persistence Rates in American Higher Education? *Econ. Educ. Rev.* **2009**, *29*, 947–958. [CrossRef]

- 64. Kehm, B.M.; Larsen, M.R.; Sommersel, H.B. Student Dropout from Universities in Europe: A Review of Empirical Literature. *Hung. Educ. Res. J.* **2019**, *9*, 147–164. [CrossRef]
- 65. Lehan, T.J.; Hussey, H.D.; Shriner, M. The Influence of Academic Coaching on Persistence in Online Graduate Students. *Mentor. Tutoring Partnersh. Learn.* 2018, 26, 289–304. [CrossRef]
- 66. Xavier, M.; Meneses, J. A Literature Review on the Definitions of Dropout in Online Higher Education. *JECP* **2020**, *1*, 73–80. [CrossRef]
- 67. Zuñiga, M.G. Desercion Estudiantil en el Nivel Superior, 1st ed.; Trillas: Mexico City, Mexico, 2006.
- 68. Project Alfa Guide. Estudio Sobre Políticas Nacionales Sobre el Abandono en la Educación Superior en los Países Que Participan en el Proyecto ALFA-GUIA; European Union: Brussels, Belgium, 2013.
- 69. Ministry of National Education. Deserción Estudiantil en la Educación Superior Colombiana: Metodología de Seguimiento, Diagnóstico y Elementos Para su Prevención, 1st ed.; Ministry of National Education: Bogotá, Colombia, 2009.
- 70. Tinton, V.; Cullen, J. Dropout in Higher Education: A Review and Theoretical Synthesis of Recent Research; Office of Education (DHEW): Washington, DC, USA, 1973.
- 71. Tinto, V. Dropout from Higher Education: A Theoretical Synthesis of Recent Research. Rev. Educ. Res. 1975, 45, 89–125. [CrossRef]
- 72. Tinto, V. Leaving College: Rethinking the Causes and Cures of Student Attrition, 1st ed.; University of Chicago Press: Chicago, IL, USA, 1987.
- Barragán, S.P.; González, L. Acercamiento a la deserción estudiantil desde la integración social y académica. *Rev. Educ. Super.* 2017, 46, 63–86. [CrossRef]
- 74. Himmel, E. Modelo de Análisis de La Deserción Estudiantil En La Educación Superior. Calid. Educ. 2002, 17, 91. [CrossRef]
- 75. Kemper, L.; Vorhoff, G.; Wigger, B.U. Predicting Student Dropout: A Machine Learning Approach. *Eur. J. High. Educ.* **2020**, *10*, 28–47. [CrossRef]
- 76. Klein, D. Das Zusammenspiel zwischen akademischer und sozialer Integration bei der Erklärung von Studienabbruchintentionen. Eine empirische Anwendung von Tintos Integrationsmodell im deutschen Kontext. Z. Erzieh. 2019, 22, 301–323. [CrossRef]
- 77. Radovan, M. Should I Stay, or Should I Go? Revisiting Student Retention Models in Distance Education. *Turk. Online J. Distance Educ.* **2019**, 20, 29–40. [CrossRef]
- Yepes, F.L.; Beltrán, M.; Martínez, E.Y. Academic dropout among undergraduate students from Universidad de Antioquia school of dentistry, 2004–2014. Revista Facultad de Odontología Universidad de Antioquia 2017, 29, 76–95. [CrossRef]
- 79. Heublein, U.; Spangenberg, K.; Sommer, D. Ursachen Des. Studienabbruchs. Analyse 2002, 1st ed.; HIS GmbH: Berlin, Germany, 2002.
- Heublein, U.; Hutzsch, C.; Schreiber, J.; Sommer, D.; Besuch, G. Ursachen Des. Studienabbruchs in Bachelor-Und Herkömmlichen Studiengängen: Ergebnisse Einer Bundesweiten Befragung von Exmatrikulierten Des. Studienjahres 2007/2008 [Causes for Dropout in Bachelor and Traditional Study Programmes. Results of a National Survey of Exmatriculated Students of the Academic Year 2007/2008], 1st ed.; HIS GmbH: Berlin, Germany, 2010.
- 81. Patton, M.Q. *Qualitative Research & Evaluation Methods: Integrating Theory and Practice*, 4th ed.; SAGE Publications, Inc.: Thousand Oaks, CA, USA, 2015.
- 82. Oasi, O.; Maggio, S.; Pacella, S.; Molgora, S. Dropout and Narcissism: An Exploratory Research about Situational Factors and Personality Variables of the Psychotherapist. *Res. Psychother.* **2019**, *22*, 369. [CrossRef]
- Godfrey, D.; Seleznyov, S.; Anders, J.; Wollaston, N.; Barrera-Pedemonte, F. A Developmental Evaluation Approach to Lesson Study: Exploring the Impact of Lesson Study in London Schools. *Prof. Dev. Educ.* 2019, 45, 325–340. [CrossRef]
- 84. Cronbach, L.J. Coefficient alpha and the internal structure of tests. Psychometrika 1951, 16, 297–334. [CrossRef]
- 85. Comrey, A.L.; Lee, H. A First Cours in Factor Analysis; Lawrence Erlbaum Associates, Inc.: Hillsdale, NJ, USA, 1992.
- 86. Tan, P.-N.; Steinbach, M.; Karpatne, A.; Kumar, V. Introduction to Data Mining, 2nd ed.; Pearson: New York, NY, USA, 2019.