DETERMINANTS OF DISTANCE EDUCATION DROPOUT: EVIDENCE FOR OPEN UNIVERSITY OF BRAZIL/FEDERAL UNIVERSITY OF SANTA MARIA COURSES

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ABSTRACT

This research seeks to understand the determinants of student dropout in the courses offered at the Open University of Brazil system at the Federal University of Santa Maria. The research used the following methods: survival function, factorial analysis, and logistic function. Results indicated that male students, with higher levels of income, who live a greater distance from the pole and who travel to it more frequently have a higher probability to drop out. Conversely, greater agreement with the adequacy of academic aspects and lower technological difficulties reduce the chance of dropout. Contrary to the evidence, the adequacy of the non-academic aspects, which refer to the infrastructure, equipment, and functioning of the hubs, increases the likelihood of dropout. However, e variation in the dropout due to the non-academic aspects of the pole is much smaller than the distance and frequency of going to the pole. Therefore, we suggested that the increase in face-to-face activities has a greater impact on the probability of dropout than the physical conditions of the pole.

Keywords: Student dropout, distance education, graduated and postgraduate courses, Open University of Brazil, Federal University of Santa Maria.

INTRODUCTION

Recently, distance education has grown systematically; however, this education modality has faced contradicts, such as the perceived quality of education (Behr et al., 2020, Gunduz & Karaman, 2020) and limits, such as the high dropout rates (Bittencourt & Mercado, 2014, Sousa & Maciel, 2016, Mouton, Zhang & Ertl, 2020). This, at the same time that higher institutions seek to expand opportunities, work with the need for pedagogical and technological adaptations and innovations for the creation and management of distance courses that produce effective results.

However, the dropout is a problem of concern to educational institutions (Lu, 2019, Radovan, 2019), as it means the interruption of the study cycle and cause aggravated social, academic, and economic problems, both for institutions, and students (Schmitt et al., 2020, Kilinc & Okur, 2021, Greenland & Moore, 2021). It is a failure of the higher education system to generate results after a significant volume of resources has been invested (Organization for Economic Co-operation and Development, 2012). Such impacts are even greater in the distance education because dropout reaches expressive numbers. According to the Brazilian Association of Distance Education [ABED] (2019), about 40% of institutions with fully remotely regulated courses recorded dropout rates between 21% and 50%.

The term dropout has several meanings, which indicate dropouts, removals, and transfers. It is a complex phenomenon a with a natural heterogeneity of definitions (Grau-Valldosera & Minguillion, 2014). Therefore, Silva & Mariano (2021) highlighted that the success of diagnostic depends, among other things, on an adequate definition of the phenomenon to be addressed. Santos and Oliveira (2009), indicated that dropout refers to the student who gives up permanently at any stage of the course. For Schmitt et al. (2020) dropout is the student's decision to drop out of the course for any reason. In distance education, dropout also includes students who enrolled and never presented themselves in the virtual environment to mediators or colleagues or who did not perform activities (Favero, 2006) or those who just voluntarily give up (Levy, 2007).

In the public distance education system, which has in the Open University of Brazil (OUB) system its structure of offering courses, dropout is also among the priorities, since the high rates determine, in a certain way, a measure of the inefficiency of public policy, since they necessarily imply in idleness in the system and higher expenses per student. In this sense, reducing dropout rates should be more than an institutional commitment, because as a public educational program, OUB courses represent the possibility of access to public higher education. In this perspective, understanding the determinants of dropout becomes essential for public institutions to promote changes in the distance education system, both in terms of management and supply. These changes will make it possible to reduce the dropout rates; and consequently, increase efficiency in the students training.

Thus, in the search for the causes of dropout, several studies identified different factors and models. Rovai (2003) initially presented four fundamental dimensions to the analysis of dropout: Socio-demographic situation, skills, and previous experiences, the situation of students that vary in course and interaction, participation, and performance. Ramos, Bicalho and Sousa (2014) expanded these dimensions, and added course and university management. Silva, Martins and Maciel (2017) subdivided the relevant factors into four categories: those related to students; the institution, teachers/tutors, and external factors. To Behr et al. (2020), the determinants can be categorized into the demographic and family background, the financial situation of students, their prior education, institutional determinants, as well as motivation and satisfaction with study.

Empirical evidence, based on different models of analysis, has in common several determinants of dropout. The three main factors, in order of importance: lack of time, financial and wrong choice (ABED, 2016).

Silva, Martins and Maciel (2017) identified that the main factors for the student's abandonment of the course are (i) low academic performance, (ii) lack of time, (iii) inexperience in distance education (lack of discipline), autonomy, maturity, among others, (iv) lack of motivation and (v) the lack of interaction and participation in the virtual learning environment. Already Vieira et al. (2020) founded two dimensions, one relating to support to learning, and the other to personal conditions during study.

The Federal University of Santa Maria (UFSM), has been offering Open University of Brazil (OUB) courses since the structuring of the system in 2005, presuming that dropout is approximately of 44% for graduation courses and 38% for postgraduate courses (Saldanha & Bender, 2020). As the was not analyzed in the institution, the UFSM does not have studies that assess the reasons for dropping out of distance learning courses. This information gap makes it impossible for the students to have adequate knowledge of their conditions; and consequently, for the production of effective policies to combat dropout and non-completion of courses.

A Condition that causes the need for the institutions to find possible strategies to increase the percentage of graduating students; and, consequently, reduce the expenditure per student trained in the distance learning system. Based on these discussions, this study determined factors of student dropout in the Open University of Brazil system of the Federal University of Santa Maria (OUB/UFSM).

Supporting this, the research explained in more detail the conditioning factors of the development and conclusion of the courses in this teaching modality, as well as the importance of educational tools in this process. Thereby, the study will subsidize the institution's managers and the coordinators of distance education courses in the formulation of educational policies on the use of technological resources selectively and directed toward effectiveness. The knowledge of the probability of a student escaping allow the institution to take differentiated and specific strategies for students who are more likely to drop out of the courses.

METHOD

To achieve the objective of this study, descriptive research was conducted using the quantitative method and applying the survey design. Descriptive research analyzed a certain problem or situation to provide greater familiarity with the theme (Hair et al. 2010). About the research design, the study is characterized as a case study (Creswell, 2014). As a research strategy, a survey was used, as this is highlighted t by Hair et al. (2010), as being the most appropriate in studies involving a sample of many individuals.

Population and Sample

Are part of the population of all students who enrolled in graduated and postgraduate courses offered by OUB/UFSM, from 2005 to 2018, totaling 18,025 enrollments. The research instrument was sent by e-mail, at the Data Processing Center of UFSM, to the entire population and was available online, for 15 days. After this period, 859 valid instruments were obtained, of which 364 were regularly enrolled and 495 were evaded students. The research was approved by the Research Ethics Committee (CAAE: 00982218.0.0000.5346).

Instrument

The questionnaire was divided into three parts. The first identifies the student profile and the enrolled course. The second refers to the extent of the dropout, including the reasons that would take to the course abandonment. The third analyzes the quality of the OUB course from the dimensions of the HEdPERF scale, proposed by Abdullah (2006) to assess the quality of services in higher education institutions. HEdPERF (*Higher Education Performance-only*) captures the quality of service in higher education from six dimensions: non-academic aspects, academic aspects, reputation, access, program issues and understanding. The research questionnaire applied to Bahia professionals contemplated a 5-point Likert scale [1 to 5], corresponding to the following statements: I fully disagree 1, I partially disagree 2, I am indifferent 3, I partially agree 4 and I fully agree 5. For all items, except those related to difficulties, the higher the agreement, the higher the quality of the course.

The instrument was submitted to three specialists to assess the adequacy of the items and to a pre-test with ten students from different distance education courses at OUB/UFSM for evaluating semantics. Table 1 presents the blocks, variables and number of questions of the research instrument.

Table 1. Variables and dimensions of the research instrument

Block	Variables/Dimension	Number of questions in instrument
Profile and course	Gender, age, income, course, pole, year of entry, etc.	Questions 1 to 5
Dropout	Distance from the pole, Reason for dropout, dedication to the course, etc.	Questions 6 to 17
The quality of the course	Non-academic aspects	Questions 18 to 59
	Academic aspects	
	Reputation	
	Access	
	Program	
	Knowledge	

Data analysis involved three other techniques in addition to descriptive statistics: Exploratory factor analysis, hypothesis tests and logistic regression, which are described in the following sections.

Survival Function

The nonparametric method proposed by Kaplan-Meier (1958) was used to estimate the survival function. The survival function *S (t)* (probability that the student will remain on the course for a longer period than the semester *t)* is given by the following:

$$\hat{S}(t) = \prod_{i:t_i \leq t} \left(1 - \frac{d_i}{n_i}\right)$$

with t_i time (semester) in which at least one event (dropout) happened, d_i the number of events (dropout) that occurred in the semester t_i and n_i the students who remain in the course in the semester t_i.

Factorial Analysis

The choice for exploratory factor analysis is justified by the fact that the dimensions of Abdullah (2006) were built and applied to Malaysian students, still needing exploratory analyzes to verify the maintenance of their dimensionality in other countries. In order to verify whether factor analysis was appropriate for the sample, Barlett's check and Kaiser-Meyer-Olkin test (KMO) were applied. To choose the variables that would remain in the factor analysis, the commonality criterion was used, in which variables with commonalities extracted equal to or less than 0.5 were excluded.

The principal component method was chosen to estimate the factor loads, and for the choice of the number of factors, the criteria of eigenvalues greater than one, the percentage of the explained variance and graph *screeplot* were used. The use of the recast technique meets the objective of better lawmaking. To evaluate the level of reliability of the factors, *Cronbach's Alpha,* was used, which verifies the internal consistency of a scale and values greater than 0.7 have been considered satisfactory for general research. For exploratory research, values over 0.6 are considered acceptable (Hair et al., 2010). After estimating factor analysis, factors related to the course quality scale were formed, based on the means weighted by factor loads.

Hypothesis Tests

The chi-square and Fisher exact tests were used to identify possible associations between covariates and main outcomes "death" versus "hospital discharge," and odds ratios ORs were used as measures of association. This test has the null hypothesis that the variables are independent and the alternative hypothesis that there is an association between the variables (Pestana & Gageiro, 2008).

To verify whether there are differences in perception regarding the factors related to drop out between the assets and evaded, *t* test of mean difference was applied. The *v* test has as null hypothesis the equality of means between assets and evaded. Additionally, to identify whether the *t* test should be homoscedastic or heteroscedastic, Levene's test for the equality of variances was previously applied.

Logistic Regression

The logistic function consists of regression over *dummy* variables. The singular characteristic of this model is that the dependent variable extracts a response of a dichotomous nature (1 or 0). Behr et al. (2020) to study the determinants of dropout have already used this method. According to Cameron and Trivedi (2009), the Logit model can be defined as the following:

$$Y_i = X_i\beta + \varepsilon_i$$

with Y_i = {1 0 *with prob. with prob.* p $1-p$; where Y_i represents the dependent variable (binary), X_i the vector of explanatory variables, and ε_i the error term that presents normal distribution with zero mean and variance equal to $1/[N_i P_i(1-P_i)]$, being the probability of $P(Y=1)$ defined as the following:

$$P_i = P(Y\_i = 1|X_i) = F(x_i'\beta)$$

where $F(.)$ is a function of $x_i'\beta$, usually a cumulative probability distribution function to ensure that $0 \leq P_i \leq 1$. The *odds ratios* (or the odds ratio) can be calculated as:

$$L_i = \left(\frac{P_i}{1-P_i}\right) = X_i$$

being L_i the logarithm of the chance ratio, the $\frac{P_i}{1-P_i}$ the chance ratio and X_i the array of exogenous variables (explanatory).

The Logit model is estimated using the maximum likelihood method, since the vector coefficients β do not have the usual interpretation of linear regression models. Thus, it is necessary to calculate the Marginal Effects (*EM*) to analyze the results more adequately. Specifically, the *EM* of an explanatory variable measures the impact on $P(Y=1)$ that corresponds to the probability of the event occurring, of a variation in the explanatory variable (s). In turn, the effects on continuous variables are obtained by the derivatives of the function in relation to the variable:

$$\frac{\partial P_i}{\partial X_j} = f(X_i\widehat{\beta_J})\widehat{\beta_J}$$

For binary variables the *EM* is the change in $P(Y=1)$ when D_j goes from 0 to 1. So, $EM_j = P(Y=1) - P(Y=1 \mid D=0)$. In terms of analysis, *EM* is interpreted as the varying impact of a unit on the variable, at the point considered (mean), on the probability of $Y=1$, keeping the other variables constant.

Data, Variables and Analytical Model

The data and variables used to estimate the Logit model as well as the expected relationships, are presented in Table 2.

Table 2. Description of the variables used to pet the Logit model

Variable	Definitions	Categories	Expected ratio
Gender	Generate student gender ratio	Male 1 Female	<
Age	Age range of students	0 - 30 years old 1 - between 31 and 40 years 2 - Over 40 years	>
D1_income	Students' income	0 - otherwise 1 - up to 2 minimum wages	<
D2_income	Students' income	0 - otherwise 1 - greater than 5 minimum wages	>
ens_med	School where he attended high school	1 - public 2 - private	>
course_level	What is the level of the course	1 - graduation 2 – postgraduate	<

distance_pole	Approximate distance from where you live to the pole	1 - up to 30 km away 2 - over 30 km away	>
Activity time	Weekly time dedicated to course activities	1 - up to 10 hours per week 2 - over 10 hours per week	<
D1_freq	The frequency with which the student goes to the pole	1 - less than 1 time a month 2 - 1 time or more	>
D2_freq	The frequency with which the student goes to the pole	1 - less than 1 time every three months 2 - 1 time between 4 to 6 months	<

Considering the logistic regression modeling and the set of variables obtained from the instrument applied to students who evaded the courses offered by OUB/UFSM, the analytical model was defined, according to the equation in (6):

$$Y_e = \delta_0 + \beta_1 gender_i + \beta_2 age_i + \beta_3 D1\_income_i + \beta_4 D2\_income_i + \\ + \beta_5 ens\_med_i + \beta_6 course\_level_i + \beta_7 dist\_pole_i + \\ + \beta_8 temp\_ativ_i + \beta_9 D1\_freq_i + \beta_{10} D2\_freq_i + \beta_{11} \sum_1^n \quad FAT_i + \beta_{12} \varepsilon_i \qquad (6)$$

in which Y_e refers to the dropout of OUB/UFSM students; δ to the intercept; β to angular coefficients; $\sum_1^n \quad FAT_i$ to the factors generated by factor analysis and ε to the error term.

To verify the suitability of the model, the diagnostic tests were performed: Wald and LR tests to test whether the coefficients of each forecaster are significantly different from zero;. If this occurs, it can be assumed that the forecaster is contributing significantly to the prediction of the output variable (Field, 2009). Wald and LR tests were used for comparison of variables, to test whether the combinations between variables are different from zero. Hausman and Small-Hsiao tests assessed the Independence of Irrelevant Alternatives (IIA). To test the suitability of the model, the Hosmer-Lemeshow test was used, which relates the data to its estimated probabilities from lowest to highest. A chi-square test determined whether the observed frequencies are close to the expected frequencies; having as a null hypothesis the appropriate adjustment of the model (Archer, Lemeshow & Hosmer, 2007).

RESULTS

Following the methodological proposal, the analysis of results was developed in two stages. In the first, based on the data of the 18,025 students entering the OUB/UFSM, between 2005 and 2018, survival functions were created. In the second, from the responses of the 859 research instruments, descriptive statistics, factor analysis, and logistic regression were applied to the analysis of the determinants of dropout.

Results of Survival Function

The analysis of survival function was divided according to the level of the OUB/UFSM courses. Of the 18,025 entrants, 8,571 (47.6%) enrollments sat in graduated courses and 9,454 (52.4%) in postgraduate courses. Figure 1 and Table 3 present the results of graduated courses.

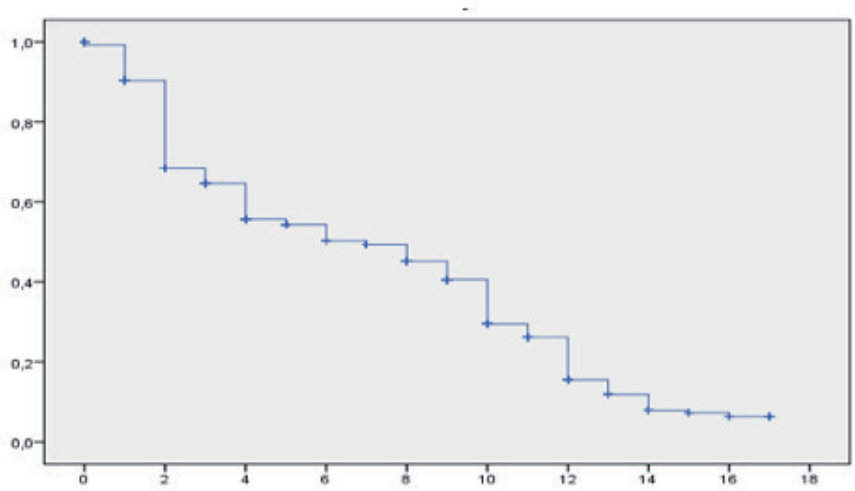

Figure 1. Results of the survival function for undergraduate courses OUB/UFSM, in semesters.

We observed that the risk of dropout of OUB/UFSM graduated course is higher at the beginning of the period and reduces over the semesters. The steps presented result from the use of the academic semester as a unit of time, so the risk remains constant during the semester, varying when the semester changes. Variations are greater in the initial periods, and over the course, the risk systematically reduces to lower rates as the periods eat. Therefore, the chances of dropout are higher when entering the institution and decrease according to the student advances. After 12 semesters, the survival function indicates that 15.5% of the students remain enrolled. These results corroborated studies that indicated that the risk of dropout is higher in the first semesters (Oliveira et al., 2018, Utami et al., 2020).

Table 3. Results of dropout for graduated courses OUB/UFSM, in %

Graduated Course	Dropout
Physics	76.9%
Spanish Letters - Literatures (REGESD)	67.0%
Letters Portuguese and Literatures	59.3%
Agric. Tec. Family Sustainability - Technologist	58.3%
Spanish Language – Literatures	57.6%
Geography	55.2%
Public Administration - Bachelor's Degree	51.3%
Sociology	50.0%
Education	44.5%
Field Education	39.7%
Computing	39.6%
Teacher Training Course for Professional Education	37.8%
Special Education - Bachelor's Degree	36.3%
in Religion Sciences	33.3%
Average	50.49%

Note: OUB/UFSM graduated courses include bachelor's degree, degree, technologist, and pedagogical training.

However, as indicated by the percentages of dropout in Table 4, the risks are substantially higher in some courses. In eight of the 14 undergraduate courses offered by OUB/UFSM, dropout is greater than or equal to 50%, reaching more than two-thirds in physics and literature-Spanish courses. The respective analyses for the postgraduate courses are reported in Figure 2 and Table 4.

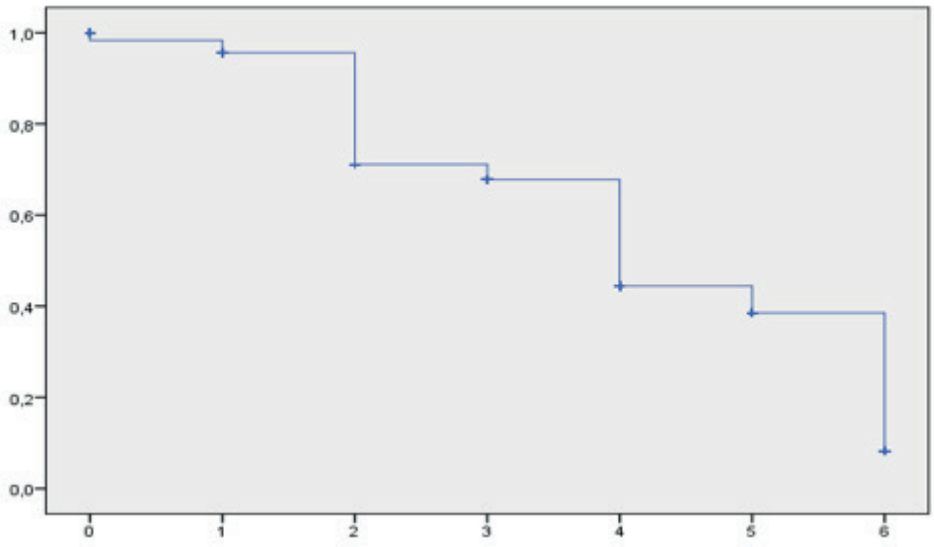

Figure 2. Result of survival function for postgraduate courses OUB/UFSM, in semesters

Dropout in postgraduate courses happens mainly, at the end of the first year (second semester of the course). Notably, for these courses, the subjects are offered in the first two semesters, being the third for the student to develop the final research. If the student has not completed the course in the three semesters, the institutional rules allow the request for an extension for one more semester. Therefore, what observed is that most students give up in the stage of the realization of the disciplines. It is also observed that most students who do not complete the course within the ideal period (three semesters) and, even requesting an extension of the deadline, about 40% do not complete it until the end of the second year.

Comparatively, the indicators of postgraduate dropout are lower than those of graduated; however, there is a high percentage of non-graduates, mainly in the courses of Energy Efficiency Applied to Productive Processes, Teaching philosophy in high school, Management in Archives and Media in Education, in which more than half of the students drop out.

Table 4. Results of dropout for postgraduate courses OUB/UFSM

Postgraduate Course	Dropout
Energy Efficiency Applied to Production Processes	57.1%
Teaching Philosophy in High School	56.0%
File Management	54.1%
Media in Education	51.2%
Special Education Cognitive Impairment and Deaf Education	47.7%
Management of Public Health Organization	44.4%
Environmental Education	42.3%
Educational Management	41.6%
Municipal Public Management	40.8%
Public Management	39.6%
Com Tec. and Com. Applied to Education	37.2%
Teaching Mathematics in High School	36.9%
Teaching Sociology in High School	34.1%
Early Childhood Physical Education and Early Years	25.2%
Average	43.44%

The mean dropout in the OUB/UFSM courses was 46.97%, and the average graduation (50.49%) higher than postgraduate studies (43.44%). According to the coordinator of the Coordination of Technology in Distance Education (CTED) of Higher Education Personnel Improvement Coordination [Capes] (2018), in general, only one out of every three students of the OUB system successfully completes the courses offered. Therefore, compared to the national dropout rate (66.66%), OUB/UFSM has trained, on average, more students than other courses at both levels of education (undergraduate and graduate).

Profile of Active and Evaded Students

In this stage, analyses characterized the interviewee's profile, the choice and dedication to the course, the use of the pole and the dropout decision. These analyses are based on the sample of 859 interviewees, of whom 364 instruments were answered by students who continue to attend some OUB/UFSM course, called 'active,' while 495 were answered by students who abandoned the courses, identified as 'droped out.' Table 5 presents the profile of the interviewees of the two groups, which are tested by χ^2, which tests the hypothesis of independence between the variable under analysis and the group.

Table 5. Frequency, percentage of answers and χ^2 to the profile variables of the interviewees of the active and evaded groups

Variable	Categories	Assets		Dropouts		Chi-Square
		Frequency	%	Frequency	%	Value (sig)
Gender	Male	83	22.8	180	36.4	18.16
	Female	281	77.2	315	63.6	(0.000)
Age	up to 20	6	1.6	2	0.4	20.32 (0.000)
	From 21 to 30 years	109	29.9	91	18.4	
	31 to 40	142	39.0	221	44.6	
	Over 40	107	29.4	181	36.6	
Income	Up to 1 minimum wage	58	15.9	23	4.6	49.66 (0.000)
	Family income was between one or two minimum wages.	75	20.6	115	23.2	
	Between three and five minimum wages	172	47.3	203	41.0	
	More than 5 times the minimum wage	59	16.2	154	31.1	
High school	Only in public school	274	75.3	357	72.1	1.30 (0.729)
	All or mostly public school	27	7.4	39	7.9	
	Private school only	44	12.1	72	14.5	
	All or mostly private school	19	5.2	27	5.5	

Most are female and studied only in public school. Family income ranged predominantly from 3 to 5 minimum wages in 11 36.6% of the patients in the sample. The χ^2 test indicates an association between the group and the variables gender, age and income. In the group of dropouts, there is a higher percentage of men, older individuals with higher incomes when compared to the group of students who remain in the course (active). Then, the distance and frequency to the pole were analyzed (Table 6).

Table 6. Frequency, percentage of responses and χ^2 to pole variables for active and dropout groups

Variable	Categories	Assets		Dropouts		Chi-Square
		Frequency	%	Frequency	%	Value (sig)
Distance to Pole	Up to 3 km	77	21.2	70	14.1	11.86 (0.037)
	From 3 to 10 km	40	11.0	72	14.5	
	From 11 to 20 km	29	8.0	39	7.9	
	From 21 to 30 km	27	7.4	28	5.7	
	From 31 to 50 km	40	11.0	75	15.2	
	More than 50 km	151	41.5	211	42.6	
Frequency to Pole	Once a month	123	33.8	263	53.1	260.12 (0.000)
	Once every two months	75	20.6	55	11.1	
	once every three months	54	14.8	32	6.5	
	once every 4 months	19	5.2	7	1.4	
	Once every five months	10	2.7	3	0.6	
	Once every 6 months	62	17.0	44	8.9	
	Once per year	14	3.8			
	Annually	7	1.9	2	0.4	
	Never			89	18.0	

The majority of active students and dropouts declared to live at a distance above 30 km from the pole. Regarding the majority (53.3%) of the dropouts indicated that they went at least once a month, whereas the active workers stated that they go once a month (33.8%) or once every two months (20.6 %). The interviewees were asked about the level, choice, hours of dedication, and work concomitantly with the course (Table 7).

Table 7. Frequency, percentage of responses and χ^2 to course variables for active and dropout groups

Variable	Categories	Active		Dropouts		Chi-Square
		Frequency	%	Frequency	%	Value (sig)
Course	Degree	186	51.1	265	53.5	0.499 (0.480)
	Postgraduate Degree	178	48.9	230	46.5	
Course Selection	Career Opportunities	172	47.3	180	36.5	13.42 (0.02)
	Peers and parental influence	3	.8	7	1.4	
	Likes the area in which the course is inserted	163	44.8	246	49.9	
	Course information: media or lectures	8	2.2	16	3.2	
	Professions Fair			1	.2	
	Other	18	4.9	43	8.7	
Doubts in the Choice	Yes	53	14.6	67	13.6	23.96 (0.000)
	No	294	80.8	426	86.4	
	Maybe	17	4.7			
Weekly Hours Dedicated to the Course	Up to 10 hours*	202	55.5	321	65.1	12.71 (0.005)
	From 11 to 15 hours	90	24.7	112	22.7	
	From 16 to 20 hours	50	13.7	36	7.3	
	More than 20 hours	22	6.0	24	4.9	
During the course	Yes, and that tends to influence my possible decision to drop out	52	14.3	198	40.2	70.34 (0.000)
	Yes, but that would not influence my decision to drop out	274	75.3	246	49.9	
	No	38	10.4	49	9.9	

The choice was motivated mainly by job and career opportunities and by the interest in the area in which the course is inserted, being dedication up to 10 hours a week. The professional expectation is an important factor in prevention dropout. About this, Gunduz & Karaman (2020) showed that students' low career expectations and academic failure in the process of education resulted in both loss of motivation and consequently dropout.

Around 90% of students work; however, among those who continue to attend the course, 75.3% reported that work would not influence the decision to leave, while 49.9% of those who dropped out, indicated that work influenced the decision. For a more detailed analysis of the decision to abandon the course, Table 8 is presented.

Table 8. Frequency, percentage of responses and χ^2 to the dropout variables for active and dropout groups

Variable	Categories	Active		Dropouts		Chi-Square
		Frequency	%	Frequency	%	Value (sig)
Decision to Leave the Course	No. I decide alone	77	21.2	263	53.3	100.86 (0.000)
	Yes. Chat with friends and/or family	194	53.3	128	26.0	
	Yes. Talk to other classmates	32	8.8	25	5.1	
	Yes. I talk to the tutor and/or teachers of the course	61	16.8	77	15.6	
Factors influencing evasion	Dissatisfaction with the chosen course	85	23.4	56	11.3	223.37 (0.000)
	Dissatisfaction with the teacher/ tutor	31	8.5	42	8.5	
	Family Issues	32	8.8	38	7.7	
	Paternity or maternity	6	1.6	32	6.5	
	Financial difficulties	23	6.3	15	3.0	
	Change City Base	8	2.2	1	.2	
	House far from the pole	49	13.5	39	7.9	
	Disease	91	25.0	19	3.8	
	Other	39	10.7	253	51.1	
Reasons for Leaving the Course	Program Structure	27	7.4	17	3.4	74.45 (0.000)
	Poor teaching infrastructure	27	7.4	16	3.2	
	Lack of support	71	19.5	55	11.1	
	Premium features do not meet my expectation	46	12.6	38	7.7	
	Difficulty adapting to the pace of the University	26	7.1	69	13.9	
	Not satisfied with my academic performance	68	18.7	87	17.6	
	Dissatisfaction with the teacher and class method	36	9.9	26	5.3	
	Other	63	17.3	187	37.8	

Among those who abandoned, 53.3% stated that they made the decision alone, while among the active ones, the majority stated that they would talk to friends and family. Notably, 51.1% of those who abandoned the course marked the option "others" when asked about the dropout influencers. This indicated that the dropout decision t involved reasons of different natures; however, the decision involved not only one, but a set of them.

Conversely, the factors most referred by the literature, such as limited financial resources and difficulty in reconciling the course with professional activity, did not stand out among the dropouts from the OUB/UFSM courses (ABRAEAD, 2007; Rossi, 2008). Conversely the assets indicated dissatisfaction with the course and illness as the factors that would most influence the dropout. These results are in agreement with Suhlmann et al. (2018) and Behr et al. (2020), which find that satisfaction with study affect the risk of dropping out, while Aydin et al. (2019) reported health problems as one of the reasons for dropout.

Factorial Analysis

Then, the exploratory factor analysis was estimated with the objective of obtaining the determinants of evasion. In this process, six items were successively excluded from the analysis because they presented commonality below 0.5. After that, the KMO (0.953) and Barlett's sphericity tests (value 18.328,42 and *sig.* 0.000) indicated the factability of the data. This was followed by the definition of the number of factors, for which the criteria of eigenvalues greater than one, percentage of variance and the scree plot were considered. Figure 3 shows the compressive strengths obtained with these mortars.

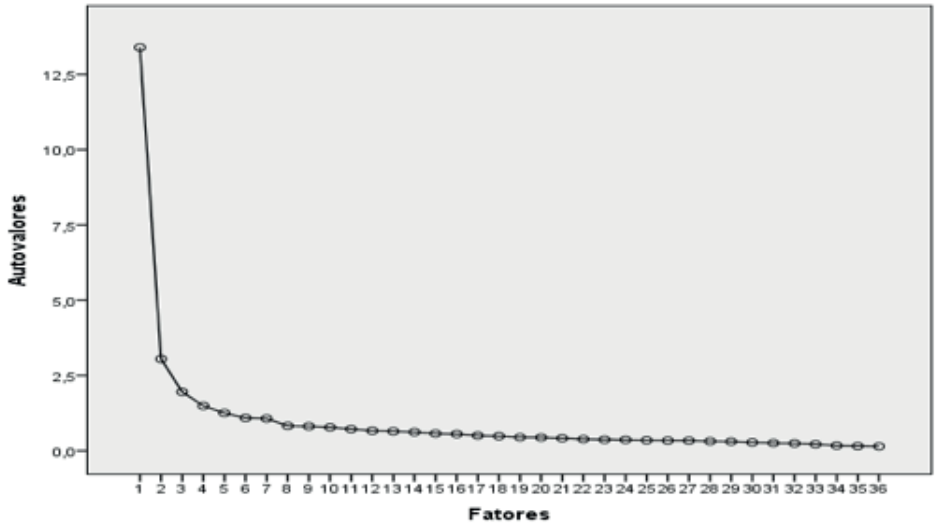

Figure 3. Scree plot graph of the factorial analysis

Seven factors had eigenvalues greater than one. The scree-plot curve corroborated with the indication that the seven factors could be extracted. In addition, the seven factors together explain 64.72% of the data variance. From these results, we chose to extract seven factors (Table 9).

Table 9. Factor loads, explained variance and Cronbach's alpha of the factors

Factors/Variables	Loads Factorial	Variance Explained	Alpha of Cronbach
Factor 1 - Academic Aspects			
I had easy access to the teachers and tutors of the course in order to help me with my doubts regarding the course	0.770	37.214	0.925
When there were difficulties, the teachers showed a sincere interest in solving it	0.760		
Teachers and tutors were sensitive to meeting the student's needs	0.711		
Was free to ask questions of teachers and tutors.	0.710		
The teachers' time devoted to solving students' doubts was adequate	0.703		
The teachers favored my best performance during the semester	0.670		
I had easy access and return from UFSM servers regarding my doubts in general	0.666		
Students came to the teacher when they needed help.	0.580		
The course had tutors in adequate quantity	0.521		
The pole manager was easily contacted and helped me whenever I needed to	0.462		
Factor 2 – Reputation			
I would recommend EaD / UFSM courses to friends to attend undergraduate or graduate courses	0.719	8.470	0.904
UFSM has a professional image	0.699		
The teaching material was updated and of good quality	0.687		
Compared with other public higher education institutions, the distance education courses / UFSM had higher quality	0.663		
The course meets/met my expectations	0.645		
The teachers showed a positive attitude in the classroom	0.603		
UFSM offered flexible and adequate teaching plans	0.582		
The course had tutors in adequate quantity	0.553		
The teachers had experience and extensive knowledge in their area	0.540		
Factor 3 - Non-Academic Aspects			
At the pole, the facilities adequately met the requirements for cleanliness, lighting, acoustics, ventilation, safety, conservation, and comfort necessary for the proposed activity	0.852	5.428	0.917
The pole had appropriate building structure conditions for classes	0.849		
I believe that the pole's infrastructure was suitable for Distance Education. (living room, table, chair, projectors, etc.)	0.786		
The sanitary facilities adequately met the requirements for physical space, lighting, ventilation and cleaning	0.782		
The pole provided up-to-date computer resources, with internet access, in quantity and quality compatible with the needs of the proposed activities and adequately attended to the individual demands of the students	0.757		
The pole had a library and computer lab suited to the needs of the students	0.745		
The pole had administrative professionals in adequate numbers	0.668		
Factor 4 - Technological Difficulties			
I had difficulties using the Moodle / UFSM system	0.879	4.137	0.771
I had difficulties with basic informatics (Excel, Word and PowerPoint)	0.868		
Factor 5 - Student Reception			
When I started the course, I participated in the reception day, an event where general information of interest to the public, as information about the city, UFSM, and distance learning are passed on	0.724	3.479	0.762
Upon entering the course, I received instructions from the course and from UFSM	0.586		
At the beginning of the course, the teaching program was presented	0.551		

Factor 6 - Disclosure and Service			
UFSM should make more frequent use of the city communication and dissemination channels	0.737	3.022	0.441
I believe that it would be very important to have psychosocial assistance in distance education courses at OUB/UFSM aiming to face and resolve psychological, social, interpersonal, academic, and institutional conflicts	0.732		
Factor 7 – Understanding			
EaD/UFSM provided, for low-income students social assistance, transportation, oral health, and meals	0.745	2.971	0.293
I would like to have visited UFSM - campus Santa Maria/RS	0.500		
I felt that I was part of UFSM	0.438		

The first factor, academic aspects, assesses different aspects of the student's relationship with the institution's teachers, tutors and servants. The factor is the one with the highest explained variance (37.21%) and internal consistency (alpha=0.925). The second, reputation (explained variance=8,470) analyzes the image of the institution, the conditions of the course and the teaching capacity.

The third, non-academic aspects (explained variance=5.428) assessed the degree of agreement regarding the pole, with regard to the adequacy of physical infrastructure, laboratories, libraries, computer resources, among others. The fourth, Technological Difficulties (explained variance=4,137) has two items that seek to assess the existence of difficulties with the moodle system and with basic informatics. The student reception dimension (explained variance=3.479) assesses whether, when entering the course, the student participated in activities that presented the institution, the course and its structure.

Finally, the disclosure and attendance factor (explained variance=3.022) and the comprehension factor (explained variance=2.971) that analyzed the attendance of the students and the attention to the student presented the smallest contributions to the explanation of the variance of the data in addition to inadequate reliability (Crombach's Alpha less than 0.6). Thus not being used for the following analysis. .

Then, the perception of the actives and dropouts on each of the factors was analyzed. Table 10 shows the descriptive statistics of the factors from the factor analysis, which were formed from the weighted average of the weights of the factor loads, and the *t* test.

Table 10. Results of descriptive statistics and *t* test of factors, according to active and escaped groups

Factors	Active		Dropouts		Test t	
	Average	DP	Average	DP	Value	Sig.
Academics aspects	3.987	0.857	3.566	1.002	6.597	0.000
Reputation*	4.233	0.738	3.902	0.869	6.007	0.000
Non-academic aspects**	4.104	0.844	4.048	0.853	0.938	0.349
Technological difficulties*	1.679	1.039	2.100	1.275	-5.314	0.000
Student Reception *	4.347	0.912	4.008	1.078	4.978	0.000
Diffusion and Service**	4.382	0.718	4.356	0.801	0.509	0.611
Understanding*	1.094	0.812	1.042	0.903	0.869	0.385

*Note: Test t of difference of means between the active and the evaded. * heteroscedastic t test, ** homoscedastic t test.*

The results showed that academic aspects presents an average of 3.99 in the group of those who did not dropout and statistically (*Sig.*=0.000) lower (3.57) among those who dropped out of the courses, indicating that, in general, the interviewees agreed with academic aspects.

The interviewees agreed with the reputation, since the average was 4.23 and 3.90 between the active and the evaded, respectively. Comparatively, it is also observed that the average difference between the two groups is statistically significant (*Sig.*=0.000), demonstrating that the dropouts were less satisfied with this dimension.

In the dimension Non-academic aspects, both groups had similar mean perceptions (*Sig.*=0.349) indicating partial agreement with the adequacy of non-academic aspects. The low averages (1.68 and 2.10) of the technological difficulty factor in both groups indicated that the students did not have difficulties with the systems, with the average of dropouts being statistically (*Sig.*=0.000) greater than that of the active.

The results also indicated that, on average, active and dropout students partially agree with the student's reception promoted by the institution. The average agreement is slightly higher for active students.

Generally, the results of the factors indicate that; although, the students who dropped out had statistically lower averages than the assets in four dimensions, the perception of both groups was of partial agreement with the academic and non-academic aspects, reputation, and partial disagreement technological difficulties.

Dropout Probability

In the last step, the impact of factors and other profile variables on the probability of dropout from the application of the Logit model was evaluated. Results of the *EM* used the model estimated with the heteroscedasticity correction, using the *White test* method. The achievement of adequacy was observed by not rejecting the null hypothesis of the χ^2 test of *Pearson* for 859 observations whose result was 866.76 and *prob.* out of 0.1760. These results indicated that the group of students exposed to these elements presented a larger number of ROS. The estimates are shown in Table 11.

Table 11. Results of marginal effects on students' dropout from courses offered by OUB/UFSM

Variable	*Dy / Dx*	*Relationship with dropout*	*P > | z |*
Gender (M/F):	-0.091966 ** (0.04307)	<	0.034
Age	0.046270 *** (0.02617)	>	0.077
D1_Income	-0.037094^{NS} (0.04381)	<	0.397
D2_Income	0.178498 * (0.04973)	>	0.000
High school education	0.033509^{NS} (0.04916)	>	0.495
Course Level	-0.016780^{NS} (0.04043)	<	0.678
Time dedicated to the activities Course	-0.096156 * (0.03952)	<	0.015
Distance from the pole	0.129301 * (0.04037)	>	0.001
D1_Frequency to the pole	0.174132 * (0.04180)	>	0.000
D2_Frequency to the pole	-0.176697 * (0.05633)	<	0.002
Factor 1 - Academic Aspects	-0.115173 * (0.03453)	<	0.001
Factor 2 – Reputation	-0.062637^{NS} (0.04152)	<	0.131
Factor 3 - Non-Academic Aspects	0.079198 * (0.02726)	>	0.004
Factor 4 - Technological Difficulties	0.071494 * (0.01702)	>	0.000
Factor 5 - Student Reception	-0.014049^{NS} (0.02539)	<	-0.580
$P(Y = 1)$	0.588542		

*Note: *, ** and *** significant at 1%, 5% and 10%, respectively; NS not significant; () standard deviation.*

Dropouts in higher education are due to a set of factors that relate to different dimensions, whether social, economic, academic, institutional and/or personal aspects (Radovan, 2019). It is no different with higher education courses in distance learning. For the OUB/UFSM courses, generally, the variables showed expected signs, according to Chart 2, and statistical significance, and for a student with average characteristics, the probability of dropping out of a course offered in this type of teaching $P(Y = 1)$, is 58.85%. Evidence that finds a parallel in Saldanha and Bender (2020), which, when analyzing the OUB/UFSM courses, reported a dropout rate equivalent to 55%. These results indicated that dropout may not be a problem specific to a course and/or a period/year, but a characteristic of these courses.

For the profile variables, the estimates of the *EM* were calculated. For the gender variable, the fact that a student is female reduces the probability of dropout by 0.0914 or 9.14 percentage points compared to the male gender. This result corroborated the empirical evidence (Laham & Lemes, 2016; Sousa & Maciel, 2016), which can be attributed to different aspects, among them the search for professional qualification due to the greater participation of women in the labor market due to the lack of alternatives. It may be the result of the knowledge area of the courses, which at OUB/UFSM are mostly graduated, an area that is more representative of the female gender (Viana, Souza & Anjos, 2017).

With regard to the age variable, the positive *EM* indicated that students with higher age groups have the probability of dropping out by 4.63 percentage points. Result that is in line with the evidence from Silva (2013), Bittencourt and Mercado (2014) and Utami et al. (2020), when they argue that older students have a higher risk of dropping out. This is a situation that would be related to the higher opportunity cost of keeping studying, whether for extra-course reasons, in the case of personal obligations, as well as possible difficulties in monitoring academic activities, adaptation to educational systems and teaching modality (Bittencourt, 2011).

Income was divided into two variables to better measure its effect on dropout. The first, D1_Income, has the measured effect for those who earn up to two minimum wages, while D2_ Income measures the effect of students with an income higher than five minimum wages. The results showed that the income level has opposite effects on dropout.; In the case of lower levels, the marginal effect was negative; although, not significant, while for higher levels of income, the probability of dropout increased by 17.85 percentage points, significant at 1%.

This evidence indicated that, for students with higher income levels, the importance of higher education or even continuing education to improve income tends to be less than for those with low-income levels, who have a higher expectation that higher education can contribute to the improvement of financial conditions and quality of life. About this, Sousa and Sousa (2016) emphasized that individual, and social issues, such as income, especially low-income levels, are predictive of students' permanence (or contrary to dropout) and that such findings imply structural solutions.

A second set of variables refers to the time dedicated to the academic activities of the course, the frequency at which the student went to the pole and the distance from the student's place of residence in relation to the face-to-face support pole. These three variables were included in the study. As for the first, the negative marginal effect indicated that students who devote more than ten hours a week to the course activities reduced the probability of dropout by 9.62 percentage points. Considering the research with students, carried out by CAPES (2018), which obtained an average of 10.7 hours per week dedicated to distance learning courses, the estimated result may indicate a pattern of behavior of students in relation to studies in courses in this teaching modality.

Bittencourt and Mercado (2014) point out that students in the distance education modality must dedicate at least 20 hours per week to the course activities. Corroborating, Herrnann *et al.* (2016) reported that students who completed the course devoted about 20 hours a week, while dropouts reported studying about 8 hours a week. In contrast, Aydin et al. (2019) found that most of learners indicated that their weekly studying hours and studying hours before exams varied between 1-5 hours.

The second variable, which defines the distance between the student's residence and the pole, had a positive *ME* in relation to dropout, suggesting that students residing more than 30 kilometers away from the pole were more likely to drop out of the course. Considering the sample of 859 OUB/UFSM students surveyed, 55.5% of them live more than 30 kilometers away, confirming the result reported. Evidence supported by

Silva (2013) and CAPES (2018), who identified the distance from the pole as one of the main factors that contribute to dropout.

Complementing this group, the student's attendance at the pole showed different relations, depending on the number of times of trips to the pole. If, on the one hand, attending the pole one or more times a month (D1_frequency to the pole) increases the probability of dropout by 17.41 percentage points; on the other hand, attending the polo once in the bi-month or semester (D2_frequency to the polo) reduced the probability of dropout by 17.70 percentage points.

The result *a priori* contradictory to the D1_frequency to the pole can be explained by the requirement that face-to-face academic activities, at least monthly, would imply the need for more time and displacement to the detriment of activities of a professional, personal or even financial nature. Evidence that aligns the variable distance from the pole, which demonstrated that more than half of the students live in distances greater than 30 kilometers from the pole, which is a factor directly related to dropout.

The result of the variable D2_frequencia to the pole demonstrated that less frequent face-to-face activities would reduce the number of dropouts and/or dropouts from the courses. It is worth mentioning that, regimentally, the distance courses offered at the Open University of Brazil system, have the minimum requirement of a face-to-face meeting to conduct an evaluative activity; however, the course coordinators have autonomy to define the face-to-face activities.

The variables referring to the place of completion of high school (whether in public or private school) and the level of the course (whether undergraduate or graduate) showed the expected signs regarding dropout (Table 2). Students who attended high school in a private school have increased the probability of dropping out Students who attend postgraduate courses have reduced the probability of dropping out of OUB/UFSM courses)not showing statistical significance to the sample studied.

The last group of variables are related to the factors obtained in the factor analysis. The higher the sensitivity, the higher the negative predictive value and higher the probability of true negative results. Among all factors, the academic aspects are the ones with the greatest contribution, since being satisfied with the academic conditions of the course reduces the chance of the student evading by 11.52 percentage points. This result is in accordance with the literature, as one of the most important reasons for dropout behavior is an academic adaptation problem (Kilinc & Okur, 2021). Conversely, technological difficulties increase the chance of dropout; therefore, students who perceived more difficulties with the technology involved in the courses, have the probability of dropout increased by 7.15 percentage points. Such results are in line with Mezzari et al. (2013) and Bawa (2016) which demonstrated that difficulties in using the system increase dropout.

The result for the Non-academic Aspects factor indicated that students who, agreed with the quality of the infrastructure, facilities, equipment, and the functioning of the centers, are more likely to dropout. When it comes to quality, it would be expected that a pole with better conditions would reduce the chance of dropout. During these 10 years the published researches have shared some fundamental concerns. This factor has an impact of 7.15 percentage points, less than the 17.67 percentage points of D2_Frequency to the pole.

Results that suggested that, for the student, the dropout decision is more related to the number of times the student travels to the pole than the quality of the same. Complementing this evidence is the fact that students often conducted their activities in places other than the center, except the evaluative activity. This situation was also reported in a study performed by CAPES (2018), when students reported that they performed activities primarily at home and at work, and less frequently at the center.

Seeking statistical confirmation, the Hosmer-Lemeshow test was performed, which assessed the quality of the estimated model, comparing the observed and expected frequencies and the model's predictive capacity test (Table 12).

Table 12. Results of the tests of quality of adjustment and predictive capacity

Hosmer-Lemeshow test			
Number of observations	**Number of covariate patterns**	**Statistics χ^2**	**Prob.**
850	845	866.78	0.1760
Predictive ability test			
Classified	D	~D	Total
+	385	147	532
-	101	217	318
Total	486	364	850
Expected positive values		Pr (D|+)	72.37%
Expected negative values		Pr (D|-)	68.24%
Properly classified			70.82%

Note: H_0: the data fit is appropriate. The number of 850 observations, lower than the total sample, of 859, resulted from the exclusion of those instruments that presented missing information.

The test of Hosmer-Lemeshow indicated the rejection of the H_0; therefore, the estimated model can be considered adjusted, which assumed that the residual variation is explained correctly. Corroborating the adequacy of the model, the predictive capacity test showed that the model correctly classified 70.82% of the 850 observations analyzed. For values of $Y = 1$, the model was correct in 72.37% of the observations, while for values equal to 0 ($Y = 0$), the model correctly classified 68.24% of the cases.

CONCLUSIONS

As a public policy, the offer of distance courses through the Open University of Brazil system has as one of its objectives the expansion of access to higher education, mainly to the population that resides in areas more distant from educational institutions. However, the effectiveness of this policy depends on the institutions' ability to take students to the conclusion of the courses. In this context, dropout can be considered a measure of inefficiency of the courses, whereas each student who gives up represents at the same time the failure of the policy, given that the objective of forming an individual is not achieved, . It is an irreversible cost for all the system, since public investments were made, thus increasing the cost per graduating student.

This discussion guided the objective of understanding the determinants of the dropout of courses in the distance modality of the Open University of Brazil system offered by UFSM. Although, in general, the dropout rate of the institution (47%) is below the national indexes (67%), the assessment of the rate per course indicates that some trained less than a third of its students. Thus, it is understood that the institution needs specific action strategies for these courses, seeking alternatives that aim to make them efficient.

As for the determinants of dropout, the results indicated that male students, with higher levels of income, who live a greater distance from the pole and who travel to it more frequently are more likely to dropout. Conversely greater agreement with the adequacy of academic aspects and lower technological difficulties reduces the chance of dropout.

Contrary to the evidence, the adequacy of the non-academic aspects, which refer to the infrastructure, equipment and functioning of the hubs, increases the likelihood of dropout. However, the variation in dropout due to the non-academic aspects of the pole is much smaller than the distance and frequency of going to the pole. Therefore, it is suggested that the increase in face-to-face activities has a greater impact on the probability of dropout than the physical conditions of the pole.

Generally, the perception of students regarding factors related to the quality of the course was high, indicating that the courses have high levels of quality both in Academic Aspects and in Non-Academic Aspects. It was

also observed that the institution's reputation is high, that the students agreed that they are well received and served and do not present technological difficulties. Therefore, the results suggested that, in terms of quality, UFSM courses have managed to reach satisfactory levels. In this sense, external factors such as displacement to the pole, and personal factors such as the compatibility of work hours and studies and income, as well as family issues emerged as possible dropout triggers.

Although, dropout is higher in distance learning courses compared to face-to-face courses, investments in education would be more efficient and would bring better results if dropout were reduced in both contexts. Thus, higher education institutions should build systems of institutional self-assessment that seek to better identify the causes of dissatisfaction, lockouts and dropout and act more effectively and quickly in driving changes to achieve higher completion rates.

In particular, it is understood that educational institutions must advance on two main points. First, to understand why the student has evaded, by expanding the institutional assessment for the evaded, including creating specific research instruments for this group. Due to lack of reliable comparable data on universities, students and researchers alike are not able to identify relevant competences and courses in Europe. Together, this information may allow institutions to better plan courses and their offerings, as well as adopting strategies aiming to expand completion indicators.

Limitations and Future Research

Despite the relevance of the results obtained, one of the limitations is its non-generalization to other OUB courses, since the analysis was limited to UFSM. Therefore, future research can expand the research to other institutions, as well as identifying other factors that may contribute to the understanding of the dropout of courses in this type of teaching and consequently expand the predictive model capacity.

Future research may seek to understand the role of factors external to the course in dropout. Factors such as the job market, student expectations regarding employability and remuneration, and family incentives to take the course are external factors that can play an important role in dropout. Another line is to carry out comparative research between dropout in the Open University of Brazil system and in the private distance education system. Furthermore, since the Open University is a system financed by public resources, research that adequately identifies the cost of dropout and that it is compared to other alternatives for providing higher education at a distance, such as the purchase of places in private institutions, is essential, aiming greater efficiency in public spending.

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