

Prediction model of first-year student desertion at Universidad Bernardo O'Higgins (UBO)*

Alexis Matheu Pérez¹
Claudio Ruff Escobar¹
Marcelo Ruiz Toledo¹
Luis Benites Gutierrez²
Germán Morong Reyes¹

Abstract

The objective of this study is to model a retention predictive system for first-year students at Universidad Bernardo O'Higgins (Santiago de Chile), by determining which of the variables of entry into higher education, whether these are academic, social or relatives, are revealed significant for this analysis. The construction of the research model was based on a thorough bibliographic review which made possible to identify explanatory variables of university dropout in the national context. Afterwards, from the systematization of socio-educational backgrounds of the students from the 2014 and 2015 cohorts available in the university's computer systems, a tripartite matrix was consolidated with the data associated with the variables that emerged from the analysis of the target group consulted. Consequently, we analyzed the relationship of each of the explanatory variables of the study with the variable control student desertion. The bivariate analysis allowed us to identify seventeen variables, significantly associated with student desertion and to specify dependency relations with the abandonment of studies. The multivariate model predicted abandonment behavior in 86.4%, indicating seven independent categorical variables that, finally, are revealed as relevant factors of the prediction model. The varied and sustained interpretations delivered in the results of the model, as well as the proposed suggestions to improve the university retention index, provide a direct value to the study aimed at optimizing one of the most important indicators linked to the quality management in universities, as is the student retention.

Keywords

Students – Student retention – Entrance behavior variables – Higher education.

* Translation: Ricardo Valverde Sánchez. Contact: ricardovalverdes73@gmail.com

1- Universidad Bernardo O'Higgins, Santiago de Chile, Chile, Contacts: alexis.matheu@ubo.cl; cruff@ubo.cl; mruiz@ubo.cl; German.morong@ubo.cl

2- Universidad Nacional de Trujillo, Trujillo, Perú. Contact: lbenitesg@gmail.com



DOI: <http://dx.doi.org/10.1590/S1678-4634201844172094>

This content is licensed under a Creative Commons attribution-type BY-NC.

Introduction

The problem of higher education students' desertion has constituted a core problem for Latin-American Universities, particularly over the last years.

Some investigations have revealed the significant percentage of students who haven't been able to complete their university studies, with all that this entails in socio-economic terms (DÍAZ PERALTA, 2008). It is important to point out that desertion is a highly complex phenomenon, with multiple negative impacts for the different agents and individuals involved in it (PATIÑO; CARMONA, 2012). According to Patiño and Carmona (2012), some studies have suggested differentiated desertion levels related to diverse variables such as the financial cost of a specific career, the students' social conditions and the university surroundings that shelter the university's incoming population. International studies have made visible the influence of a set of factors that interact among themselves, namely, the obstacles imposed by an institution on a student, his/her characteristics that prevent his/her integration to a specific system or the involvement felt by the student with his/her new university (DE VRIES et al., 2011). Apparently, the overwhelming growth of the educational supply and coverage of universities has had as correlate the emergence of new dynamics in professional training, linked to the new sociological contexts in which the dynamics of higher education are inserted. In this sense, aspects such as curricular flexibility, administrative organization, infrastructure and the academic and social environment seem to determine the permanence of the student in one or another higher education institution (DE VRIES et al., 2011).

When analyzing the Chilean context, it could be practically held that three out of ten students drop out of the institutions they enrolled in their first year (NAVARRETE; CANDIA; PUCHI, 2013). The clearly alarming preceding data allows anticipating the consequences of desertion: the impact of family indebtedness and the damage this entails in the first quintiles of income.

For the aforementioned reasons, many countries and higher educational institutions have begun to design mechanisms and ways to assure the increase in the retention in the first years of university studies, by following the theoretical models to be described in this research as pattern. These theoretical models have variably evolved from 1975 to date, nonetheless there's very little evidence on mathematical models and statistical tests that prove the theories proposed, especially on general studies from different university studies centers, as well as mixtures of several categories that according to the models explain the causes of this phenomenon.

Nevertheless, the current study seeks to offer a predictive model of university retention, which through explanatory variables that may result significant, measures may be taken to provide anticipated answers to the university desertion problem. The results of the obtained model are important because, on the one hand, they allow focusing on the variables that significantly affect the Universidad Bernardo O'Higgins (UBO) with its own features, and on the other hand, it is about a predictive model that could be applied to Latin-American Universities, since the variables with which the study initiate, are those that all scientific references suggest as the possible ones that respond to the current university retention phenomenon.

In order to depict the desertion phenomenon by focusing on carrying out actions that aid in its reduction, the current study proposes the search of a mathematical model that explains the university undergraduate students' desertion problem. In this sense, the current study is structured in three parts; the first part offers the theoretical context of desertion and its main analytical models, the second part provides the description of statistical/mathematical model for the analysis of the information and characterization of variables, their relations and significance. The third and last part delivers the study's conclusions through the obtained results.

The Problem: Higher education in the current contingency

Undoubtedly, education constitutes one the most highly precious and fundamental values on which social life is built, since our potential is developed through it as individuals and members of a given community. Higher education is particularly acknowledged as the cornerstone of the country's social, cultural, political, economic, scientific and technological development (VELA VALDES, 2000). In Chile, tertiary education faces the challenge of guaranteeing the development and human promotion of its students, by fostering educational environments that ensure their progress and well-being (AMÉSTICA; LLINAS-AUDET; SÁNCHEZ, 2014).

By the end of the twentieth century (decade of the 80s), and influenced by the economic model inspired on the country's liberalization of the economy, the higher education rate coverage experienced significant progress, replacing a model based on only educating the elites to rapidly move on to a model of "massification", and, from the earliest years of the twenty first century onwards when the educational coverage levels reached above 50%, to advance towards a stage known as the "universalization" of tertiary education. Thus, the Chilean model shifted to a market regulated model and "[...] not to one regulated by the government impetus" (BRUNNER, 2015, p. 46). Over the last decades, in most member countries of the Organization for Economic Co-operation and Development (OECD), higher education has grown enormously, not only in what relates to the number of educational offers, but also, in the wide array of them. Nowadays, this diversity is reflected in the multiplicity of educational programs aimed at catching the attention of a great, and increasingly heterogeneous, number of students. This increase in coverage generated changes and a new glance at education, unthinkable in the recent past (RODRÍGUEZ PONCE, 2012).

Higher education access in Chile experienced a meaningful growth over the last 30 years (DONOSO et. al., 2012). At undergraduate level this meant an increase in the students' enrollment from 165 thousand students in the early eighties to more than one million students in 2012. This development has implied an increase in the net coverage from 27,9% in 2007 to 36,3% in 2011 (CHILE, 2012). The burst in the number of higher education enrolled students is justified by several reasons, such as the conscious training need of today's individuals who perceive education as a way of acquiring the necessary tools to face the day by day challenges of an increasingly demanding and competitive world. On the other hand, the appearance of a vision oriented to an openness of an

educational market previously characterized by a closed hegemony, aimed at an elite of university organizations that nowadays must share their leadership with private educational institutions (GAETE; MORALES, 2011).

Higher education has grown and diversified, generating a clearly more complex scenario than that of previous decades (LÓPEZ SEGRERA, 2008). Both, the number of enrolled students in higher educational institutions as well as the gross coverage have progressively increased. In 2002, there were around 520.000 students registered in the Chilean higher education system, whereas in 2012, the number of enrolled students more than doubled, with more than 1.100.000 (NAVARRETE; CANDIA; PUCHI, 2013). The number of higher education institutions has also increased and diversified, offering a wide variety of academic, professional and technical programs (OCDE, 2013).

Abandonment and desertion in higher education

Before this array of opportunities, numerous students, enticed by the appealing academic offers, decide to get enrolled in the great project of pursuing a university career with the purpose of obtaining a professional diploma. However, in many of these students, this previous motivation and enthusiasm decant, gradually and proportionately, in the measure they visualize the requirements and demands implied in a professional training (DÍAZ PERALTA, 2008). Therefore, it isn't enough to ensure the growth in the number of enrolled students, but also, it is essential to generate action strategies so that this percentage of students stays and finally concludes their studies successfully.

The development experienced by the system has allowed a new group of young people to gain access to higher education. However, this achievement has brought about an additional challenge to the higher education system: to retain this new group of students in the institutions and/or in the study programs they enrolled in (CHILE, 2012). Several hypotheses stand that one of the most important causes of the high number of students dropping out of their study programs is related to the young people's new needs, coupled with the poor adaptation capability of the system to those needs (GONZÁLEZ; URIBE; GONZALEZ, 2005).

Desertion is directly framed within a diagnosis associated to the lack of efficiency and social decline, since multiple factors are involved, such as: earnings index, development, productivity and growth which are affected at the time the students drop out of the initial training system. In the first place, part of the resources the State, the students and their families are lost, which have been invested in the training of those who do not complete their studies, leading to a socioeconomic loss. Finally, young students who drop out see their graduation dreams shattered, which leads to frustration and dissatisfaction (GONZALEZ; URIBE; GONZALEZ, 2005). According to the Education Board's figures in Chile, more than half of the students who enter higher education end up abandoning the training program. This causes numberless losses not only for the student and his/her family, but also for the institutions and the nation's development itself.

School drop-out at university level is a complex problem that can be derived from different factors (CELIS SCHNEIDER et. al., 2013). There are models and theories aimed at

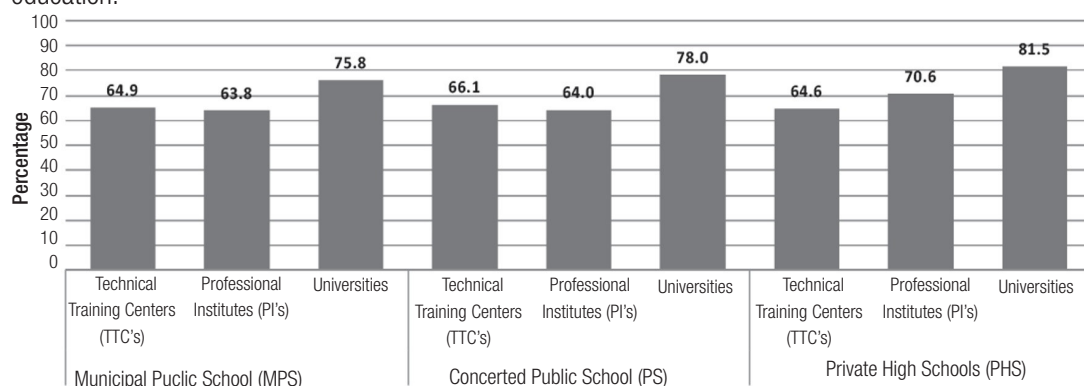
analyzing this phenomenon, delivering us predictive or explanatory variables associated to three primary factors: first, the student's condition related to his/her academic background, socioeconomic stratum, psychological traits and family features. On the other hand, the institutional conditions, that is, the characteristics associated with the program, its resources, their teaching staff, their pedagogical approach and the level of commitment, as well as the support program offered to the students and evidently, the interaction between these two factors in a reciprocal way (PINEDA; PEDRAZA; MORENO, 2011). The analysis of these variables has given way to the proposal of various approaches oriented to explain the university desertion as an effort to understand what affects the abandonment and the generation of programs aimed at promoting the student's permanence and success.

Students' Retention/Permanence in higher education

Regarding the students' permanence –as pointed out above- three out of ten higher education students drop out of their institution during the first school period (CHILE, 2012). This percentage rises to 35% for the TTC's (Technical Training Centers) and PI's (Professional Institutes), whereas in the universities scenarios the average is lower (25%). In PI's and Universities, PHS (Private High Schools) students score higher permanence indexes, while students from MPS (Municipal Public Schools) show a lower percentage (Chart 1).

This fact is not observed in TTC's probably because just a small percentage of the students from PS enrolled in TTC's. The average duration of higher education studies in Chile are lengthy (6,3 years on average according to SIES³ latest estimates), and late graduation and dropout phenomena abound, even beyond the first career school period (OCDE, 2013).

Chart 1 - Percentage of student retention during the first school year by type of institution of higher education.



Source: SIES, consulted in División de Educación Superior del Ministerio de Educación/Ministerio de Educación (CHILE, 2012). Informe Nacional de Antecedentes: *El Aseguramiento de la Calidad de la Educación Superior en Chile, Comité de Coordinación. Sistema Nacional de Aseguramiento de la Calidad de la Educación Superior en Chile* (SINAC-ES).

3- Servicio de Información de Educación Superior.

Currently, one of the associated quality management indexes of universities is bound to students' retention. That's how this issue has gained increasing relevance in the educational field due to the felt necessity of generating alternatives for the promotion of permanence and graduation of students from the university education system (TORRES GUEVARA, 2012). Under this scenario, higher education institutions have created and implemented students' retention support programs.

According to the Inter American Agency for Cooperation and Development, a student retention program encompasses all actions developed by an institution's educational system to guarantee the accompaniment of the student during his/her academic career, so that he/she can successfully complete it. Its goal is to provide the necessary tools for the successful completion of the different cycles and stages in the time periods established, and in addition to that, to ensure the knowledge required and the development of indispensable skills and attitudes for the development in life (PINEDA; PEDRAZA; MORENO, 2011).

On the other hand, students' retention constitutes one of the main indicators of inner efficiency within any higher education institution (whether this is a University, a Professional Institute or a Technical Training Center). Thus, at the level of the Higher Education System, the information on retention rates becomes essential to determine the institutional performance, and in an aggregate form it encompasses a relevant indicator of the education's quality in Chile according to the information requirements from OECD and the World Bank (SIES, 2010).

It is relevant to consider the data on retention and satisfactory graduation rates, since it clearly illustrates an equity problem if certain groups show higher desertion or failure in their graduation than others. Secondly, because the reforms to the admissions system designed to aid a larger number of disadvantaged groups do not help much if the larger number that enters proves to be incapable of graduating satisfactorily. In this specific context, the government of Chile has allocated a considerable amount of funds from MECESUP for remedial or *leveling* programs in selected universities, for students whose knowledge in mathematics, language or sciences is under the necessary standard in order to successfully complete a course (OCDE, 2009).

Retention models

Over the years and pondering the problematic, several authors contributed in the development of hypotheses and studies to determine the most adequate method to deal with students' retention in university education. Nevertheless, the most widely accepted model is the one proposed by Vincent Tito, in which varied theories and different exponents have been related. It proposes that the student success is mediated by the degree of academic and social integration; in other words, by the fulfillment of academic guidelines and by the ties woven between his/her surrounding and him/her and the higher education institutional agents.

In 2012, Tinto proposed an approach shift on the phenomenon of persistence and an institutional action model. In this context, Tinto provides a conceptual distinction between the two terms of retention and persistence. He defines persistence from the student's perspective, who has the control of remaining or not in the institution as well as in the

career chosen till graduation. Therefore, the retention and persistence indicators may be different since they are based on different reference points: the first one is attributed to the university commitment; the second one is focused on the student's effort. Tinto (2012) proposes a model of institutional action based upon the evidence that Universities may create academic and social communities leading to the student's success. The author reflects on a series of minimal conditions that universities must take into account in order to create these communities, among which the systematic effort to clarify what's needed to succeed in the training process stands out. The essential idea is to provide quality information to the student that may allow him/her to reason out the different courses for as long as his/her career lasts and during his/her stay at the university. He also insists on creating the conditions that allow the student to boost his/her self esteem and self worth (TINTO, 2012).

The approach of desertion as an individual responsibility of the student is turned over to the institutional responsibility of retaining the student (BENSIMON et al., 2004). It is no longer interesting to know why the student leaves, but to find out what strategies may be implemented by the institutions so that the student develops cognitively and affectionately in his/her academic progress until obtaining the college degree (CABRERA et al., 2012).

Understanding that students' desertion of the higher education system is a problem that affects everyone and it implies social exclusion, it becomes urgent to seek the remedies that better alleviate the causes of this phenomenon, that do not only affect the promotion of people, but also the overall social development.

In order to overcome the negative diagnosis disclosed by the current dropout rates, it is necessary to investigate beyond the figures and emphasize on the knowledge of the students' profile, their generational, social, economic and academic characteristics. Considering all these variables, it will be possible to have a more complete and significant scope by the time of making decisions in the construction of a retention model, which undoubtedly must be based on academic support programs that include the accompaniment of the student so that he/she may achieve both, the development of academic and social integration skills, as well as the cultivation of positive self-concept that may guide him/her when facing difficulties and orient him/her in the way of reaching his/her objectives and goals.

The permanence at a university is directly related with the students' perspective of success, as well as the positive experiences the student lives within the university. Therefore, the family support, the relationship with their peers and professors, the degree of perseverance, the meaningful social and educational experience within the formation atmosphere, they all play a leading role. Every retention model must consider these factors and determine how they can sustain and promote their development, since the main remedy to the problem of desertion is to facilitate the students' integration process. Student failure in universities is a problem that challenges everyone, since it is in this training process in which professionals are forged to meet tomorrow's social needs. The desertion generates a personal, social and economic impact that calls for a deep analysis of the subject, accompanied by strategic planning, which combines the reality of the students, their needs, interests, abilities and motivations, with the objectives that the institutions, and in them the reflected interests of society, aim for the students to reach as future professionals and agents of social change.

Methods and materials

Population

The study population involved 2.741 students from the cohorts of 2014 and 2015 who enrolled for their first year at Universidad Bernardo O'Higgins (Santiago, Chile). It should be noted that the model obtained excludes 400 students for not having the complete information to determine all variables required for the study. However, in several univariate and bivariate analyses, they are indeed included.

Instruments and context

This investigation studied the behavior variables of newcomer students –suggested by the scientific literature– that characterize the students and refer to the background related to their *previous academic preparation*, their socioeconomic stratum, their psychological traits and family features. All these variables were analyzed and contrasted with the student's situation at the end of the first year of university life (retention). The likely relations between the newcomers' behavior and the students' academic future were analyzed. The latter was done with the purpose of controlling from the prediction, one of the main indicators for universities at present, which is the student retention.

Procedures and methods performed

For the analysis of the information, the logistic regression technique was employed as a multivariate inferential method. The purpose of this analysis is to structure a predictive model capable of rendering significant background related to the student retention of freshmen at Universidad Bernardo O'Higgins (Santiago, Chile). For that purpose, a model based on the determination of significant variables related to the entrance behavior of university newcomers was created. Prior to this analysis, the relation of each one of the explanatory variables (independent variables) along with the variable of student retention (dependent variable) of UBO's students was studied, by applying the Chi-square test or the Fisher exact test (categorized qualitative variables) according to the frequency values of the contingency tables.

The model is proposed by defining “Y” as the binary dependent variable which takes two codified possible values between 0 and 1. In this study, the dropout students take the value 0 of the variable, and those who carry on with their studies (retention) take the value 1 of the variable. The variables X_1, X_2, \dots, X_i are the set of independent variables observed to explain or predict the value of the dependent variable “Y”. The model is built to accomplish the goal of figuring out the probability that variable “Y” is equal to 1, given X_1, X_2, \dots, X_i ($\text{Prob}(Y/ X_1, X_2, \dots, X_i)$) is: $\text{Prob}(Y/ X_1, X_2, \dots, X_i) = g(X_1, X_2, \dots, X_i; \beta)$, where the probabilistic function “g” is the link function with values between [0,1], whose value depends on a vector or parameters β , which in the case of a binary logistic regression is proposed as follows:

$$\text{Formula 1: } P(Y=Retention=1/X_i) = \frac{e^{\sum \beta_i X_i}}{1 + e^{\sum \beta_i X_i}}$$

The explanatory variables of the student's entrance behavior (independent variables of study) that were chosen during the registration processes of the cohorts and the yearly student profiling survey carried out by the University's Department of Integral Training; are shown on Table 1, divided in three categories;

Table 1 - Explanatory variables of newcomer students' entrance behavior at Universidad Bernardo O'Higgins.

INDEPENDENT EXPLANATORY VARIABLES		
CATEGORY 1 Previous academic preparation	CATEGORY 2 Socioeconomic stratum	CATEGORY 3 Psychological Traits and Family Features
High School of origin	Financed Studies	Gender
Previous Higher Studies	Work Performance	Age Group
Type of Higher Studies	Type of Work Performance	Study Day
University Selection Test, (Whether you perform the test or not)	Family Income	Marital Status
Selection Test the same year of entry (Performed the UST the same year of admission to the higher education system, in previous years, or not at all)	Type of Disability	Who you live with
University Selection Test Result	Home Address	Father's schooling Type of Disability
Student above 50% of his/her generation in high school education	Studies with UBO scholarship*	Mother's schooling
Student with Selection Test above the average of high school grades	Studies with the UBO Tariff Grant**	Father's occupation Mother's occupation Reasons to study at the UBO Reasons for career option Previous Family Professionals

* UBO scholarship (Universidad Bernardo O'Higgins): Varied benefits offered to students at the University, e.g.: lunch scholarship, sporting scholarships, academic excellence scholarships or others.

** UBO Tariff Grant: Benefits destined to the career's cost tariff.

Source: Own elaboration for this research.

The independent variable is detailed on Table 2, by assigning the value 0 to the student who drops out, and the value 1 to the student who does not (retained) in the regression model.

Table 2 - Student retention dependent variable.

Dependent Variable	Frequency	Percentage
Drop out (0)	444	16,2
Retain (1)	2297	83,8
Total	2741	100,0

Source: Own elaboration for this research.

Results

Preliminary study, bivariate analysis

Prior to the multivariate analysis, the relation between every explanatory variable and the university retention was evaluated. Table 3 shows the bivariate analysis results with their respective statistical tests to contrast the hypothesis of independence, for which the tests' hypothesis is accepted for values of significance lower than 0.05, and therefore, the explanatory variable is related to the dependent variable.

Table 3 shows that the variables associated to retention with significant differences, justified by the statistical tests performed (significance $p < 0.05$) are seventeen, distributed in six variables of entrance behavior on *previous academic preparation*, five variables of entrance behavior on *socioeconomic stratum* and six variables of entrance behavior on psychological traits and family features.

Each one of the explanatory variables that affect the student's retention is shown in the following analysis. The variables are represented by expressing the frequency percentages of the indicators of each independent variable vs. the dependent variable. These variables at the moment of being analyzed in the logistic regression model, were categorized in the computer system (0,1,2...). These categories are shown in some of the variables under analysis, in order to clearly understand the final regression model.

Table 3 - Significance of the explanatory variables in the bivariate analysis vs. the retention control variable.

Categories Variables	Significance Value	Related to retention	Statistical Test Employed	Frequency Values (%)
Gender	<.001	Yes	Pearson's Chi-Square	0,00
Age Group	<.001	Yes	Pearson's Chi-Square	0,00
Study Day	<.001	Yes	Pearson's Chi-Square	0,00
Marital Status	.008	Yes	Fisher's Exact Test	25,00
High School of Origin	<.001	Yes	Pearson's Chi-Square	0,00
Previous Higher Studies	.321	No	Pearson's Chi-Square	0,00
Type of Higher Studies	.380	No	Pearson's Chi-Square	0,00
Who you live with	<.001	Yes	Pearson's Chi-Square	0,00
Father's schooling	.655	No	Pearson's Chi-Square	0,00
Mother's schooling	.559	No	Pearson's Chi-Square	0,00
Father's occupation	.032	Yes	Pearson's Chi-Square	10,00
Mother's occupation	.918	No	Pearson's Chi-Square	10,00
Financed Studies	<.001	Yes	Pearson's Chi-Square	8,30
Work Performance	<.001	Yes	Pearson's Chi-Square	0,00
Type of Work Performance	<.001	Yes	Pearson's Chi-Square	0,00
Family Income	.549	No	Pearson's Chi-Square	0,00
Reasons to study at the UBO	.302	No	Pearson's Chi-Square	0,00
Reasons for career option	.560	No	Pearson's Chi-Square	0,00
Previous Family Professionals	.561	No	Pearson's Chi-Square	0,00
Type of Disability	.638	No	Pearson's Chi-Square	10,00
Home address	.935	No	Pearson's Chi-Square	0,00
Studies with UBO scholarship	.001	Yes	Pearson's Chi-Square	0,00
Studies with the UBO Tariff Grant	.016	Yes	Pearson's Chi-Square	0,00
University Selection Test	<.001	Yes	Pearson's Chi-Square	0,00
Selection Test the same year of entry	<.001	Yes	Pearson's Chi-Square	0,00
University Selection Test Result	<.001	Yes	Pearson's Chi-Square	0,00
Student above 50% of his/her generation in high school education	<.001	Yes	Pearson's Chi-Square	0,00
Student with Selection Test above the average of high school grades	<.001	Yes	Pearson's Chi-Square	0,00
UBO's admission cohort	.577	No	Pearson's Chi-Square; exact significance	0,00

Source: Own elaboration for this research.

Table 4 - Variables of the *prior academic preparation* category vs. student retention.

High School of Origin explanatory variable		Dependent Variable	
Variable's Category	Drop out	Retain	
Municipal (0)*	19,6	80,4	
Paid Private (1)	20,2	79,8	
Subsidized Private (2)	11,1	88,9	

University Selection Test explanatory variable		Dependent variable	
Variable's Category	Drop out	Retain	
Without University Selection Test	27,9	72,1	
With University Selection Test	13,1	86,9	

Year of the UST test's** explanatory variable		Dependent variable	
Variable's Category	Drop out	Retain	
Without UST test	27,9	72,1	
With UST test performed in previous years	16,7	83,3	
UST test performed the same year of admission	11,4	88,6	

UST Results' explanatory variable		Dependent variable	
Variable's Category	Drop out	Retain	
Without UST (0)	27,9	72,1	
Higher than 600 (1)	19,1	80,9	
550-599 (2)	8,0	92,0	
500-549 (3)	9,4	90,6	
450-499 (4)	12,1	87,9	
400-449 (5)	14,4	85,6	
Lower than 400	24,1	75,9	

Explanatory Variable of "50% above his/her high school cohort"		Dependent variable	
Variable's Category	Drop out	Retain	
Without UST	27,9	72,1	
50 % Below his/her cohort	14,4	85,6	
50 % Above his/her cohort	10,7	89,3	

Explanatory Variable of "UST scores above average grades"		Dependent variable	
Variable's Category	Drop out	Retain	
Without UST	27,9	72,1	
UST Result < Average grades	14,7	85,3	
UST Result > Average grades	16,9	29,4	

* Number with which the indicator of the variable appears in the Final regression's Final Model (0 is the control reference indicator).

** University Selection Test: Test aimed at high school graduates for admission to the higher education system in Chile. This test is reviewed as a normal "Gauss Bell" distribution, in which 500 points is the national average and the scores are distributed from 100 to 850 points as suggested by the Normal distribution.

Source: Own elaboration for this research.

In this first category (Table 4) it stands out the low students' desertion from subsidized schools (11,1); the high dropout among students who do not take the University Selection Test (UST) (27,9), moreover, those who do take the UST the same year of entrance to their tertiary studies, show a considerably lower dropout (11,4). It is highly relevant to observe that students with higher UST scores (higher than 600 points) also display higher dropout rates than those groups with lower scores, and the remaining score intervals increase the desertion as the scores decrease to lower than 400 points, where the group with the highest desertion rates is found (24,1). Finally, the students belonging to the better 50% of their cohorts in high school show a low dropout rate (10,7). In the particular case of the students with higher scores (above 600 points), their higher desertion may be due to personal motivations that are analyzed in the conclusions of this study. Apparently, Table 4 shows a sort of paradox in the sense that, on the one hand, students who took the UST to enter the university display a lower dropout rate. However, the highest scores of this same test evidence a significant desertion rate.

The results obtained in this first dimension, are compatible with the approach shift in 2012 for Tinto's models of persistence (2012), which are the basis for the university action models that must respond to the entrance behavior differences of the students, expressed in this category. This suggested change of paradigm expresses an institutional action based on the principle that universities must create academic and social communities with measurements that lead to the student's success.

The current lines of research have carried out varied studies, divided by different socioeconomic groups to measure the impact of the preparation received at levels prior to tertiary studies, concluding that universities that had clear and ambitious educational plans to equalize the differences of academic behavior at the moment of entrance to the university, had a greater possibility of obtaining their university diploma, regardless of their socioeconomic level (CABRERA; PÉREZ; LÓPEZ FERNÁNDEZ, 2015). Other studies in Latin America (ARBONA; NORA, 2012; SWAIL et al., 2005) confirm this new trend suggested to Tinto's model. In this first category, the importance of having passed the university selection test and the results obtained in it to stay in the university study program, as well as the school of origin, becomes evident. By considering the obtained results, the importance of the student's support programs for those students with higher desertion risk in their first year is highlighted, among them, the first year leveling program, the reinforcement of critical school subjects and the psycho-educational and psycho-pedagogical attentions.

Table 5 -Variables of the *socioeconomic stratum* category vs. student retention.

Financed Studies' Explanatory Variable		Dependent variable	
Variable's Category	Drop out	Retain	
Scholarship	7,8	92,2	
Loans	9,5	90,5	
Agreement	28,6	71,4	
Personal	22,6	77,4	
Parents	12,2	87,8	
Others	14,2	85,8	

Explanatory Variable of "Studies with UBO scholarship"		Dependent variable	
Variable's Category	Drop out	Retain	
Without scholarship	13,8%	86,2	
UBO Scholarship	18,7%	81,3	

Type of Work Performance's Explanatory Variable		Dependent variable	
Variable's Category	Drop out	Retain	
Does not work	10,3	89,7	
Employed Full time	22,1	77,9	
Employed Half time	20,8	79,2	
Occasional	14,6	85,4	
Others	17,3	82,7	

Work Performance Explanatory Variable		Dependent variable	
Variable's Category	Drop out	Retain	
Does not Work	10,3	89,7	
Works	18,2	81,8	

UBO Tariff Explanatory Variable		Dependent variable	
Variable's Category	Drop out	Retain	
Without Tariff Scholarship	15,2	84,8	
UBO Tariff Scholarship	16,4	83,6	
Other Institutions	22,6	77,4	

Source: Own elaboration for this research.

In this second category (Table 5), it stands out the low desertion among students with grants (7,8); the high dropout among students with full time jobs (22,1), as well as the low desertion among students who do not work (10,3) as oppose to those who do work (18,3). These results propose to focus on the afternoon shift's students, and since most students who work are in the afternoon study shift, this topic is analyzed in detail in the following category.

Regarding the scholarships assigned to higher vulnerability students, Brunner (2016) already detailed the increasing privatization of the Chilean tertiary education in the international comparative context, for which the State in recent years aims to regulate

these effects in three dimensions. The first one based on the objectives of equity, by granting scholarships or students' loans: so that the conditions imposed on these benefits may explain the low dropout result among students with scholarships. The second dimension is related to State control that refers to the quality, imposing demands for more information and accreditation. This study contributes to this dimension by delivering statistically validated information, which is in addition, the basis of the third dimension suggested by Brunner (2016) which is the development of capacities, measured through the competitive allocation of resources to the institutions.

Table 6 - Variables of the *psychological traits and family features* category vs. student retention.

<table border="1"> <thead> <tr> <th>Age Group's Explanatory Variable</th> <th colspan="2">Dependent variable</th> </tr> <tr> <th>Variable's Category</th> <th>Drop out</th> <th>Retain</th> </tr> </thead> <tbody> <tr> <td>Younger than 21 (0)</td> <td>12,4</td> <td>87,6</td> </tr> <tr> <td>21-25 (1)</td> <td>16,9</td> <td>83,1</td> </tr> <tr> <td>26-30 (2)</td> <td>21,5</td> <td>78,5</td> </tr> <tr> <td>30-35 (3)</td> <td>21,6</td> <td>78,4</td> </tr> <tr> <td>Older than 35 (4)</td> <td>23,6</td> <td>76,4</td> </tr> <tr> <td>UBO's Total</td> <td>16,2</td> <td>83,8</td> </tr> </tbody> </table>	Age Group's Explanatory Variable	Dependent variable		Variable's Category	Drop out	Retain	Younger than 21 (0)	12,4	87,6	21-25 (1)	16,9	83,1	26-30 (2)	21,5	78,5	30-35 (3)	21,6	78,4	Older than 35 (4)	23,6	76,4	UBO's Total	16,2	83,8	<table border="1"> <thead> <tr> <th>Marital Status's Explanatory Variable</th> <th colspan="2">Dependent variable</th> </tr> <tr> <th>Variable's Category</th> <th>Drop out</th> <th>Retain</th> </tr> </thead> <tbody> <tr> <td>Married</td> <td>23,3</td> <td>76,7</td> </tr> <tr> <td>Single</td> <td>13,2</td> <td>86,8</td> </tr> <tr> <td>Cohabiting</td> <td>28,6</td> <td>71,4</td> </tr> <tr> <td>Divorced</td> <td>18,5</td> <td>81,5</td> </tr> <tr> <td>UBO's Total</td> <td>16,2</td> <td>83,8</td> </tr> </tbody> </table>	Marital Status's Explanatory Variable	Dependent variable		Variable's Category	Drop out	Retain	Married	23,3	76,7	Single	13,2	86,8	Cohabiting	28,6	71,4	Divorced	18,5	81,5	UBO's Total	16,2	83,8			
Age Group's Explanatory Variable	Dependent variable																																																
Variable's Category	Drop out	Retain																																															
Younger than 21 (0)	12,4	87,6																																															
21-25 (1)	16,9	83,1																																															
26-30 (2)	21,5	78,5																																															
30-35 (3)	21,6	78,4																																															
Older than 35 (4)	23,6	76,4																																															
UBO's Total	16,2	83,8																																															
Marital Status's Explanatory Variable	Dependent variable																																																
Variable's Category	Drop out	Retain																																															
Married	23,3	76,7																																															
Single	13,2	86,8																																															
Cohabiting	28,6	71,4																																															
Divorced	18,5	81,5																																															
UBO's Total	16,2	83,8																																															
<table border="1"> <thead> <tr> <th>Study Day 's Explanatory Variable</th> <th colspan="2">Dependent variable</th> </tr> <tr> <th>Variable's Category</th> <th>Drop out</th> <th>Retain</th> </tr> </thead> <tbody> <tr> <td>Morning</td> <td>12,1</td> <td>87,9</td> </tr> <tr> <td>Evening</td> <td>26,5</td> <td>73,5</td> </tr> <tr> <td>UBO's Total</td> <td>16,2</td> <td>83,8</td> </tr> </tbody> </table>	Study Day 's Explanatory Variable	Dependent variable		Variable's Category	Drop out	Retain	Morning	12,1	87,9	Evening	26,5	73,5	UBO's Total	16,2	83,8	<table border="1"> <thead> <tr> <th>Gender's Explanatory Variable</th> <th colspan="2">Dependent variable</th> </tr> <tr> <th>Variable's Category</th> <th>Drop out</th> <th>Retain</th> </tr> </thead> <tbody> <tr> <td>Feminine</td> <td>13,2</td> <td>86,8</td> </tr> <tr> <td>Masculine</td> <td>20,7</td> <td>79,3</td> </tr> <tr> <td>UBO's Total</td> <td>16,2</td> <td>83,8</td> </tr> </tbody> </table>	Gender's Explanatory Variable	Dependent variable		Variable's Category	Drop out	Retain	Feminine	13,2	86,8	Masculine	20,7	79,3	UBO's Total	16,2	83,8																		
Study Day 's Explanatory Variable	Dependent variable																																																
Variable's Category	Drop out	Retain																																															
Morning	12,1	87,9																																															
Evening	26,5	73,5																																															
UBO's Total	16,2	83,8																																															
Gender's Explanatory Variable	Dependent variable																																																
Variable's Category	Drop out	Retain																																															
Feminine	13,2	86,8																																															
Masculine	20,7	79,3																																															
UBO's Total	16,2	83,8																																															
<table border="1"> <thead> <tr> <th>Explanatory Variable of "Who you live with"</th> <th colspan="2">Dependent variable</th> </tr> <tr> <th>Variable's Category</th> <th>Drop out</th> <th>Retain</th> </tr> </thead> <tbody> <tr> <td>Parents (0)</td> <td>11,4</td> <td>88,6</td> </tr> <tr> <td>Spouse and children (1)</td> <td>18,8</td> <td>81,3</td> </tr> <tr> <td>Just one of the parents (2)</td> <td>13,0</td> <td>87,0</td> </tr> <tr> <td>Children (3)</td> <td>26,5</td> <td>73,5</td> </tr> <tr> <td>Others (4)</td> <td>18,6</td> <td>81,4</td> </tr> <tr> <td>UBO's Total</td> <td>16,2</td> <td>83,8</td> </tr> </tbody> </table>	Explanatory Variable of "Who you live with"	Dependent variable		Variable's Category	Drop out	Retain	Parents (0)	11,4	88,6	Spouse and children (1)	18,8	81,3	Just one of the parents (2)	13,0	87,0	Children (3)	26,5	73,5	Others (4)	18,6	81,4	UBO's Total	16,2	83,8	<table border="1"> <thead> <tr> <th>Father's Occupation Explanatory Variable</th> <th colspan="2">Dependent variable</th> </tr> <tr> <th>Variable's Category</th> <th>Drop out</th> <th>Retain</th> </tr> </thead> <tbody> <tr> <td>Employee (0)</td> <td>10,8</td> <td>89,2</td> </tr> <tr> <td>Employer (1)</td> <td>15,9</td> <td>84,1</td> </tr> <tr> <td>Armed Forces</td> <td>10,2</td> <td>89,8</td> </tr> <tr> <td>Staff Service Domestic labor</td> <td>12,5</td> <td>87,5</td> </tr> <tr> <td>Household owner /Other</td> <td>15,2</td> <td>84,8</td> </tr> <tr> <td>UBO's Total</td> <td>16,2</td> <td>83,8</td> </tr> </tbody> </table>	Father's Occupation Explanatory Variable	Dependent variable		Variable's Category	Drop out	Retain	Employee (0)	10,8	89,2	Employer (1)	15,9	84,1	Armed Forces	10,2	89,8	Staff Service Domestic labor	12,5	87,5	Household owner /Other	15,2	84,8	UBO's Total	16,2	83,8
Explanatory Variable of "Who you live with"	Dependent variable																																																
Variable's Category	Drop out	Retain																																															
Parents (0)	11,4	88,6																																															
Spouse and children (1)	18,8	81,3																																															
Just one of the parents (2)	13,0	87,0																																															
Children (3)	26,5	73,5																																															
Others (4)	18,6	81,4																																															
UBO's Total	16,2	83,8																																															
Father's Occupation Explanatory Variable	Dependent variable																																																
Variable's Category	Drop out	Retain																																															
Employee (0)	10,8	89,2																																															
Employer (1)	15,9	84,1																																															
Armed Forces	10,2	89,8																																															
Staff Service Domestic labor	12,5	87,5																																															
Household owner /Other	15,2	84,8																																															
UBO's Total	16,2	83,8																																															

Source: Own elaboration for this research.

The third category (Table 6) highlights the high dropout among students from the afternoon shift (26,5); the significant differences per gender in the dependent variable; as well as the high desertion among students who only live with their children (26,5). The increase in dropout is also observable as the age group of the students increases; in other words, the older the age the higher the desertion. Finally, there are differences between categories of the variable marital status, with the highest dropout among married students (23,3) and cohabitants (28,6).

Several results in this first part of the study are coincident with some previous studies on the subject. According to the data supplied by the Ministerio de Educación (MINEDUC), in Chile the behavior of the university dropout rate is lower in younger age groups. There's research evidence that concludes that the students age negatively affects the retention in the same career and institution. In this regard, Bordon, Canals and Rojas (2012) state that:

[...] one more year reduces the probability of retention in 2% on average, even though it is controlled by skill. This could be due to two reasons. On the one hand, older students usually have greater responsibilities (family and/or work) that could hinder their academic performance, and with it, their retention. On the other hand, older students may have spent longer time periods without studying, in which case, to retake the study required in a university career may be difficult and such obstacles may lead to desertion. Retención en los programas e instituciones de educación superior (BORDÓN; CANALS; ROJAS, 2012, p. 13).

By following this reasoning and based on SIES data between 2010 and 2015, a higher retention was identified among the enrolled students in careers scheduled during the morning sessions than that of the afternoon. In order to explain such behavior, the time availability variable appears once again as a plausible explanation to understand these results, since students of evening programs complement their professional training with work, the obligations associated to the latter could be affecting their academic performance, thus in the decision of defecting from the system when it is assessed that the conditions are not optimal to complement both activities. The research evidence also states that having a family network support constitutes a possible explanation to understand the higher rate of retention expressed by this group above other categories (BORDÓN; CANALS; ROJAS, 2012). In this regard, the aforementioned authors shed light on the prevalence of the desertion in a group of students that enter the higher education without the UST, according to these:

Taking the UST increases the retention probability in 1,7%. Surely, the self selection of students when registering or not to take the test and then attend to take it, is associated with their own expectations to access careers that require the UST. When students don't take this test, they surely didn't have any expectations of gaining access to careers that required the UST, and therefore, had a lower performance that would make them more prone to dropping out." Retención en los programas e instituciones de educación superior (BORDÓN; CANALS; ROJAS, 2012, p. 15).

It is possible to recognize in the previous quote an aspect not outlined so far in the current research on desertion in higher education, and that is related to the necessary skills that have to be developed in high school in order to successfully face the set of tasks and demands that involve taking higher education studies, being associated with the performance in high school education and future expectations to pursue a university career.

When comparing the data for those students taking the UST in previous years with those who took it the year before their enrollment at the university, it seems that the observed trend points to a different corollary from the one defined by the theory regarding this point. Indeed, and according to Bordon, Canals and Rojas (2012) the behavior of the UST performance variable is not enough to explain the university dropout, since generations that took the UST the same year they graduated from IV grade express a lower probability of retention than those who took the test in previous years, which according to this study's judgment, could be because:

[...] those who are from the generation enter into higher education for the first time, and therefore, are more likely to change careers and/or institution. On the other hand, those who are not from the generation, which includes students who had previously studied another career, possibly are less willing to change careers and/or institution once again, and those students who didn't immediately enter into higher education after graduating from IV grade." Retención en los programas e instituciones de educación superior (BORDÓN; CANALS; ROJAS, 2012, p. 14).

Considering the differences identified between the study's data and the aforementioned quote, it seems appropriate to point out that the differences could be due to social, economic and academic variables implied in both studies, in the sense that the study by these authors by acquiring census characteristics stands away from the students' profile that enters the Universidad Bernardo O'Higgins. Indeed, our students preferably come from families without higher education background, with a poor economic condition, so the national corollary has little chance of fulfillment since having access to higher education with scholarships and/or loans, the possibilities of abandoning the studies and changing careers and university are reduced, which in the opinion of the research team could explain these differences.

Multivariate analysis of the student retention's logistic regression at Universidad Bernardo O'Higgins

Statistic analysis of the model

For the block 1 of the regression model (with the variables of the model), the table of Chi-Square values of the model indicates that there is a significant improvement in the prediction of the probability of occurrence of the categories of the dependent variable, (Chi-Square: 163.169; $p < .001$). The Naglekerke R square value indicates that the model proposed explains 12.4% of the variance in the dependent variable with a $p > .005$ (.370) of the test of goodness of the Hosmer and Lemeshow Test that assures us that the observed results are sufficiently adjusted to what is expected under the model.

The logistic regression model shows in its final step (Table 7), that it has eliminated, in its previous stages, numerous dependent variables adjusting, predictively, each phase until arriving at the final model with seven dependent variables and a probability of success of the retention variable of 86,4%.

Table 7- Estimated logistic regression model (Block 1 Final step of the regression model).

Variables of the regression logistic Model in the final step of the Model Step 12		Estimation Coefficient	Standard error	Wald Statistics	Degrees of Liberty	associated p Sig.	Reason of disparity (OR, odds ratio)
Final Model	Gender(1)	-,510	,134	14,501	1	,000	,600
	Age Group			13,294	4	,010	
	Age Group(1)	,154	,158	,946	1	,331	1,166
	Age Group(2)	,651	,241	7,285	1	,007	1,918
	Age Group(3)	,799	,338	5,578	1	,018	2,224
	Age Group(4)	1,201	,393	9,358	1	,002	3,325
	Study Day(1)	-,522	,194	7,238	1	,007	,593
	High School of Origin			15,027	2	,001	
	High School of Origin(1)	-,101	,284	,125	1	,723	,904
	High School of Origin(2)	,496	,139	12,735	1	,000	1,643
	Who you live with			14,493	4	,006	
	Who you live with(1)	-,448	,359	1,564	1	,211	,639
	Who you live with(2)	-,220	,155	2,006	1	,157	,803
	Who you live with(3)	-1,317	,390	11,424	1	,001	,268
	Who you live with(4)	-,454	,178	6,490	1	,011	,635
	Father's Occupation			7,414	4	,116	
	Father's Occupation(1)	-,425	,166	6,563	1	,010	,654
	Father's Occupation(2)	,034	,341	,010	1	,921	1,034
	Father's Occupation(3)	-,042	1,130	,001	1	,970	,959
	Father's Occupation(4)	-,262	,170	2,384	1	,123	,769
	Type of Work Performance			4,350	4	,361	
	Type of Work Performance(1)	-,177	,243	,533	1	,465	,838
	Type of Work Performance(2)	-,543	,295	3,397	1	,065	,581
	Type of Work Performance(3)	-,218	,173	1,576	1	,209	,804
	Type of Work Performance(4)	,016	,355	,002	1	,965	1,016
	USTLEVEL			48,906	5	,000	
	USTLEVEL(1)	,449	,441	1,036	1	,309	1,566
	USTLEVEL(2)	1,687	,369	20,847	1	,000	5,401
	USTLEVEL(3)	1,117	,206	29,505	1	,000	3,055
	USTLEVEL(4)	,928	,182	26,108	1	,000	2,529
USTLEVEL(5)	,686	,200	11,795	1	,001	1,985	
Constant	1,600	,237	45,433	1	,000	4,952	

Source: Own elaboration for this research.

The final regression model gives us as a main result the determination of seven variables that may significantly predict the possible students' desertion at Universidad Bernardo O'Higgins. These variables are: gender, study day, age group, high school origin, who he/she lives with, UST level and an indicator of the father's occupation variable.

The model offers us several possible interpretations, of which the most revealing ones are enunciated to predict the retention of Bernardo O'Higgins students.

- a) The afternoon shift students have a significantly greater probability of abandoning their studies. (*1,7 times as much as those of the morning shift*).
- b) Male students have a greater dropout probability (*1,7 times as much as female students*).
- c) Students over 35 years old have three times as many possibilities of deserting than students under 21; while those over 30 years old have twice as many possibilities of deserting than those under 21.
- d) Students residing with their children have three times as many possibilities of dropping out than those living with their parents.
- e) Students who score between 450 and 600 points on the university selection test, have, according to the sections of the variable's indicators, between twice and five times as many possibilities of staying in their higher education studies than those who don't perform the UST.
- f) By using the formula 1, it is possible to calculate the probability of retention of a student entering the university, (with the current academic conditions), once the significant variables of the model are known.

Conclusions

During the bivariate analysis, it was found that seventeen variables are significantly associated with the university retention. The logistic regression model breaks down to seven the number of variables that can predict the future of the students during the first year of their tertiary studies, with a probability of 86,4%. Therefore, for the Universidad Bernardo O'Higgins it is recommended that:

1. The significant variables suggested in the bivariate analysis serve to diagnose and take preventive measures in support of the students, whom according to their entry condition, are found within the risk factors.
2. By using the logistic regression model it may be estimated, with 86.4% accuracy, the possibility that every student entering the university does not abandon his/her studies, by strengthening the current system of academic support.
3. Propedeutics leveling in the field of Linguistic Skills and Mathematics is proposed, above all, to students who have underperformed in the UST or whose scores are below 400 points.

4. It may be suggested to have follow-up or reinforcement proceedings in the academic, economic or psycho-educational areas, as well as in the indicators of greater risk of each variable according to the results of the multivariate analysis (multiple regression).

5. Attention to students with entry scores higher than 600 should be paid, since they might feel little motivated for not having programs that meet their high academic expectations, and that could become a reason of desertion in this group.

Currently this research team combines the variables of the year 2016 cohort and measures the effects of intervention programs generated by this study. Furthermore, it increases other input variables derived from psycho-educational tests for forthcoming investigations and it will continue the analysis of the studied population until the completion of their tertiary studies.

References

AMESTICA, Luis; LLINAS-AUDET, Xavier; SANCHEZ, Iván. Retorno de la educación superior en Chile: efecto en la movilidad social a través del estimador de diferencias en diferencias. **Formación Universitaria**, La Serena, v. 7, n. 3, p. 23-32, 2014.

ARBONA, Consuelo; NORA, Amaury. The influence of academic environmental factors on Hispanic college degree attainment. **Review of Higher Education**, Maryland, v. 30, n. 3, p. 247- 270, 2007.

BENSIMON, Estela Mara et al. Doing research that makes a difference. **Journal of Higher**, Ohio, v. 1, p. 104-126, 2004.

BORDÓN, Paola; CANALS, Catalina; ROJAS, Saúl. **Retención en los programas e instituciones de educación superior: nueva evidencia para Chile**. Santiago de Chile: Mineduc, 2012.

BRUNNER, Joaquín. Medio siglo de transformaciones de la educación superior chilena: un estado del arte. In: BERNASCONI, Andrés (Ed.) **La educación superior de Chile: transformación, desarrollo y crisis**. Santiago de Chile: UC, 2015. p. 21-108.

BRUNNER, Joaquín. **Sistema privatizado y mercados universitarios: competencia reputacional y sus efectos**. Santiago de Chile, 2016. Informe elaborado en el marco del proyecto FONDECYT N° 1050138.

CABRERA, Alberto F. et al. Pathways to a four-year degree: determinants of transfer and degree completion. In: SEIDMAN, Alan (Ed.). **College student retention: a formula for student Success**. Westport: Praeger, 2012. p. 155-209.

CABRERA, Alberto F.; PEREZ, Paulina; LÓPEZ FERNÁNDEZ, Lorena. Evolución de perspectivas en el estudio de la retención universitaria en los Estados Unidos: bases conceptuales y puntos de inflexión. In: FIGUERA GAZO, Pilar (Ed.). **Persistir con éxito en la universidad: de la investigación a la acción**. Barcelona: Laertes, 2015. p. 15-40.

CELIS SCHNEIDER, Rubén et al. Factores de riesgo de deserción presentes en alumnos repitentes de las carreras de enfermería y kinesiología en una universidad chilena. **Ciencia y Enfermería**, Concepción , v. 19, n. 3, p. 63-71, 2013.

CHILE. Ministerio de Educación. **Análisis y recomendaciones para el sistema de financiamiento estudiantil**. Santiago de Chile: Comisión de Financiamiento Estudiantil para la Educación Superior, 2012.

DE VRIES, Weitse et al. ¿Desertores o decepcionados? Distintas causas para abandonar los estudios universitarios. **Revista de la Educación Superior**, México, DF, v. 40, n. 160, p. 29-49, oct./dic. 2011.

DIAZ PERALTA, Christian. Modelo conceptual para la deserción estudiantil universitaria chilena. **Estudios pedagógicos**, Valdivia, v. 34, n. 2, p. 65-86, 2008.

DONOSO, Sebastián et al. La oferta de educación superior de pregrado en Chile desde la perspectiva territorial: inequidades y asimetrías en el mercado. **Calidad en la Educación**, Santiago de Chile, n. 37, p. 99-127, dic. 2012.

GAETE, Marcela; MORALES, Raquel. Articulación del sistema de educación superior en Chile: posibilidades, tensiones y desafíos. **Calidad en la Educación**, Santiago de Chile, n. 35, p. 51-89, dic. 2011

GONZALEZ, Luis; URIBE, Daniel; GONZALEZ, Soledad. **Estudio sobre la repitencia y deserción superior chilena**. Santiago de Chile: Instituto Internacional para la Educación Superior en América Latina y el Caribe, 2005.

LOPEZ SEGRERA, Francisco. Tendencias de la educación superior en el mundo y en América Latina y el Caribe. **Avaliação**, Campinas, v. 13, n. 2, p. 267-291, jun. 2008.

NAVARRETE, Susana; CANDIA, Ruth; PUCHI, Rodrigo. Factores asociados a la deserción/retención de los estudiantes mapuche de la Universidad de la Frontera e incidencia de los programas de apoyo académico. **Calidad en la educación**, Santiago de Chile, n. 39, p. 43-80, dic. 2013.

OCDE. Organización para la Cooperación y Desarrollo Económico. **La educación superior en Chile**. Santiago de Chile: OCDE:Banco Mundial, 2009.

OCDE. Organización para la Cooperación y Desarrollo Económico. **Revisión de políticas nacionales de educación: el aseguramiento de la calidad en la educación superior en Chile**. Santiago de Chile: OCDE, 2013.

PATIÑO, Luceli; CARMONA. Revisión de algunos estudios sobre la deserción estudiantil universitaria en Colombia y Latinoamérica. **Theoria**, Bío-Bío, v. 21, n. 1, p. 9-20, 2012.

PINEDA, Clelia; ORTIZ, Alexandra; MORENO, Iván. Efectividad de las estrategias de retención universitaria: la función del docente. **Edución y Educadores**, Chia, v. 14, n. 1, p. 119-135, abr. 2011.

RODRIGUEZ PONCE, Emilio. La educación superior en Chile y el rol del mercado: ¿culpable o inocente? **Ingeniare**, Arica, v. 20, n. 1, p. 126-135, abr. 2012.

SIES. Servicio de Información de Educación Superior. **Retención de primer año en el Pregrado**: descripción y análisis de la cohorte de ingreso 2007. Santiago de Chile: Mineduc, 2010.

SWAIL, Watson Scott et al. **Latino students and the educational pipeline**: pathways to the bachelor's degree for latino students. Part III. Stafford: Educational Policy Institute, 2005.

TINTO, Vincent. **Completing college**: rethinking institutional action. Chicago: University of Chicago Press, 2012.

TORRES GUEVARA, Luz. **Retención estudiantil en la educación superior**: revisión de la literatura y elementos de un modelo para el contexto colombiano. Bogotá: Universidad Javeriana, 2012.

VELA VALDES, Juan. Educación superior: inversión para el futuro. **Educación Médica Superior**, Habana, v. 14, n. 2, p. 171-183, agt. 2000.

Recibido on November 17th 2016
Modificaciones on August 10th 2017
Aprobado on November 14th 2017

Alexis Matheu Pérez - PhD student in Education, Universidad SEK, Santiago, Chile, Centro de Investigación de Educación (CIE) Bernardo O'Higgins University, Master in Statistics, Educuencias teaching award, Institutional research.

Claudio Ruff Escobar - PhD in Engineering Sciences, Master in Finance, Commercial Engineer, UBO Rector.

Marcelo Ruiz Toledo - Master in Finance, Commercial Engineer, General Director of UBO Development

Luis Benites Gutierrez - PhD in Administration, Economic Engineering National Prize, CONCYTEC qualified researcher, Director of UNT Postgraduate in Engineering.

Germán Morong Reyes - PhD in American Studies, Bachelor in Education, Director of UBO Center for Historical Studies.