

# The information of a Higher Education Census in the implementation of organizational knowledge management on school dropout

## *As informações do Censo da Educação Superior na implementação da gestão do conhecimento organizacional sobre evasão*

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**Abstract:** The undergraduate dropout rate is a management concern and can generate many academic studies. In Brazil, the Ministry of Education annually conducts the Census of Higher Education. The different methodologies for calculating and analyzing indicators of school dropout rate are often considered imprecise and inconsistent, weakening their importance in public policies and strategies for control and improvement of educational services within higher education institutions. This exploratory study uses a quantitative technique and presents systematization for the school dropout rate analysis, using the Census as a data source. Looking for Census from 2009 to 2014, organizational knowledge can be systematically extracted. The proposed methodology contributes to the alignment between information technology and knowledge management. It is possible to develop solutions that facilitate and organize the sharing of ideas, good practices and data that can be transformed from the implicit to the explicit state, contributing to the managers and course coordinators to control evasion.

**Keywords:** Evasion; Knowledge management; Census of Higher Education.

**Resumo:** A evasão no ensino superior representa uma preocupação na gestão e um campo fértil para estudos acadêmicos. No Brasil, o Ministério de Educação realiza anualmente o Censo da Educação Superior. As diferentes metodologias para o cálculo e análises de indicadores da evasão são muitas vezes consideradas imprecisas e inconsistentes, fragilizando sua importância nas estratégias e políticas públicas de controle e melhorias dos serviços educacionais no âmbito das instituições de ensino superior. Este trabalho exploratório e com abordagem quantitativa propõe uma sistematização para a análise da evasão, utilizando como fonte de dados o Censo. A análise de 2009 a 2014 demonstra que, a partir dos dados do Censo, o conhecimento organizacional pode ser extraído de forma sistemática. A metodologia proposta contribui para o alinhamento entre a tecnologia da informação com a gestão do conhecimento, sendo possível desenvolver soluções que facilitem e organizem o compartilhamento de ideias, boas práticas e dados que podem ser transformados do estado implícito para o explícito, contribuindo na tomada de decisão dos gestores e coordenadores de curso com a finalidade de controlar a evasão.

**Palavras-chave:** Evasão; Gestão do conhecimento; Censo da Educação Superior.

## 1 Introduction

With the process of expanding vacancies in Brazilian higher education, joining the higher education system has become relatively easier. For the vast majority of

those selected, undertaking a college degree represents satisfying ambitions, expectations and personal and professional aspirations for a more promising future.

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However, especially in the early years of higher education, halting up or dropping out of the course is not uncommon. As a Higher Education Institution (HEI) has the role of empowering economic and social development by graduating persons with quality and in sufficient quantity, the dropout rate and its causes need to be identified and combated.

In the federal public sector, by a joint initiative of the Ministry of Education (MEC), National Association of Directors of Federal Institutions of Higher Education (ANDIFES), Brazilian Association of Rectors of State and Municipal Universities (ABRUEM) and Secretariat of Higher Education (SESu/MEC), the evasion theme has been the subject of analysis. The study carried out by ANDIFES (1996) allowed us to identify that the predominant causes of evasion are: one related to students, another related to courses and institutions, and another one of more conjunctural order, called by Polydoro (2000) of “socio-cultural and economic variables”. The last one is related to the labor market, the social recognition of the career chosen, the quality of primary and secondary education, the socioeconomic context and government policies (Adachi, 2009, p. 15).

For years, HEIs have been collecting information, conducting simulations, generating trends and discussing the problem of evasion. However, reliable statistics on this issue are still lacking in Brazil, as well as a uniform methodology for its measuring. Some HEIs, with a focus on budget, measure their evasion year by year, accounting for losses with the number of students who dropped out of the course, either by halting the enrollment or by canceling. However, this measurement does not measure the actual loss of budget (Silva et al., 2007). Others make the measurement by looking at the beginning and end of the course only, that is, by measuring how many students started the course and how many, from that class, completed. However, this type of measurement can be influenced by the possible students received by transfers (Neri, 2009). However, even if the measurement criterion is not uniform and segment data are stored as a top secret issue (no one likes to admit the loss of students) the truth is that the percentage of students who do not complete their undergraduate courses is high and variable for different types of institution, courses, shifts or profiles of students (Lobo, 2012).

The managers of higher education institutions have already realized that for the survival of their organizations, knowledge is of fundamental importance. Organizations that value knowledge management as an activity that can contribute significantly to the achievement of organizational goals need to identify who owns the knowledge and where it is. This importance goes through the operational, tacit and strategic levels, since knowledge management is considered a resource in routine operations, in

strategic planning and direction, and in management actions, favoring innovation at all levels and ensuring sustainable competitive advantages organization (Jácome et al., 2011).

Several approaches to knowledge management are available in the literature, however, according to Bornemann & Sammer (2003), most of these approaches fail when it comes to measurement (indicators). The knowledge management (KM) needs to show that it adds value to the organization, in this way the measurement becomes indispensable (Bose, 2004). Organizations need to measure the KM process to check if the desired outcomes are being achieved.

This paper explores, as a source for modeling and construction of organizational knowledge about evasion, the Census data model, a data collection system that the Ministry of Education (MEC) already uses in a systematic way in the calculation of the resource allocation index to the Federal Institutions of Higher Education (IFES). From the Census data model, this work demonstrates that the extraction of data from academic systems in a systematized way allows generating tools to support the management of the courses and the institution.

In the development of the case study, conducted with the data of the undergraduate courses, traditional face-to-face modality of the Federal University of Santa Maria (UFSM), from 2009 to 2014, the research extracts indicators for monitoring and definition of educational policies for recognition and combat of evasion. Systematization in the collection of data and the construction of indicators bring a better knowledge management as a benefit, since with the aid of information technology the mapping of the evasion process can be better interpreted, that is, it can indicate what each information means and what impacts in the medium each information can cause so that information can be used for important actions and decision making by course coordinators and institutional managers.

The article is organized as follows. Section 2 presents the theoretical reference on evasion (school dropout rate), knowledge management and Higher Education Census. Section 3 discusses the potential of the Census to generate knowledge about evasion. Section 4 presents the research methodology and section 5 presents how the case study was structured. Section 6 describes the results obtained with the case study and Section 7 reports the final considerations.

## 2 Theoretical reference

This section presents the interpretations and concepts that underpinned the elaboration and execution of this research. The following topics are addressed: Evasion in Higher Education, Knowledge Management and Higher Education Census.

## 2.1 Evasion in higher education

The theoretical contribution to the topic Evasion originates from the debate that began in the United States, beginning in the early 1950s. In the words of Adachi (2009), this debate has the studies of Tinto (1975) as one of its main theoretical references of explanation of the evasion and emphasizes, already in this opportunity, the importance of the academic integration, established through personal, social and academic commitments that consist in elements establishing a strong bond of the student with the institution. Such elements would become mechanisms capable of avoiding a disappointment with the course or with the institution that would eventually cause the student to leave.

Tinto (1975 apud Silva et al., 2007) support the idea that the greater the student's commitment to HEI, through academic and social integration, the lower the probability of evasion. The author verifies that the student's stay in the IES as a consequence of his / her academic (social and academic results) and social integration (with colleagues and teachers), considering also his family background, previous knowledge and expectation with the course.

According to a study by the Lobo Institute for the Development of Education, Science and Technology, 2% to 6% of HEI revenues are spent on marketing campaigns to attract new students while little or even nothing is invested to keep students already enrolled (Silva et al., 2007). On the other hand, they indicate that, in general, the public and private institutions point economic factors as main reason for school dropout.

In the context of ANDIFES, evasion in higher education is classified into three types: abandon of

course, when the student disconnects from the course of origin without completing it (including course change); abandon of institution, when he / she leaves the HEI in which he / she is enrolled (including HEI exchange); and system abandon when the student is permanently or temporarily absent from the academy (dropping out of higher education). In other words, school dropout is a social phenomenon defined as an interruption in the cycle of studies (Gaios, 2005), and can occur within the course, institution or system. Chart 1 presents some causes for evasion in the literature.

In an institution, evasion can also be measured by course, area of knowledge, supply period or any other universe, however the challenge is access relevant data and information, generally stored in various ways and medias.

Among the different forms to compute evasion, the formulation of Silva et al. (2007) for the annual evasion rate, showed in the sequence, has been one of the most publicized and used. The calculation is based on a comparison between the number of students enrolled in a course in a given year, minus the graduates, with the number of students enrolled in the following year, subtracting the total number of students entering that year. The Formula 1 can be interpreted as having zero as the ideal value, and the greater the value of E, the worse the situation.

$$E(n) = 1 - \frac{[M(n) - I(n)]}{[M(n-1) - C(n-1)]} \quad (1)$$

where: E = annual dropout rate; M = number of students enrolled; C = number of graduated students; I = number of entrants; n = year under study; (n-1) = previous year.

**Chart 1.** Evasion's causes.

| Author                   | Approach   | Reasons   |
|--------------------------|--|---|
| Lobo (2012)              | Public and private education approach.   | The main problems are related to university management.   |
| Oliveira (2009)          | Build student motivation due the need to retain him/her in the institution in order to best graduate the students, directing conscious citizens to the formation of society. | HEIS do not know the profile of their student.  |
| Tigrinho (2008)          | Approach in public and private education and building actions to combat the phenomenon.  | The main problems are related to the management of the HEI with few actions to combat evasion.  |
| Dias (2008)              | Concern about the social responsibility of the citizen.  | Students' lack of maturity.   |
| Silva et al. (2007)      | National and international environment   | Economic-financial.   |
| Costa & Gouvintas (2005) | Overview of evasion in private higher education.   | Concerning HEI: Infrastructure, faculty, curricular matrix.<br>Concerning Student: economic-financial situation, schedule inconsistency and academic performance. |

Source: Prepared by the authors (2015).

## 2.2 Knowledge management

It is notorious that an organization can not create knowledge without the people who make up its workforce. The creation of organizational knowledge needs to be understood as a process that extends to the sphere of organization the knowledge created by individuals, making it available (explicit), composing the organization's knowledge network. In order for knowledge to be shared, there must be a culture of knowledge sharing in the organization that encourages the individual to participate in this process of exchanges (Nonaka & Takeuchi, 1997). However, this Culture is only one of the three pillars necessary for knowledge management (Costa & Gouvinhas, 2005). Information Technology (IT) and Process Mapping are the other two pillars that underpin the Knowledge Management (KM) process.

Nonaka & Takeuchi (2008) assume that knowledge is created through the interactions between tacit and explicit knowledge, presenting the classification of these interactions into four knowledge conversion quadrants that underlie and sustain the programs, initiatives and actions of Management of Knowledge (KM) and allow this process to be sustainable in the long term: (i) tacit knowledge for tacit knowledge, called socialization; (ii) tacit knowledge for explicit knowledge, called externalization; (iii) explicit knowledge for explicit knowledge, called combination; and (iv) explicit knowledge for tacit knowledge, called internalization.

Knowledge management emerged as a proposal to add value to information and facilitate its interactive flow throughout the organization, in order to enable sustainable conditions of competitiveness. According to Terra (2005), knowledge management was seen only as a system based on information and communication technologies that allowed to store data and information throughout the development of business processes, emerging IT initiatives such as expert systems based on artificial intelligence. Emphasizing that the current understanding of knowledge management comes from the use of these technologies as a support for their activities. Davenport & Prusak (2003, p. 148) argue that knowledge management is much more than technology, but technology certainly forms part of and supports knowledge management. Terra (2005) adds to the debate the complexity and multidimensionality associated with knowledge management, refuting the reductionist approaches, which generate simplistic and ineffective solutions. According to him, knowledge management involves not only the adoption of few managerial practices, but also, understanding, stimulus and credit in the basic human processes of creation and learning, both individual and collective.

Public administration in any society is important and complex. It influences and directs most aspects of social coexistence. Its way of acting and its

effectiveness influence the culture, quality of life, success and viability of a society. Knowledge management contributes with new options for action, improving the capacity to realize and its practices can benefit the public administration. Managing knowledge has also become a new responsibility of public administration and its managers so that it can increase the effectiveness of public services and improve the society it serves (Karl, 2002).

The concept developed by Batista (2012), in which Knowledge Management in public administration is an integrated method of creating, sharing and applying knowledge to increase efficiency, to improve quality and social effectiveness; and contribute to legality, impersonality, morality and publicity in public administration and for Brazilian development.

In the Brazilian Public Administration it is important to consider the definition of knowledge management presented by the Executive Committee of Electronic Government (CEGE) which highlights the importance of the KM to increase the individual ability of the public manager to understand knowledge management as one:

[...] a set of systematic, articulated and intentional processes capable of increasing the ability of public managers to create, collect, organize, transfer and share strategic information and knowledge that can be used for decision making, policy management and the inclusion of citizens as producers of collective knowledge (Brasil, 2004, p. 24).

The concept of Alvarenga (2008), which says that Knowledge Management is a set of activities aimed at promoting organizational knowledge, allowing organizations and their employees always to use the best information and the best available knowledge in order to achieve organizational goals and maximize competitiveness. A management with this objective is able to establish a strategic vision for the use of information and knowledge, as well as promote the acquisition, creation, partial codification and transference of tacit and explicit knowledge, stimulate and promote creativity, innovation, learning and continuing education, as well as providing an adequate organizational context to serve the citizens.

Daft (2002) pointed out three forces that drive the administration management of knowledge as a systematic and deliberate way to capture, create, organize and transfer knowledge: (i) Information Technology, favoring the shared dissemination of explicit knowledge and facilitating the connection of people in networks for the exchange and sharing of tacit knowledge; (ii) Intellectual Capital, as the foundation of the economy, enabling managers to use and invest in knowledge resources; and (iii) Interest in Knowledge Management, which is

closely linked to organizations' efforts to become learning organizations.

The core of the organizational knowledge design strategy is in developing the organizational capacity to acquire, create, accumulate and exploit knowledge. The knowledge organization must be able to unite the three pillars of knowledge management by forming a continuous cycle of learning and adaptation: the cycle of knowledge (Choo, 2006), which involves the creation of meaning, the construction of knowledge and the decision-making. The use of this organizational knowledge in decision making is the noblest goal of knowledge management programs.

However, according to Lucch et al. (2011, p. 305), in order to obtain competitive advantages and to be in the process of innovation in the last four decades, knowledge management has mobilized the attention of managers, researchers and academics, in Brazil and in the world. It is through organizational knowledge that continuous and increasing returns are provided, resulting in sustainable competitiveness. It can also be perceived as a set of organizational practices that structure and facilitate the learning and sharing of knowledge (Hislop, 2013 apud Ferguson et al., 2010), including tools and techniques that enable the identification, analysis and administration of the intellectual organization and its associated processes, in a systemic and strategic way (Cassini & Tomasi, 2010).

Knowledge repositories are typically intranets or portals that centralize, preserve, make accessible, and disseminate the intellectual capital of an institution. There are several different types of knowledge repositories that can be classified in different ways. In general, a knowledge repository will contain more than documents (document management system), data (database), or records (records management system). A knowledge repository will contain valuable knowledge, a blend of tacit and explicit knowledge, based on the unique experiences of the individuals who are or were part of that company, as well as the know-how that has been tried, tested, and demonstrated to be successful in situations of work (Dalkir, 2011, p. 213-214).

According to Fachin et al. (2009), knowledge management in the academic environment has become a valuable strategic resource and is pointed out as one of the main factors responsible for the growth of organizations. Leite (2007) explores other contexts in which there are intensive activities in creating and disseminating knowledge, which can also benefit from the benefits of KM. In this sense, universities, which can be observed as the main source of scientific production, constitute a fertile field for the study and application of KM.

Leite (2007) adds that KM applied in an academic environment or scientific context should be called

Scientific Knowledge Management (SKM). According to the author, two arguments justify the use of SKM, which can be understood as a specialization of Organizational Knowledge Management:

- The activities of the university are directly related to the production and communication of scientific knowledge, whether through scientific research or through the teaching and learning process;
- The university constitutes a larger scientific system, surrounded by a scientific culture that values and privileges the sharing of the knowledge that is constantly produced.

Sharing this point of view, several authors, including Fachin et al. (2009), Leite & Costa (2007) and Leite (2007), describe that SKM has all the necessary prerequisites to meet the needs of implementing, improving and enhancing the transfer of scientific knowledge, contributing to the creation of new scientific knowledge.

### 2.3 Census of Higher Education

The Census is a system of data collection of Higher Education Institutions held annually by the National Institute of Studies and Educational Research Anísio Teixeira (INEP), characterizing itself as the most complete instrument on undergraduate courses in institutions of higher education. It gathers information on higher education institutions, their undergraduate courses, offered vacancies, enrollments, entrants and graduates, student funding data, assisted technology resources available to the disabled as well as other information such as faculty and their assignments within of the institution. As an example of the Data Integration Platform of the Federal Institutions of Higher Education (PINGIFES), which makes it possible to develop the necessary skills to build organizational knowledge about evasion (Nunes et al., 2013), the Census is an important source for evasion study.

Census data are used in conjunction with other public policies such as the National Student Achievement Examination (ENADE), the National High School Examination (ENEM), the Student Financing Fund (FIES), the University for All Program (PROUNI), the Restructuring and Expansion of Federal Universities (REUNI), the Unified Selection System (SISU), and the construction of indicators such as the Preliminary Course Concept (CPC) and the General Course Index (IGC). After the dissemination of the consolidated data of the Higher Education Census, the information provided by the IES becomes the official statistics of Higher Education (Brasil, 2014).

As a way to improve the quality of the analyzes carried out, the Census brings the individualized and standardized student and teacher information, that is, it allows the policies of the sector and its participants to be followed in a thorough manner. The Census still subsidizes the planning and evaluation of public policies, while giving transparency to what happens in institutions, that is, it increases the possibilities for the use of academic data by the MEC as well as universities and other spheres of government.

### 3 Knowledge management from the Census of Higher Education

In an higher education institution, knowing the indicators of evasion is a key point for the creation of policies, programs and activities that aim at the permanence of the students. It is mandatory to have indicators that support effective combat actions, which will depend on more detailed analyzes that allow the identification of causes or segments of students that present a higher dropout rate. In addition, for the management and consolidation of organizational knowledge, it is important to systematize the methods and indicators so that actions can be understood and replicated within the institution or system.

The relationship between organizational knowledge management and the causes and measures to combat evasion in higher education institutions has been a challenge to identify. There is a lot of information collected, analyzed, understood, but still restricted to people, usually in course coordinations, or in non-comprehensive publications. It is strategic to have standardized and detailed data to understand the causes and compare with other studies. The information systems of educational institutions record data of different types, from the traditional data of academic performance to data on the lifestyle of the students, being able to support thus perspectives of analysis. However, different institutions often adopt different data models, and may or may not contain equivalent data.

In order to systematically capture sectoral knowledge, for use and application in the issue of evasion, it is proposed here, the adoption of the Census data model. The context of the use of KM in this work is focused in the sharing experiences and actions developed in the scope of undergraduate courses that aims to mitigate the existing evasion. These experiences are extracted in the form of indicators and shared within the information system as a way to allow the actions developed individually by some courses can be used systematically and integrated by all the undergraduate courses, allowing an improvement of dropout rates.

Through the Census, a flexible platform that allows the search of any type of academic information while giving transparency about what happens in institutions, the possibilities of using academic data

are widened both by the MEC as well as universities and other spheres of government. As a standardized database, the Census eliminates the possibility of errors of interpretation, increases the quality of the data and allows comparative analysis within or between institutions.

The Census data model contains personal data about teachers and students, enrollments and academic performance, information about courses and institutions, as well as details of high value for the evasion study, such as entry form, semesters, sex, year of entry, level and course model, being an invaluable tool for systematic data collection for evasion analysis.

Thus, based on the information contained in the data of the Higher Education Census, indicators were extracted based on the knowledge of a team of specialists and professionals who previously studied evasion in the institution. These indicators allow the systematization in the data collection, the sharing of knowledge accumulated in the team, as well as the comparison of the indicators with other institutions. It is observed that, minimally, it is important to have indicators that indicate rates of evasion by means of enrollment, courses, areas of knowledge, gender and age group. However, from the Census data, specializations can be made in the data collections that allow the generation of partial indicators such as failures, frequency, performance at specific times of the course, etc. In this way, the dynamicity in the systematization of indicators results in support to course coordinators concerned with evasion and committed to knowing the reasons that determine the causes of evasion in their courses.

Based on data, collected and audited annually, it is possible to include in management reports, in addition to fees, the evolution of relevant aspects of the Institution's performance, which may indicate, over the years, the age group of the students who evade most, the form of admission that needs more attention, in which semester the students more evade and several other management information that can be directed to the identification of good practices and opportunities for improvement.

Figure 1 illustrates the student flow model, considered in this work, which contains four forms of entrance (Vestibular, Serial Process, SISU and Other Forms of Entrance) and two forms of evasion (concluded and evaded). During the stay in the IES, the student is considered enrolled, including in the year of entry and in the year of completion.

The student who evaded represents a direct loss, since the resources of the institution were used, such as materials, financial resources, equipment, teachers' time, underutilization of infrastructure, and, in general, economic, financial and social loss and the goal to complete the course was not realized.

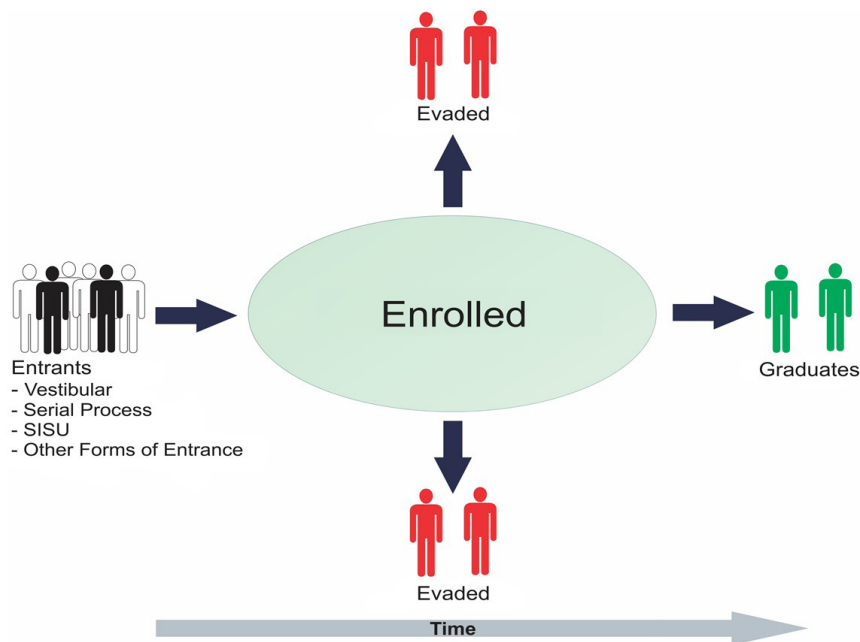


Figure 1. Student flow model. Source: Prepared by the authors (2015).

## 4 Research methodology

This research is classified as exploratory (Yin, 2010), as it seeks to develop, clarify and modify concepts and ideas about systematization of evasion analysis, allowing the formulation of appropriate approaches for the development of later studies. An exploratory research, in principle, has as its objective “to provoke the clarification of a situation for the awareness”, which is done from the exploration of data modeling of the Census of Higher Education. As for the approach, it is characterized as predominantly quantitative research (Richardson, 2007; Hair et al., 2005), since the case study (section 5) is centered on the statistical data set of the academic system.

The methodology adopted is a case study to reach the research objectives. According to Yin (2010), every case study investigates a contemporary phenomenon in depth and in its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. The case study investigates the modeling and completion of Census data in a real higher education institution.

### 4.1 Data collect

Data analysis was performed in the following steps: coding and data preparation using DB2 which is a Relational Database Management System (SGDBR) that is used in the Institution, the instructions were in Structured Query Language (SQL), searching in an objective way to identify the information of undergraduate students that are stored in their interior, showing that there is a great amount of information that

contains valuable and useful knowledge for decision making. The resulting data were analyzed from the quantitative point of view. At first, all the variables characterizing the research (gender, age group, course, selective process, among others) were coded, and then the codification and preparation of the data were made. In a second moment, descriptive analyzes were performed, such as frequency distributions, mean of each scale searched through the statistical package Statistical Package for the Social Sciences (SPSS).

## 5 The case study in the Federal University of Santa Maria

The case study was carried out at the Federal University of Santa Maria, and the studied population was made up of students entering by the Vestibular entrance, Serial Process, SISU and other forms of entries of the Undergraduate courses in the presencial modality. Students entering the Cultural Agreement PEC-G, Freire Platform entry, Diploma Bearer, Re-entry, Internal Transfer, Transfer based on law and Transfer based on Vacancies were classified as entry by Other Forms.

After an initial analysis, some courses were excluded from the sample because they were still without final students, and two courses that had reoptions in qualifications (degree types, to teach and marked work). Also all the different qualifications of the Music course were combined in a single course, totaling in the sample 99 courses. The period of analysis was from 2009 to 2014, and the main sample populations

were the entrants, enrolled and graduating students in the period.

The data used in the case study were obtained in the Academic System and mapped according to data collection of the Census model. The MEC Census database contains annual and individualized data per student as of year 2009. However, since only the Census data model was used, using the same collection system, data were collected from 2009.

In order to demonstrate the applicability of the use of the Census data model to the evasion study, a specialist committee formed by members of the Graduate Pro-Rector office, former coordinators and administrative technicians linked to the academic sector, foreseen for the case study: i) identify how evasion occurs in the different forms of admission; ii) to establish a profile (gender, age, etc...) of a student who has been evaded so that one can act proactively with this public; iii) know the average number of semesters taken from the evaded students; iv) identify the evasion rates by area of knowledge and course; v) identify trends in evasion; vi) identify the evasion rates per year of evasion and also the courses where the highest and lowest evasion rates occur.

Figure 2 illustrates the Census Data Model, composed of integrated modules: HEI, Course, Student and Teacher. The internal system corresponds to the institution's computerized academic system.

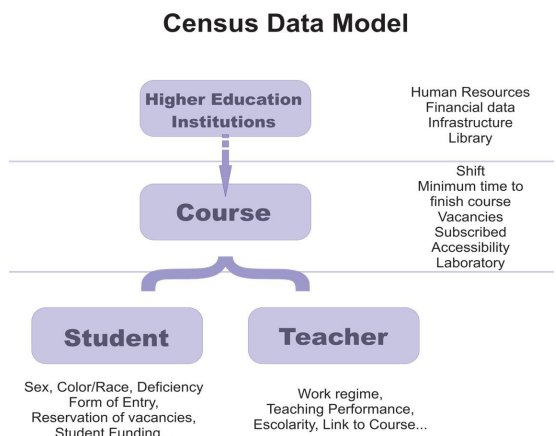


Figure 2. Census data model. Source: Prepared by the authors (2015).

In the 2013 Census, more than 2,300 institutions of higher education are expected to participate, in addition to more than 7 million enrolled students, distributed among 32,000 thousand undergraduate students. It can thus be explored to serve as the basis for a knowledge management model that allows the systemic evasion analysis in undergraduate courses.

## 6 Results of the case study

In this section, the main results of the research on the case study are presented. Considering the evolution of entrants, enrollments and graduates in the analyzed period, Table 1 shows the evolution of the general dropout rate of the institution.

For the analysis of the data, according to the use of the formula of the study of Silva et al. (2007), it was also necessary to include students who had been evaded and concluded in the 2008 period.

In Table 1, it can be observed that there was a significant reduction in enrollments and graduates in the year 2014, as a result of the fact that, when the data was collected, the students entering and finishing the second semester of 2014 did not enter. However in 2012 and 2013, the increase in the number of students is due to the implantation of new curricula, causing the internal transfer of students from one course to another.

The historical evolution of the UFSM annual evasion rate compared to that of the public HEIs in Brazil (Silva et al., 2007) is presented in Figure 3. The comparative presented in the historical evolution is til 2013 due to the data availability.

As can be seen in Figure 3, the UFSM evasion rate remained lower, in the period from 2009 to 2012, in relation to the rate in Public HEIs, presenting a higher rate in the period of 2013. However, it is noted that these data little explain the evasion in the context of an HEI.

In the following sections, the data available in the Census are explored for further analysis.

### 6.1 Sample profile

In this step, the profile of the sample participants with respect to gender is detailed. For the participants by Vestibular and Serial Process, 54.2% are women

Table 1. Evolution of entrants, enrollments and graduates.

| Year | Entrants | graduates | Enrollments | Evasion rate (%) |
|------|----------|-----------|-------------|------------------|
| 2009 | 2372     | 1422      | 10856       | 7.87             |
| 2010 | 2654     | 1586      | 11797       | 10.77            |
| 2011 | 3313     | 1797      | 13843       | 9.94             |
| 2012 | 3658     | 1739      | 15313       | 10.48            |
| 2013 | 3851     | 1999      | 16490       | 13.46            |
| 2014 | 3596     | 574       | 16328       | 11.68            |

Source: Prepared by the authors (2015).



(11758) and 45.8% are men (9919), as detailed in Table 2. In the Other Forms of Admission, the female sex corresponds to 59.7% of the sample while the male sex was 40.3%. In Table 2, the sum of the graduates and evaders does not coincide with the total number of participants, since in the formula for calculating the annual evasion rate, it was necessary to include the students who completed in the period from 2008 to 2014 and with a previous entry to this period.

Considering the participants by the Vestibular / Serial Process, it is observed in Table 2 that the evasion rate is higher among male students, while in the Serial Process women are the majority. Of the total number of evaders, 53.2% were male and 46.8% female. According to Tinto (1975), this is especially true during the first year of college, when most academic dropout occur among men. Analyzing the enrollment by Other Forms of Admission, it is observed that dropout is slightly higher among female students (55.5% against 44.5% for males).

Considering the students' age at the time of entry, it was found that the average age of students entering the institution, in the Vestibular and Serial Process forms, was 20.2 years and that the students' final age at the conclusion of the course was 24, 2 years, while that of the students evaded was 21.3 years. In the Other Forms of entry, the general average age of the incoming students was 26.8 years, of the final 29.1 years and of the evadidos, 28.2 years.

### 6.2 Semesters taken from students evaded

For the calculation of the average of semesters studied, the semesters in which the students made total locking were not computed and also were not computed the semesters which students evaded in the following forms: reentry in the same course, reentry by a new vestibular and internal transfer by reoption of course.

The graph of Figure 4 shows the average number of completed semesters by evaded student (excluding the graduates) per year of evasion. The result shows that there was a small increase in 2014 for students who entered the Vestibular and Serial Process, pointing to a later decision to evade. The occupants of Other Forms of Entry have a regular average, showing a slight decrease in the last two years.

By analyzing the previous data, in an analysis by the knowledge areas one can visualize in which areas of knowledge evasion occurs in the initial semesters and in which students attend a greater number of semester in their course before evading. The analysis of the average number of semesters enrolled in the Vestibular / Serial process and other forms of entrance are shown in Figure 5. It can be observed that in the results by area of knowledge, the area of Biological Sciences does not appear because the courses linked to this area were disregarded from the sample because they did not have students graduated or because the students make reopções in qualifications (Bachelor's and Teaching).

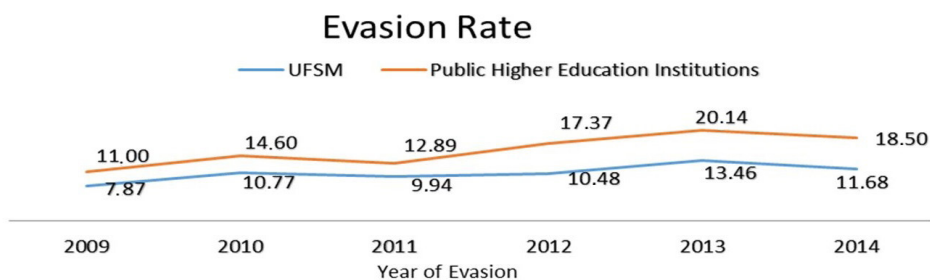


Figure 3. Comparison of Evasion Rates in UFSM and Public HEIs. Source: Data obtained from the institution's information system (2015).

Table 2. Gender students.

| Form of Entry                    | Total  | Female    |      | Male      |      |
|----------------------------------|--------|-----------|------|-----------|------|
|                                  |        | Frequency | %    | Frequency | %    |
| <b>VESTIBULAR SERIAL PROCESS</b> |        |           |      |           |      |
| Entrants                         | 21,677 | 11,758    | 54.2 | 9,919     | 45.8 |
| Graduates                        | 9,162  | 5,061     | 55.2 | 4,101     | 44.8 |
| Evaded                           | 8,074  | 3,775     | 46.8 | 4,299     | 53.2 |
| <b>OTHER FORMS OF ENTRY</b>      |        |           |      |           |      |
| Entrants                         | 6,004  | 3,585     | 59.7 | 2,419     | 40.3 |
| Graduates                        | 2,098  | 1,276     | 60.8 | 822       | 39.2 |
| Evaded                           | 1,745  | 969       | 55.5 | 776       | 44.5 |

Source: Prepared by the authors (2015).

### Semesters studied

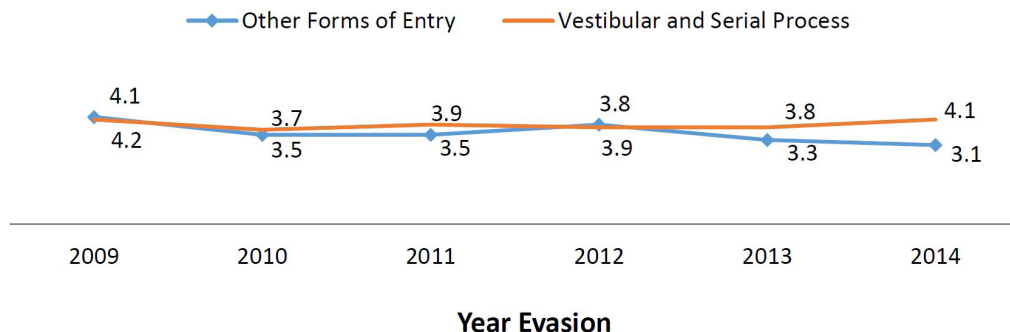


Figure 4. Average of semesters studied for students evaded grouped by ticket form. Source: Data obtained from the institution’s information system (2015).

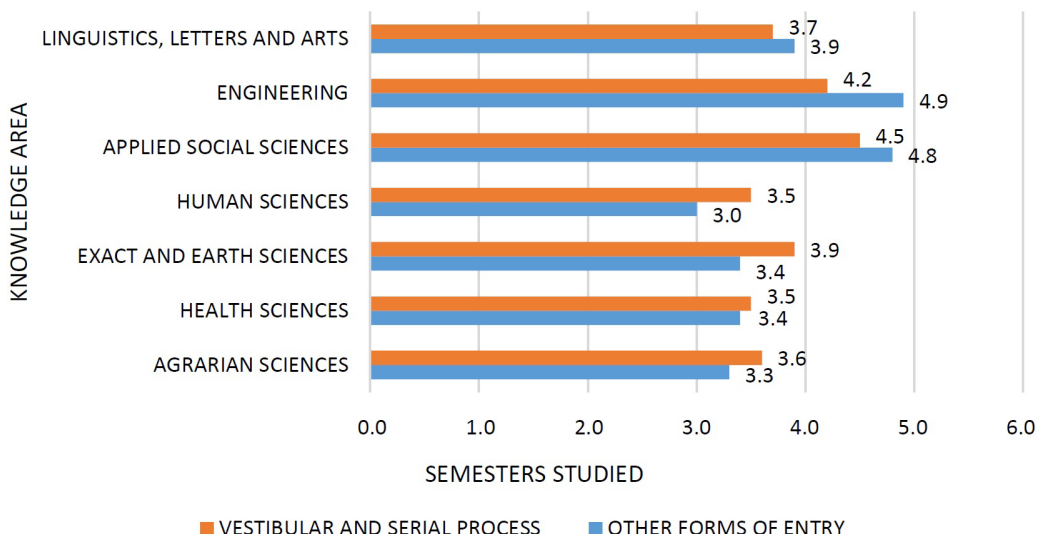


Figure 5. Average number of semesters studied for evaded students. Source: Data obtained from the institution’s information system (2015).

For entries form of Vestibular/Serial Process the area of knowledge of Applied Social Sciences (4.5) presented the highest average of semesters studied while the areas of Health Science (3.5) and Human Sciences (3.5) presented the lowest average of semesters studied. In the areas of knowledge of Engineering (4.9) and Applied Social Sciences (4.8), the average number of semesters studied is higher among the other forms of admission, while the areas of Agrarian Sciences (3.3) and Health Sciences (3.4) had the lowest average of semesters studied.

### 6.3 Annual evasion rate

After verifying a distortion in the rate of evasion in some courses, throughout the historical series, the data referenced from the development of this

research will be the year in which the courses had concluded students.

In Figure 6, it is possible to observe the results of the evasion rate by area of knowledge in the period from 2009 to 2014, with the following groupings related to the forms of entry: i) Vestibular and Serial Process and ii) Other forms of entry.

The highest evasion rates were in the area of knowledge of Exact and Earth Sciences, in all forms of entry, and the lowest in the areas of Health Sciences, Agrarian Sciences and Engineering.

99 courses were analyzed in the seven areas of knowledge. Next, Table 3 highlights in each Knowledge area the course that points, respectively, the lowest and the highest dropout rates in the period from 2009 to 2014.

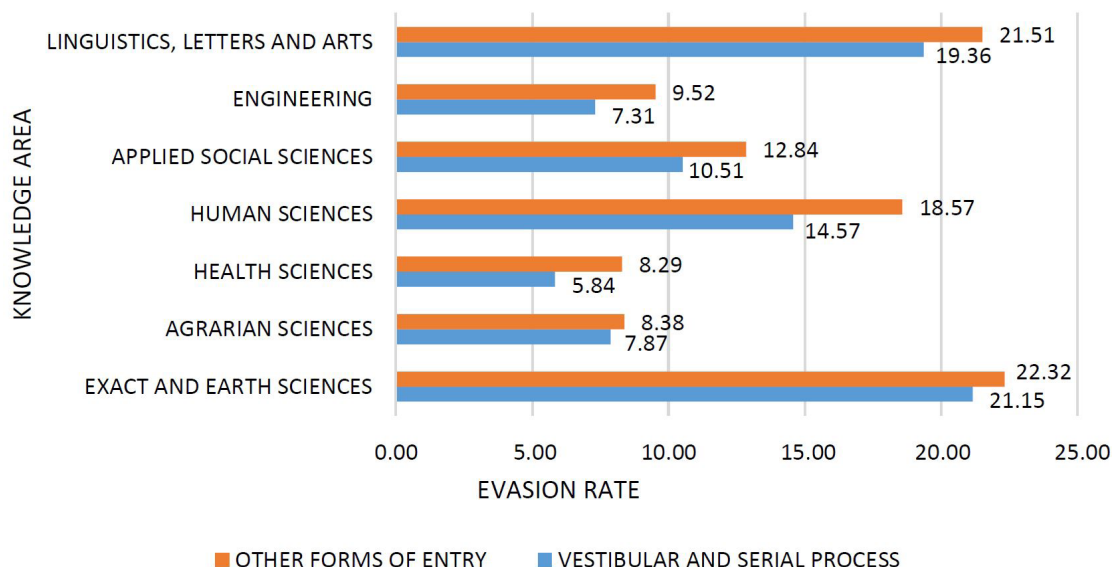


Figure 6. Evasion rate by knowledge area. Source: Data obtained from the institution’s information system (2015).

Table 3. Courses with the lowest and highest dropout rate by knowledge area.

| Knowledge área                       | Courses                                       | Evasion Rate |
|--------------------------------------|---|--------------|
| <b>Exact and Earth Sciences</b>      | Industrial chemistry                          | 9.26         |
|                                      | Mathematics - Bachelor and Teaching           | 41.19        |
| <b>Agrarian Sciences</b>             | Veterinary Medicine                           | 3.14         |
|                                      | Superior Course of Technology in Agribusiness | 25.90        |
| <b>Health Sciences</b>               | Medicine                                      | 1.36         |
|                                      | Physical Education – Bachelor                 | 13.39        |
| <b>Human Sciences</b>                | Psychology                                    | 5.60         |
|                                      | Philosophy – bachelor, nocturnal              | 37.81        |
| <b>Applied Social Sciences</b>       | Law, diurnal                                  | 1.94         |
|                                      | Social Sciences - Bachelor                    | 21.77        |
| <b>Engineering</b>                   | Civil Engineering                             | 5.20         |
|                                      | Technological in Mechanics                    | 23.98        |
| <b>Linguistics, Letters and Arts</b> | Performing Arts - Theatrical Interpretation   | 6.50         |
|                                      | Arts in Portuguese / Literature, Bachelor     | 52.84        |

Source: Prepared by the authors (2015).

From Table 3, it can be observed that the area of knowledge of Linguistics, Letters and Arts has, in the course of Portuguese / Literatures, the highest rate of evasion, while the area of knowledge Health Sciences has, in the course of Medicine (Medical Doctor) the lowest rate. Although all the analyzes are carried out by the knowledge areas, it can be observed that, within the same area of knowledge, there are significant differences in relation to the evasion rate. For example, the Veterinary Medicine course has one of the lowest dropout rates and the Course of Agribusiness has a significantly high rate. All areas of knowledge had a large variation between

Table 4. The 10 courses with the lowest dropout rate.

| Course                 | Evasion Rate |
|------------------------|--------------|
| Medicine               | 1.36         |
| Daytime Law            | 1.94         |
| Dentistry              | 2.41         |
| Veterinary Medicine    | 3.14         |
| Agronomy               | 3.95         |
| Law, Nocturnal         | 5.12         |
| Physiotherapy          | 5.20         |
| Civil Engineering      | 5.20         |
| Mechanical Engineering | 5.20         |
| Industrial Design      | 5.23         |

Source: Prepared by the authors (2015).

**Table 5.** The 10 courses with the highest dropout rates.

| Course                              | Evasion Rate |
|-------------------------------------|--------------|
| Literature / Portuguese - bachelor  | 52.84        |
| Mathematics - bachelor and teaching | 41.19        |
| Philosophy – bachelor, nocturnal    | 37.81        |
| Theater - teaching                  | 32.54        |
| Statistics - bachelor, nocturnal    | 31.49        |
| Mathematics - bachelor              | 26.48        |
| Physics - teaching, nocturnal       | 26.12        |
| Physics - teaching                  | 25.95        |
| Agribusiness                        | 25.90        |
| Arts - Theater direction            | 25.66        |

Source: Prepared by the authors (2015).

the lowest and highest evasion rates. This behavior can be partially explained by socio-cultural and economic variables.

Tables 4 and 5 highlight the ten courses that presented, respectively, the lowest and highest dropout rates in the period from 2009 to 2014.

In Table 4, Medicine is highlighted with the lowest evasion rate, followed by courses in Law and Dentistry. It is observed that the 10 courses belong to the following areas of knowledge: Health Sciences with 3 courses; Engineering, with 2 courses; Applied Social Sciences, with 3 courses and Agrarian Sciences, with 2 courses.

Bachelor in Literature / Portuguese leads the list of the highest dropout rates with 52.84 and in the 2nd position, Mathematics - Bachelor and Teaching degree with 41.19 evasion rate (Table 5).

It should be noted that most of the courses belong to the area of Exact Sciences and Earth. They also appear in the areas of Human Sciences, Agricultural Sciences with one course and Linguistics, Letters and Arts with two courses. The Mathematics course appears twice in Table 5 because it has three codes in the institution, one for a course in extinction (Bachelor's and Bachelor's degree) and another two for Bachelor's and teaching degree courses. Among them, only the teaching degree did not figure among those with the highest evasion rate.

## 7 Final considerations

The evasion is a phenomenon highly harmful to the system of higher education, since it represents the failure in the formation, showing still moments of retraction and expansion in the last decade. Detailed studies of their behavior were, therefore, the target of this work.

Aiming to provide indicators for follow-up and definition of educational policies for the recognition and combat of evasion, based on the knowledge of a team of experts and professionals who previously

studied evasion in the institution, the diversity of data collected and organized on the basis of in the Census data model, thus allowing the systematization of the collection and the comparison of the indicators with other IFES.

The case study developed at the Federal University of Santa Maria made it possible to observe that the granularity of the data of the Census model is convenient to carry out different analysis on evasion with the possibility of doing other data crossings generating new information. In order to support course coordinators, even without experience, it is essential that the institution, especially the senior management of the academic area, together with the institutions' IT units, develop tools such as queries, graphs and reports that demonstrate behavior and performance of its students, signaling trends and behaviors of academics that may indicate future abandonment, and can proactively interfere in the phenomenon, altering it within an administrative process that involves planning, organization, execution of actions, control of results and socialization of knowledge. The result is the improvement of the organization's potential to develop skills and innovative capacity that results in better organizational knowledge.

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