RESEARCH ARTICLE

FACTORS THAT INFLUENCE THE ACADEMIC ACHIEVEMENT AT THE FACULTAD DE CIENCIAS EDUCATIVAS-UNACAR

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ABSTRACT

There exists a problem that is faced by many higher education institutions in Mexico, this problem is known as drop-out, to tackle this situation there has been done a lot of research of this topic. Following the same line of inquiry, it is presented here a study done with students that belong to the Facultad de Educación of Universidad Autonoma del Carmen-UNACAR during the autumn 2018 term. There was done a transectional and descriptive study using the data mining with the Cluster k-means technique to regroup the participants. The participants were a total of 105 students whose main characteristic was to have at least one failed course of their curricula. The instrument consisted of a questionnaire which the following objective: to identify the factors that involved the failing rate of the academic, social, family, and motivational types. The results do show that the academic factor is the most detected and being identified that the explanations of the topics by the teachers are not so clear for the students, the topics explained are not so clear, dropping-out at the middle of the term, missing classes, homework and tasks not done by the students, lack of time to study. In relation to social factors, there were identified as problematic the use of social networks and working problems reasons. Among the family factors, the findings do show that economical problems in the family is the cause, and finally the motivational factor is the lack of information that students have of the topics treated in class. Due to the diversity of factors involved in the causes of failing a course it was necessary, and optimal, the use of the data mining in order to determine those causes of that failing.

INTRODUCTION

According to the National Association of Universities of Higher Education (Anuies in Spanish) in Mexico, the Higher Education Institutions face problems of dropping-out, lag behind and low graduation rates (Anuies, 2001). Those higher education institutions belonging to ANUIES have got the responsibility to face and solve those problems of dropping-out, lag behind and low graduation rates by means of implementing strategies according to each situation. So it is really important to develop research in the higher education institutions in order to detect the problems that cause the dropping-out, lag behind and low graduation rates during the students academic process of formation, so it is necessary to carry out analysis of their academic trajectories in order to know their academic development. For Vera, Ramos, Sotelo, Echeverría, Serrano and Vales (2012) the academic trajectories of the students must be considered since they start their degree until they got their certificate at the end of their academic program. What is more, Romo and Hernandez (2005) state that the academic trajectory of a student can be categorized as repeater, laggard and regular student, also Cain and Ramirez (1997) emphasize that the academic trajectories as the "

academic behaviors during the school time of the students that include problems of laggard, failing courses, academic achievement, dropping-out, and accomplishment of the courses". Those characteristics of the problems faced by students mentioned before are the main problems that the higher institutions face every day and those problems are reflected in the low rates of graduation of the higher institutions in Mexico. And as a consequence, the low graduation rates do require a quick attention in order to determine the causes of the lack of academic achievement. The Universidad Autonoma del Carmen -UNACAR has detected the academic achievement of the students by means of a study done by Hernandez and Olan (20019) where they emphasized the need to carry out more studies focusing in the academic achievement of the students since they found that a very low graduation rate (rate of 54.62%) in the 2002- 2006, 2003- 2007 and 2004- 2008 generations of the students belonging to the BA in Education, also it was noticed, by the teachers, that there is a decreasing tendency , in the graduation rates, as the students advance in getting their degree. An exemplar students is the one who attends all the courses belonging to each semester and he or she does not present any laggard situation with courses and also he or she is not repeating a course, so it

means that this students has got the possibility and the chance of finishing his or her degree on time (Ramos, Sotelo, Echeverría, Serrano and Vales, 2012). In the same way, in another study about academic achievement Hernandez and Yong (2014) classified those students as "regular" the ones who are attending the courses according to their curricula, without any laggard situation and with a 27% of the failing courses. Also, Hernandez and Yong point out that most of those students that are "regular" were not married students, it means single. But the situation gets bad when the students have to attend courses of English as Foreign Language, it is when their laggard start since they proficiency level of English is really poor, and this is the main cause of the laggard and failing rate during all the students' academic life. The failing rates and the laggard situation of the students are the problems that affect the academic achievement of the students in higher education of the universities. Under this line of research Riego (2013) states that the relationship between the failing rate and the laggard situation are the factors that stops the professional academic achievement in the higher education universities. In the same line, Hernandez, Yon and Arias (2017) did a research in the Department of Education, where they analyzed students of the BA in Education and students of the BA in Language Teaching. The students who participated in this study were of the 2010, 2011, 2012, 2013, 2014 and 2015 generation of both academic programs, BA in Education and BA in Language Teaching. The results do show that both BAs have got low graduation rates and it was detected that the laggard situation and academic dropping out is during the first four terms of their academic program.

The academic laggard is one of the problems that affect most the academic trajectories of the students and the causes of it is related to the failing of the courses. With respect of the causes of failing course that the students show, it can be multifactorial since the causes can be external of the universities, from the own university, the academic ones, and the ones related to the personality of each student (UNESCO, 2006). However, there exist another reasons that cause the laggard situation which are related to the previous degrees, or schooling, and the system of education. Such factors as teaching methods, students profiles, curriculum planning, academic organization, among others (Ezcurra, 2005). The causes of failing of the university students are very diverse and they can be of the social type, familiar type, economical type, academic achievement, physical ones, psychological ones (Espinoza, 2005). What is more, Figueroa (2004) and Amado, García, Brito, Sánchez Sagaste (2004) emphasize that the more frequent causes are the ones related to the learning process of the students, the teaching methods of the teachers, lack of general knowledge of the students, missing classes by students, difficulties in getting the main ideas of the topic treated in class, lack of study habits, lack of time and motivation of the students. Trying to identify the failing rates of the students at the Department of Education, Saucedo, Herrera, Díaz, Bautista and Salinas (2014) did a study with the objective to see the main causes of that failing. They found that those students that fail as a minimum a course the students (38%) said that it is due to they did not understand the teaching explanation of the topics, another 29% said that the topic was boring, due to the teaching method of the professor at 9%, other reasons at 13%. The researches point out that those failing rates are higher with students attending the first terms since those courses are generic ones that include mathematics, English as a Foreign Language, and ITC. One of the research done using data mining to predict and classify

slow learning problems of students of Middle school was carried out by Parneet, Manpreet and Gurpreet (2015). They used data mining for educational purposes using a software of open code known as WEKA. The techniques used in data mining using WEKA was to measure regression ad density estimation, and output data with multilevel perception algorithms Naïve Bayes, SMO, J48 and REPTree. After the analysis using WEKA, they concluded that the multilevel perception algorithms are the most accurate with 75% confidence, being this technique the most accurate to identify students with slow learning problems who are at risk of a good development of their academic achievement. In the same way, the results of a research using data mining to predict academic achievements of students was presented in the *Third International Congress using Data Mining* in Malaysia in 2015 by the researchers Shahiri and Husain where they presented an overview of the techniques used to predict academic achievement of students whose main point was the use of the algorithms of prediction in order to get the most relevant information from the data mining for educational purposes. Ashish Dutt, Saeed Aghabozrgi, Maizatul Akmal Binti Ismail and Hamidreza Mahroeian (2015) also reported another research using data mining with clustering groups applied to Education. In this research the main research question was "How can the higher institutions benefit from the statistical data in order to favor the academic achievement?" Under this question, they analyzed the data, stored in the servers of the institutions, by applying techniques of DM (clustering, classification and analysis of associations), Sequential pattern analysis and dependency making classifications, clustering, data mining rules of association and regression in order to see possible areas of opportunity to improve the academic achievement of the students of the courses that the students were attending.

The conclusion they got was that the use of the clustering algorithm to data analysis proves to be efficient to detect a learning style of the students with relation that students have to do in class, working in groups, family issues, behavior in the class, motivation for learning. In sum, all these factors can be analyzed and this analysis can provide us relevant information by using the clustering technique. Based on those studies done in the Department of Education of UNACAR, reviewed previously, and the results of the different researches presented above in relation of the academic trajectories and academic achievement, the Department of Education requires a study to identify the main, and most frequent, causes of failing courses in the three BAs of the Department (BA in Education, BA in Language Teaching and BA in Communication and Cultural Affairs). By doing this research it might be possible to detect, and understand, the main causing factors that generate the laggard situation of the students , of those three BAs, during their academic trajectories and the most important to generate possible solutions to increase the academic achievement of the students.

MATERIALS AND METHODS

Those studies done previously in the Department of Education – UNACAR do provide some evidence about the problem of failing rates, academic achievement and laggard situation of the BAs in that Department. This evidence detected provide and suggest the need to continue doing research in order to detect the main factors that are causing the lack of academic

achievement of the students during the university time. So the current study is going to try to have a closer look to the causes of the lack of academic achievement of the three academic programs, BAs, of the UNACAR. In order to determine the more frequent causes of failing courses, it was done a descriptive and transactional study during the term August-December 2018. To do the data collection it was administered a closed survey. The survey consisted of 52 target items in total, those items were divide into 13 questions for each of the fourth sections (academic, motivational, family, and social). The task of the students was to cross out, with an X, the cause that motivate the failing of a course during their university time. The purpose of that survey was to have numerical data in order to do the analysis. In doing the data mining it was used the Cluster K-means technique for clustering. The sample consisted of 105 participants, those participants needed to have at least one failed course during their academic life in the university. From those three academic programs, BAs, included in the project, there were 62 from the BA in Language Teaching, 16 from the BA in Communication and Cultural Affairs, and 27 from the BA in Education. Table 1 below shows the general information of the participants.

The instrument was elaborated based on the literature reviewed, the main purpose of this instrument was to know the perception that the students, of the three BAs included in this research, have about the academic situation they were involved in relation of failed courses and their academic achievement. The approach of the instrument was multifactorial that included four open questions to get data about failed courses, BA students were attending, term, and gender. And the four factors investigated which were academic factor, social factor, family factor and motivation factor. Each of these four factors included 13 items related to reasons of failing a course, making a total of 52 target items in total. Table 2 describes the four factors investigated.

RESULTS

In this section it is presented a descriptive analysis of the data collected of the three BAs involved in the research and data from the students that have failed at least one course of their curricula. All the four factors were measured, academic, social, family and motivational.

Table 1. Total of participants that failed at least one course in the university

BA	Gender		Total of participants
	Male	Female	
Language Teaching	26	36	62
Education	4	12	16
Communication and Cultural Affairs	7	20	27
Total			105

Source: Elaborated from the data collected in this study.

Table 2. Description of the four factors investigated

Section	Description
Academic	This section has 13 test items related to the academic factor of the students , in those items the questions elicited were trying to identify the most common reasons of failing a course. The questions were like: I did not like the course, I did not get the teacher´s explanations, I did not show interest of the topic, the teaching method was inadequate, among others.
Social	This section has got 13 test items. Those questions were eliciting the social factors that influenced the failing courses during the university life. The questions were like: Practicing a sport most of the time, friendship groups, working , among others.
Family	This section contains 13 test items related to identify the impact of the family situation at home that is influencing the academic achievement of the students. The questions in this section were like: Separation of the parents, lack of interest of the academic life of the students by their own parents , healthy problems of a relative, among others.
Motivation	This section contains 13 test items with the aim of identifying the motivational aspect that leads into the failing a course of the student. The questions in this sections were like: I felt excluded, I felt confused, I do not have study habits, my schedule was not flexible, I felt not satisfied with the academic curricula, among others.

Source: Elaborated from the researchers of this paper.

Table 3. Responses related to the academic factor

Causes	LI	LE	LC	Total
1. I did not like the course	17.7%	22.2%	12.5%	18%
2. I did not get the teacher´s explanation	38.7%	25.9%	31.2%	34.2%
3. I was not interested in the course	17.7%	3.7%	6.2%	12.3%
4. The teaching method of the professor was not adequate	8%	29.6%	12.5%	14.2%
5. Classroom environment	3.2%	3.7%	6.2%	3.8%
6. Lack of time for studying	12.9%	33.3%	25%	20%
7. late arriving to class	14.5%	22.2%	43.7%	20.9%
8. Homework did not handed in	19.3%	11.1%	50%	21.9%
9. Lack of knowledge of the topic of the course	41.9%	51.8%	37.5%	43.8%
10. Learning difficulties	24.1%	40.7%	18.7%	27.6%
11. Differences with the professor	1.6%	11.1%	0%	3.8%
12. Missing classes	32.2%	18.5%	43.7%	30.4%
13. Dropping out the course	40.3%	33.3%	25%	36.1%

LI= BA in Language Teaching
LE=BA in Education
LC= BA in Communication and Cultural Affairs
Source: Table elaborated by the researches based on the data collected.

Table 4. Responses related to the social factor

Causes	LI	LE	LE	Total
14. Practicing a sport most of the time	3.2%	7.4%	6.2%	4.7%
15. Older friendship groups	0%	0%	6.2%	0.9%
16. social influences	9.6%	3.7%	0%	6.6%
17. Addicted to drugs	0%	0%	0%	0%
18. Living alone	3.2%	11.1%	6.2%	5.7%
19. Working situation	24.1%	44.4%	18.7%	28.5%
20. In charge of the living expenses of the family	3.2%	0%	0%	1.9%
21. Nightclubbing	0%	0%	0%	0%
22. Most of the time in social networks	17.7%	29.6%	18.7	20.9%
23. Feeling discriminated	1.6%	11.1%	0%	3.8%
24. Spending much time with friends	4.8%	18.5%	0%	7.6%
25. Problems with boyfriend/girlfriend	11.2%	0%	0%	6.6%
26. Problems with classmates	0%	0%	0%	1.9%

LI= BA in Language Teaching
LE=BA in Education
LC= BA in Communication and Cultural Affairs
Source: Table elaborated by the researches based on the data collected.

Table 5. Responses related to the family factor

Causes	LI	LE	LC	Total
27. Separation of parents	9.6%	7.4%	0%	7.6%
28. Parents did not show interest in the academic life of students	1.6%	3.7%	18.7%	4.7%
29. Healthy problems of a relative	6.4%	25.9%	12.5%	12.3%
30. Dysfunctional families	6.4%	11.1%	0%	6.6%
31. Economic situation faced by the family	19.3%	37%	12.5%	22.8%
32. Death of a family member	1.6%	3.7%	6.2%	2.8%
33. Family member addicted to drugs	0%	0%	0%	0%
34. Unwanted pregnancy	6.4%	0%	0%	3.8%
35. Harassment within the family	0%	0%	0%	0%
36. Intrafamily violence	0%	0%	0%	0%
37. Taking care a sick relative	4.8%	3.7%	12.5%	5.7%
38. Taking care a family shop	1.6%	3.7%	6.2%	2.8%
39. Providing living expenses for the whole family	3.2%	7.4%	0%	3.8%

LI= BA in Language Teaching
LE=BA in Education
LC= BA in Communication and Cultural Affairs
Source: Table elaborated by the researches based on the data collected

Table 6. Responses related to the motivation factor

Causes	LI	LE	LC	Total
40. I felt excluded from the class	12.9%	7.4%	6.2%	9.5%
41. I felt lost in the class	35.4%	40.7%	31.2%	36.1%
42. lack of study habits	22.5%	22.2%	12.5%	20.9%
43. Lack of flexibility in the schedule	6.4%	18.5%	37.5%	14.2%
44. I do not feel satisfied with the education provided by the university	4.8%	14.8%	12.5%	8.5%
45. Professor do not care about my learning problems	1.6%	18.5%	6.2%	6.6%
46. My vocational issues	6.4%	0%	0%	3.8%
47. Counseling was not a lot	0%	14.8%	0%	3.8%
48. Lack of resources of support to study	8%	29.6%	6.2%	13.3%
49. Lack of knowledge	4.8%	3.7%	0%	3.8%
50. The curricula is really huge and complicated	3.2%	14.8%	12.5%	7.6%
51. Lack of personal skills for the selected degree	14.5%	7.4%	6.2%	11.4%
52. Others:	6.4%	11.1%	6.2%	7.6%

LI= BA in Language Teaching
LE=BA in Education
LC= BA in Communication and Cultural Affairs

Table 7. Clustering with the indicators grouped

Clustering	%	Indicators grouped
1	17.2	Arriving late to class; homework do not handed in; missing classes ;having a job.
2	2.8	I did not get the professor explanations of the topic; the teaching methods of the professor were not the adequate; bad relationships with classmates has got influence in my process of learning; Lack of information of the topic discussed; Personal learning difficulties; having differences with the professor in turn; I felt discriminated in class; Problems with my classmates; I felt lost; I am not satisfied with the information received in class; Lack of counseling; Oher causes.
3	26.6	Lack of time for studying; Lack of knowledge of the topic treated in class;I dropped out the course ;I was working; Economical problems in my family; I felt lost; Lack of economic support for studying.
4	27.6	I did not get the teachers explanations; Dropping out the course.
5	25.7	I did not get the teachers explanations; Lack of knowledge of the topic; Personal learning difficulties; Spending a lot of time in social networks; I felt lost; Lack of study habits.

Source: Elaborated from the researchers of this paper, based on the results of this study.

In general it seems that there is no a particular factor involved in their failing but a combination of factors. Table 3 shows the frequency of the academic factor of the three different BAs involved in the research. In table 3, it can be observed that the main causes related to failing a course are: The student did not get the teacher explanations, lack of knowledge of the topic of the course, dropping out the course, missing classes, due to not handed in homework, by arriving late to classes and because the students did not have enough time to study. All those causes are presented by the students of the three BAs involved in the research and all of them are related to the academic factor of the students. And also, it can be observed that the students are not taking the classes seriously and a as a result of this they lack of knowledge of the course- topics of the course and this leads them to drop out the course. As it can be noticed, in table 4 it is shown that there are less failing causes in the social factor compared to the academic one. What is important to note here is that the failing rate, of the students of the three BAs, is associated with spending a lot of time in the social networks, or because they were working (they have got a job).

These two detected factors are derived from the economic situation of the family and the influence that the social networks have been doing in our days as a normal lifestyle. In the previous table 5, it can be noticed that the most frequent causes of failing in relation to the family factor is the economic problem that the families face everyday, as it can be notice the 22.8 % of the whole students of the three BAS responded that the economic situation is affecting the university life is due to the family situation, the lack of economic resources is affecting the academic trajectories of the students and as a consequence is affecting the academic achievement and the graduation rates too. There is no doubt that the motivation is a real factor during the students process of learning , so it is really necessary to analyze in detail those motivation factors that are causing the failing of courses from the students. Table 6 shows the most frequent reasons exposed by the students of the three BAs, among the reasons are: I felt lost in class, I do not have study habits, The schedule of classes in not flexible, the university did have enough study resources, the lack of personal skills for the elected degree, but the highest number is for "I felt lost in class" with a 36.1% , this item is presented in the three degrees analyzed which is a result of the lack of counseling to support students during their process of getting their BA, the lack of help in their academic trajectories and as a consequence not a good academic achievement.

As it can be seen, not only a reason is the cause of the failing a course but a mix of reasons being of family, academic, social and motivation ones. In order to visualize the coincidence point of reason it was applied the data mining specifically the cluster K-means technique, in the following table, table 7, it is shown the results done by clustering the reasons by data mining. These results are taken from the SPSS output. As it can be seen in the previous table, in the cluster number 1 represents a 17.2% of the total of tested participants, in the cluster number 2 it is represented by a 2.8%, in the cluster number 3 it has a 26.6%, cluster number 4 a 27.6% and finally cluster number 5 is represented by a 25.7%. As it can be noted from table 7, by means of using the clustering technique, shows that the reasons that cause the failing of courses by the students of the three BAS analyzed, are not causes alone but a mixture of them, and due to this combination of reasons leads students to fail courses in the university. What is more, clusters 3,4 and 5 indicate that the academic factors, social factors and

motivation factors show the most high rates of reasons of failing courses, which allow us to think that there is a missing of counseling and academic support for the students in order to let them reach a good academic achievement in their BA.

Conclusion

In relation of the instrument applied, and the data gathered, to the three BAs of the Department of Education of UNACAR, and taking into consideration that those students have got at least one failed course during their university life, it can be observed that the academic factor is one of the most problematic for the students and it has the most frequent causes detected in this research of this factor are: I did not get the teachers explanation, lack of knowledge of the course attending, because of dropping out the course, missing classes, because I did not handed in the homework, arriving late to classes and for lack of time for studying. Those are the causes of failing a course, according to the results, and also it shows evidence of the lack of responsibility of the students in relation of their courses attending and also, it shows that the teachers must use different strategies for teaching in order to have a good understanding of the topic treated.

Based on the previous paragraph, there is evidence that it is required to motivate the students so they can have a good development of the courses attending, and above all, it is really important to provide psychological counseling in order to give the students the required tools to face those problems of low academic achievement , failing, and laggard situations, etc. It is really important that both teachers and psychological department of the institution work hand by hand in order to tackle the most risky and vulnerable students on time and to prevent failing courses. Students of the UNACAR depend on economically of the family support to get their degrees, however, according to the results it is seen that the family factor is not so high as the academic factor. It seems that it is required studies, or case studies, involving the economic problems faced by the family of the students as well as the healthy problems of a relative, both having a percentage of 22.8% and 12.3%. In doing so, the researchers will have the chance to detect a problem, that is causing the failing of courses, on time and prevent the low academic achievement of the students.

Even though, some students depend economically of their family to study a degree, there exist a minimum quantity of students that need to get a job in order to pay their own fees by themselves, this represented by a 28.5% of the students that have got a job, also another 20.9 % of students spend a lot of time in social networks. Being the first case a real need to continue paying the fees, even all higher institutions in Mexico have got a scholarship programs to cover the fees of the students, this scholarship is not enough to cover all the expenses of the students. On the other hand, spending a lot of time in social networks is a question more related to the personal motivation of the students by themselves and it needs to be researched in more detail. Finally, it is worth to mention that data mining applied to education is a good approach since it has many advantages like converting the data in numerical factors and assign them a value in order to analyze it and making future decisions, retrospective analysis, and to support new models in the area of teaching and learning. The use of data mining allow us to discover new patterns from the

databanks, and these patterns might be very useful to implement new models of research applied to education, and other areas, also, it supports the automatized learning, the use of statistics, artificial intelligence, visualization of the information and hierarchical patterns of the new data gathered using datamining techniques. In this study there was used data mining in the education, specifically in a study of academic trajectories of students in order to predict future patterns of failing rates of the courses and this will help educators and teachers , and students of course, in the teaching and learning process in higher education in Mexico. According to the results presented here it was used the clustering by using the technique of cluster k-means to regroup the students and to predict the failing causes and this new generated info will serve to predict the academic achievement of the students according to the responses in each factor analyzed.

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