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Development of an Early Warning System to Detect the Undergraduate Dropout at the Faculty of Agriculture, University of Ruhuna

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Abstract

Student dropout is a critical issue related to the higher educational systems in the world. Among Sri Lankan universities also, student dropout has become a vital issue. Student dropout rate at the Faculty of Agriculture, University of Ruhuna is considerably high and there is no mechanism to identify possible dropouts in advance. The objective of this concept paper is to propose an Early Warning System to detect the undergraduate dropout at the Faculty of Agriculture, University of Ruhuna. The proposed system would provide explicit pre-awareness regarding dropout-prone candidates and help the faculty to take appropriate measures to reduce the dropout rate determining the best ways to minimise the number of dropouts.

Keywords: Higher Education System, Early Warning System, Sri Lankan Universities, University Dropouts

Introduction

Education is considered the foundation for the development and wellbeing of a society and therefore, the students are considered the most valuable fundamental asset of an education institute. A strong higher education system is a significant contributor to the country's ability to compete in the global marketplace and is critical to our economic strength, social well-being, and position as a world leader. As per (Bungău et al., 2017),"the goal of higher education is identical with those of education: the development of an informed, responsible citizenry and the preparation of every boy and girl for a personally satisfying and socially useful career".

Higher educational institutes including universities are complex organizations facing difficult and multifaceted challenges. According to literature, student dropout has become a distressing issue faced by both Sri Lankan universities and universities worldwide in the current challenging and dynamic

environmental context (Anishka and Thushara, 2016). Within the Sri Lankan context, the national government is making a substantial investment on free education and, therefore, student dropout is a serious issue which affects both the country's education system and its economy. Dropout of undergraduates from government universities raise several concerns within the universities; the efficiency of the universities is being questioned, the quality of the academic programs is being questioned, the management system of the universities is being questioned and may damage the reputation of the university (Bedregal-Alpaca et al., 2020). On one hand, a high percentage of student dropout exacerbates the lack of highly qualified individuals in the labour market that is predicted for the next few decades (Vogler-Ludwig et al., 2016). On the other hand, only a limited number of students are being selected for the government universities. From a societal point of view, dropout is argued to be a waste of tax resources due to the individual blocking a university place that could have been taken by another student (Sosu and Pheunpha, 2019). Considering this issue at the personal level, it appears that dropout is often associated with personal failure, and both waste of time and monetary investments (Behr et al., 2019).

In the United States, the overall dropout rate of undergraduate college students is estimated at 40%. In Germany, the dropout rate is nearly 29% (Behr et al., 2019). According to the data from the Higher Education Statistics Agency of the United Kingdom, 6% of first-degree entrants aged under 21 who enrolled in 2013-2014 years did not continue their studies beyond their first year. In countries that belong to the Organization for Economic Cooperation and Development, 12% of students who enter a full-time bachelor's program, on average, leave the tertiary system before beginning their second year of study. This percentage increases to 20% by the end of the program's theoretical duration and to 24% three years later. In all countries with available data, women have higher completion rates than men in BA programs (Sandoval-Palis et al., 2020). But the empirical evidence on undergraduate dropout in Sri Lanka is very limited. In the Faculty of Architecture, University of Moratuwa, the number of students who have dropped out or not completed as a fraction of the total number of students in a batch are alarmingly high; above 2/5 of the batch in 2006 intake and over and above 1/5 in other intakes (Anishka and Thushara, 2016). The seriousness of the dropout problem can be evidenced through many studies which have been carried out to analyze the dropout issue, to detect the main variables involved, to determine the scope of those variables, to model the dropout process so to organize it into many of its sub problems, to get a better understanding of its dynamic and of the sub-processes it involves, always aiming at a better understanding of the whole problem in an attempt to prevent/minimize it. The term "dropout" is commonly used to describe the situation of students who enrol at a certain institution of education and leave without obtaining a diploma or passing their final

examinations (Bungau et al., 2017). Tinto and Cullen (1973) defined two categories of dropping out: leaving the college of registration and failing to obtain any degree.

According to Donoso et al. (2007), the retention of students in university education is a broad phenomenon, related to access and higher education selection policies, which reflect the fact that some high-school graduates do not possess the skills, conditions, capacities, aptitudes, or competences to continue their university studies. Recent studies have found that the university dropout issue generally arises during the early years of an individual's career. Tinto (2006) highlights two critical periods when the risk of desertion is higher than usual. The first critical period is the admissions process when a student first accesses the university. The second critical period occurs during the first semesters spent in university when the student begins the process of social and academic adaptation. Bean (1982) points out that dropout is not only due to academic variables but can also be explained by psychosocial, environmental, and socialization factors.

Finding a suitable solution for the high dropout rates is important for both universities and students. Universities have an obvious interest in not spending scarce resources on students who will not be able to complete their programs. Students also shall have an obvious interest, since the time they get paid to study in higher education is limited. Therefore, early identification of the students who are at risk of dropping out from the university might be a solution up to some extent.

An institution's success in recruitment ultimately depends on how satisfied students are in pursuing their studies until graduation, and thus receiving value for the investment they and their families are making in obtaining higher education (Voigt and Hundrieser, 2008). Initially, an institution should have a proper admission mechanism to attract the best fitting students to follow the relevant degree courses. Once enrolled, after a rigorous admission procedure an undergraduate dropping from a degree course or failing to complete within the standard duration is not spontaneous. As defined by Doll et al. (2013), the cause of a student dropping out is often termed as the antecedent of dropout because it refers to the pivotal event which leads to dropout. This is indeed the ultimate result of a cumulative prolonged process taking place in a student's life as an undergraduate in a certain higher education institution.

According to the academic records, dropout rates of the Faculty of Agriculture, University of Ruhuna in 4 consecutive academic years; 2012/2013, 2013/2014, 2014/2015 and 2015/2016 were 9.30%, 9.7%, 6.44% and 16.57%, respectively. Those percentages are considerable in terms of the cost of producing an agricultural graduate. Currently, the Faculty of Agriculture does not have a system to identify possible student dropouts. Therefore, it is essential to address the issue of student dropout and the

proposed Early Warning System could be a reliable measure to identify the students who are at risk of dropping out.

Methodology

The proposed Early Warning System is based on the Management Information System (MIS) of the Faculty of Agriculture. According to the by-laws of the Faculty, the maximum time period for completing the degrees is four years. The students can attempt 1st year repeat subjects for another 7 times, 2nd year repeat subjects for another 6 times, 3rd year repeat subjects for another 5 times and 4th year repeat subjects for another 4 times. According to the proposed system, students are being continuously monitored and when a student is at a critical point, an alert is sent to the relevant parties such as student mentors and academic counsellors if necessary.
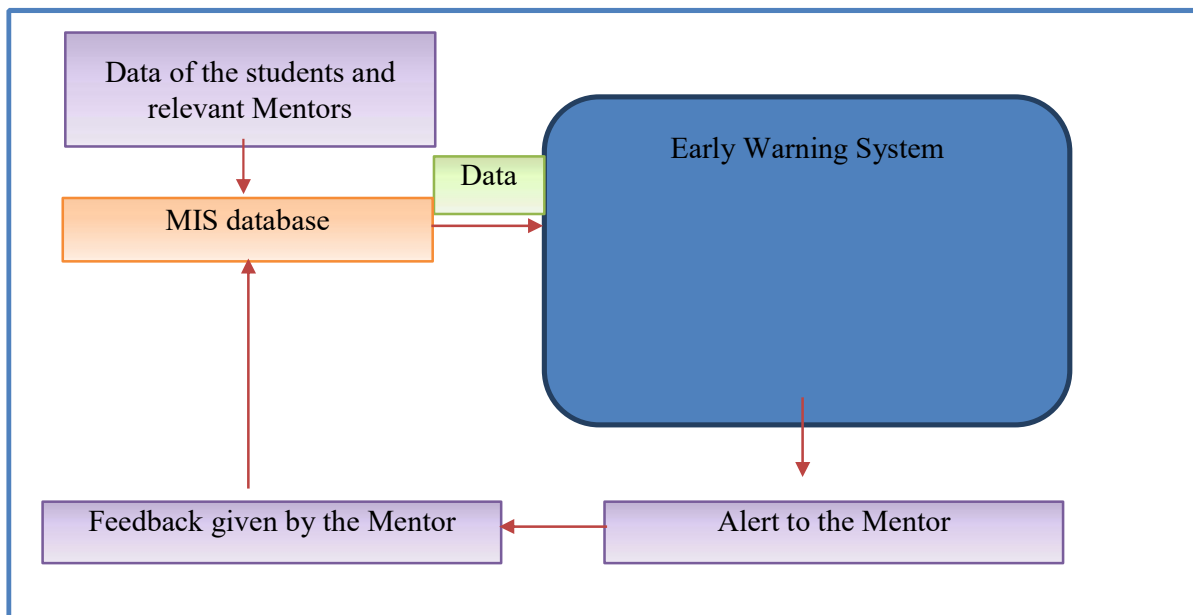

Figure 1: Proposed Early Warning System

According to the system, the relevant data of the students including the name, registration number, relevant degree, subjects enrolled numbers of attempts taken and the results should be entered to the MIS database. Those data are already included in the existing database. Apart from that, relevant information of the mentor of a particular student needs to be added to the MIS database.

The data from the MIS are sent to the Early Warning System. There are 4 components of the system.

1. Enrolment – Enrolment of the students to the courses of the semester is automatically done via the LMS (Learning Management System). The proposed system assumes that there are three subjects per semester.

Semester	Subject	Enrollment	Eligibility		Attemt				1	2
1st 1st	A	YES	YES	NO	YES	NO	*	PASS	FAIL	FAIL
	B	YES	YES	NO	YES	NO		PASS	PASS	FAIL
	C	YES	YES	NO	YES	NO		PASS	PASS	PASS
1st 2nd	D	YES	YES	NO	YES	NO		PASS	FAIL	FAIL
	E	YES	YES	NO	YES	NO		PASS	PASS	FAIL
	F	YES	YES	NO	YES	NO		PASS	PASS	PASS
2nd 1st	J	YES	YES	NO	YES	NO		PASS	FAIL	FAIL
	K	YES	YES	NO	YES	NO		PASS	PASS	FAIL
	L	YES	YES	NO	YES	NO		PASS	PASS	PASS
	A					NO	**		PASS	PASS
	B					NO				PASS
	C					NO				
2nd 2nd	M	YES	YES	NO	YES	NO	*	PASS	FAIL	FAIL
	N	YES	YES	NO	YES	NO		PASS	PASS	FAIL
	O	YES	YES	NO	YES	NO		PASS	PASS	PASS
	D					NO	**		PASS	PASS
	E					NO				PASS
	F					NO				
3rd 1st	P	YES	YES	NO	YES	NO	*	PASS	FAIL	FAIL
	Q	YES	YES	NO	YES	NO		PASS	PASS	FAIL
	R	YES	YES	NO	YES	NO		PASS	PASS	PASS
	J					NO	**		PASS	PASS
	K					NO				PASS
	L					NO				
	A					NO	***			
	B					NO				

Figure 2: Preview of the designed system

2. Eligibility – Eligibility to attempt the examination is checked via the system. If a student is not eligible, an alert is sent to the mentor to check the possible causes for not being eligible. It can be considered as a critical point in the system.

3. Attempt – The status of attempting the examination is checked by the system. If a student did not attempt an examination, an alert is sent to the mentor to find out the possible causes for not attempting.

4. Results - All the possible combinations of the proposed model have been identified. If a student has got repeated in a considerable number of subjects (that threshold value could be identified later), an alert is sent to the mentor. According to by-laws a student can attempt any examination for a period of 8 years.

Accordingly, alerts are sent to the mentor at different critical points of the system. The mentor is responsible for sending relevant responses back to the MIS database. Those responses are also recorded in the MIS database. Accordingly, the student is continuously being monitored.

Conclusions

The proposed system would provide explicit pre-awareness regarding dropout-prone candidates and help the faculty to take necessary actions to reduce the dropout rate after determining the best ways to minimise the number of dropouts. The possible causes for student dropouts would be identified by the relevant mentors by discussing with the identified students with the help of this proposed system. This system would identify possible dropouts while monitoring the undergraduates of the faculty continuously during their student career.

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