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Design of Warning System for Student Support Services

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Abstract

Many academies encounter with the student resigning or dropping out midway. This situation affects the reduction of the student retention rate. The objective of this paper is to design the student support service warning system. When the system finds the student who has problems, the warning messages are displayed to staffs or advisors. Then, the staff ad advisor could know the student who needs for incubation. Next, the troubleshooting is applied to solve the problem for the student case by case. In this paper, the system is tried out and evaluated by fifteen staffs and advisors. The result shows that the student support services process life cycle consists of five components: 1) student data collection 2) data analytics and problem classification 3) warning and appointment making 4) incubation and 5) monitoring and incubated evaluation. After the samples trying out the system, their rating in system performance is satisfied with the average mean and the standard deviation equal to 4.23 and 0.57 respectively.

Keywords: Student Support Services; Warning System; Retention

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1. Introduction

Providing student support services in higher education is a work that higher education institutions should support and encourage in order for students to be qualified graduates with physical, emotional, and intellectual aspects and responsibility both for themselves and society [1]. In addition to teaching organized according to the curriculum, student development activities are divided into 2 parts: (1) Providing services to students and alumni which the institution held to be in line with the needs and maximum benefits for students and alumni (2) organizing student activities conducted by student organization which is supported by the Institute. This is to enable students to develop physical, emotional, social, and intellectual aspects, as well as desirable graduate characteristics. These are knowledge, thinking skills, interpersonal skills, responsibility, analytical and communication skills, and moral and ethical development [2].

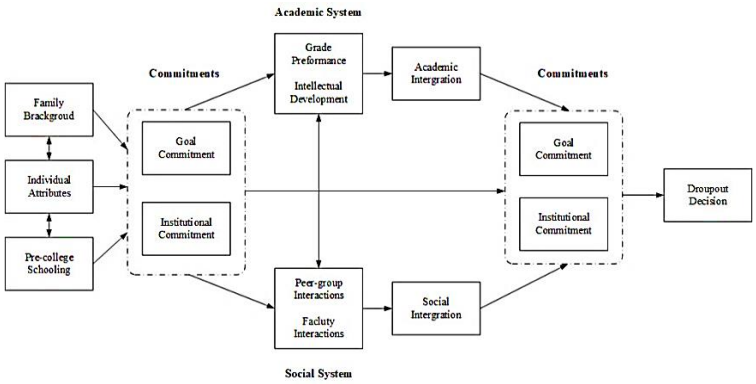

Fig. 1 Student Retention Model [3]

Student Support Service (SSS) is caused by students who are not ready to enter higher education. These may be due to the high school education level is not good enough or caused by students coming from poor families, students have problems in adapting, and health problems. All these problems result in students who are enrolled in higher education have poor academic results, drop out, transfer to other institutions, or are unable to complete their education according to the conditions, time, and grade point average by Vincent Tinto [3] presented the model of participation and retention of students shown in Fig. 1.

From the model in Fig. 1 shows that students' potential and background and academic and social participation will affect student retention, which Alexander Astin [4] further explained that the involvement of students with universities often has a better relationship than those who do not participate and tend to remain until graduation. While students who do not have a tendency to resign participating students may participate in co-curricular activities, volunteer activities both on and off campus may work for the university and/or join the activities of the university and George Kuh [5] further stated that student participation shows that students are devoting both time and physical activity in their activities with the goal of graduation. Moreover, educational institutions are also trying to devote themselves to effective practices for providing efficient support services as well. Besides, Britto & Rush [6] still support the idea that keeping students in higher education is very important. Over the past several years in Thailand, the graduation rate for undergraduate degrees with the numbers is at a percentage of 75 [7] in which the government and educational institutions are aware of this issue. Therefore, they tried to find a solution by providing a budget for contributing scholarships, implementation of academic and social support student programs. However, with students from a variety of sectors including disabled students, poor students, students from various tribes, and students from abroad it makes solving problems more difficult.

By way of developing students to be graduates with physical, emotional, intellectual, and responsible completion both for themselves and society, it is absolutely necessary to rely on processes and methods to help develop which the process of producing graduates and student development is a complex process. This process requires the readiness from the academic department and the student affairs department. If either party lack of readiness would result in inefficient results, which in the part of the students found that there are many students who are still lacking in readiness, such as having health problems, lack of goals in life, adaptation to the education system as well as adapting to friends and the environment. However, the agency that has the main mission to help solve such problems is Student Affairs Department that provides various services to help students both Individuals and groups for students to be ready to study and can help develop students to have perfection all in academic and professional, intellectual, social, emotional, physical and mental

aspects in order to be consistent with the philosophy, aspirations and objectives of educational institutions [8].

Providing good student support services (SSS) will play an important role in helping to increase the retention and graduation rates for both regular and online students [9, 10]. Educational institutions should have an information system to assist in monitoring and helping students with problems [11]. The American Productivity and Quality Center [12] presented the conceptual framework of the process of school administration to set standards for educational institutions to be applied in the design process to cover and no redundancy to achieve efficiency and effectiveness in the management of the institution with a systematic design process for providing student support services as shown in Fig. 2.

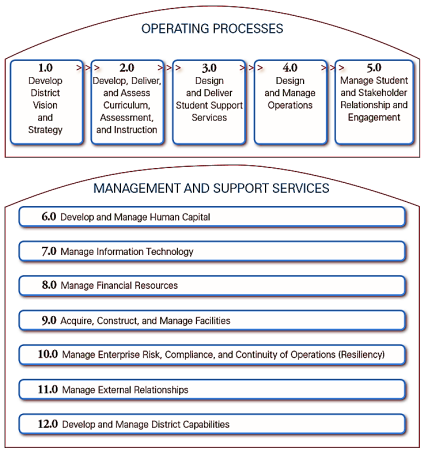

Fig. 2 Education Process Classification Framework [12]

Therefore, the introduction of information technology systems to support the implementation of student support services will be an information technology innovation designed to increase the efficiency of student support services in solving problems for students to keep up with the demands that will increase the retention rate and graduation.

In this paper, we propose the warning system of the student support service. When the system finds the student who has problems, the warning messages are displayed to staffs or advisors. Then, the staff ad advisor could know the student who needs for incubation. Next, the troubleshooting is applied to solve the problem for the student case by case.

2. Materials and Methods

Research objectives

To study the student support service process.

To design a warning system for student support services.

To evaluate the efficiency of the warning system for student support services.

The research processes

The purpose of this research was to design a warning system for student support services for use in solving student problems that might have or occur during the study to meet the needs of students. The research process consists of 4 steps as follows:

The study of the context of providing student support services from related documents and research to be used in the process design of student support services.

Design of warning system for student support service. In this process, we apply the context of students, staffs, advisors and concept of factor of dropping out midway of students to design the process of the SSS warning system.

User interface design to suit the users. In this process, we apply the design of warning system and interview the stakeholder to design the user interface which ease of used for stakeholders.

Assess the efficiency of the service warning system by inquiring from experts with experience in information technology and student support services not less than 5 years.

Population and sample group

The population used in this research was 96 of staffs and advisors related to student support services at Lampang Rajabhat University, and the sample group was purposive sampling method by selecting 15 experts with information technology experience and student support services not less than 5 years to test and evaluate the efficiency of the warning system for providing student support services.

Research tools

The design of the warning system for student support services will bring information technology to help support the work. The details are as follows.

PHP language version 7.1.2 is a language program for the instruction set, such as display, contact to database, etc.

MariaDB Version 10.1.26 is a database program for data storage.

Xammp Version 7.19 is a program for simulate the computer to operate as a server.

phpMyAdmin Version 4.8.5 is a program in MySQL database management.

Assessment form for the effectiveness of student support services caused by the quality of the warning system used the theory of successful information systems models of Delone & Mclean [13].

Statistics used in research

Data analysis [14] of the respondents will use statistics of the percentage and standard deviation with the average value being interpreted as follows.

Score	Meaning
4.50 – 5.00	Very satisfied
3.50 – 4.49	Satisfied
2.50 – 3.49	Neither satisfied nor dissatisfied
1.50 – 2.49	Dissatisfied
1.00 – 1.49	Very dissatisfied

3. Results and Discussion

The process work of Student Support Services is a procedure management of education support services so that students can successfully complete the course within the specified period. Providing student support services needs to be able to identify students' problems in order to properly resolve individual problems [12]. By the life of the student support services will begin to collect student data that is distributed in different departments to gather to analyze and sort out student problems in each term that may occur in 5 different areas [15 – 17] as follows: 1) Learning 2) Finance 3) Social 4) Health and 5) Psychology. And then make reminders and appointments for students with problems to meet the consultant for entering the incubation process. This will have to consider how to resolve common problems from the incubator set up. Every term will be monitored and evaluated from the Board of Directors whether or not to solve problems or to alleviate problems for students then it became the life cycle of student support services until the students graduated as shown in Fig. 3.

Fig. 3 Student Support Service Life Cycle

System Analysis and Design

Design of warning system for student support service [18]. Normally, the general information system is a data model that is processed, stored, and took the result for use in the work. But to design the process of providing support services for students to work automatically. But to design the process of providing support for students to work automatically in order to alert the service, it is necessary to have an analysis of the work processes that are shown in Fig. 4 which are detailed in 5 parts as follow:

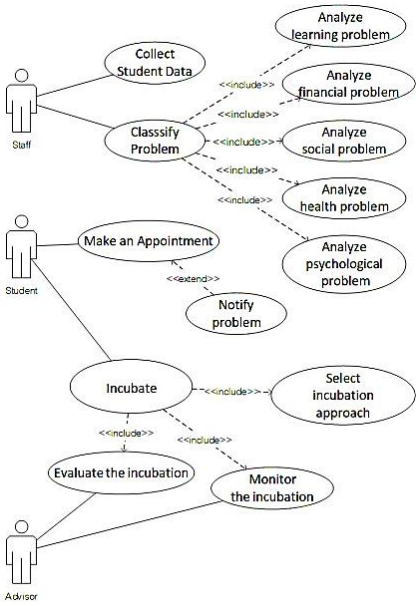

Fig. 4 Use Case Diagram for Student Support Service Warning System

Collection of student information: For the collection of data, the objective is to gather information about factors that will affect the student's learning. This will be an obstacle that makes it impossible to complete the course which the information gathered will come from sources such as:

Background data obtained from registration as a new student.

Study results from the registration and measurement department.

Loan information and payment of tuition fees from the finance department.

Information on participation in activities from the Student Affairs Department.

Information on health and mental health problems from advisors and instructors.

The data collected will be analyzed to create student information that needs to monitor the Watch List (WL) that will have to enter the incubation process.

Analysis and segregation of various information problems, obtained from monitoring students, monitoring will be analyzed and sorted out problems into various problems.

Supposing that t_i = The problem value with , where

$i = l$ Instead of learning. Problem indication value is t_l = Cumulative GPA<2.0

$i = f$ Instead of finance. Problem indication value is t_f = Number of registered days is slow> 30 days

$i = s$ Instead of society. Problem indication value is t_s = Number of participations in activities < 80%

$i = h$ Instead of health. Problem indication value is t_h = Have health problems such as having a disease or disability from a medical report

$i = m$ Instead of Psychology. Problem indication value is t_m = Have mental health problems such as violent behavior, have love problems, drug problems, etc. from the evaluation of the advisor. The algorithm is as follows:

1 Read Student Data
2 Repeat
3 $j = j + 1$
4 Read student j
5 IF $j(t_l) < 2.0$ Then Add $pp(t_l, \mathrm{j}) = 1$
6 IF $j(t_f) > 30$ Then Add $pp(t_f, \mathrm{j}) = 1$
7 IF $j(t_s) < 80$ Then Add $pp(t_s, \mathrm{j}) = 1$
8 IF $j(t_h)$ = True Then Add $pp(t_h, \mathrm{j}) = 1$
9 IF$j(t_m)$ = True Then Add $pp(t_m, \mathrm{j}) = 1$
10 Until EOF
11 If weight $(pp(i,j)) \geq 1$ then put j in WL

By giving pp_{ij} is Problem Profile of student, $1 \leq j \leq n$, i = 1,…,5 By pp_{ij} = 1 if student j has problems that need to be cultivated with i

For student j =1 to n
And problem i = 1 to 5

If at pp_{ij} = 1 Make an appointment for students to meet a counselor to find ways to incubate in i

Notifications and appointments. Information from various problems of students will be provided as information that causes notifications in the system. The algorithm is as follows:

1 Read Student Problem Profile
1 Repeat
2 $j = j + 1$
3 Read Student Problem Profile j
3 For i = 1 to 5
4 $if\ pp_{ij} = 1\ then\ warn_{message}(i,j)$
5 Next i
6 Until EOF

By $warn_{message}$ As a notification to students to make an appointment for student j has a problem in i

Incubation to solve the problem of incubation list or Incubation List is List of incubation methods used from

l_n = Incubation list in learning
f_n = Incubation list in finance
s_n= Incubation list in society
h_n = Incubation list in health
m_n = Incubation list in psychology

Each student entering the incubation process will have an incubation program to solve their own problems. One student may have many problems, which need to be selected for more incubation programs. In each incubation program, there are specific methods to solve problems such as

l_3 = Get Tutoring Services from teachers
f_4 = Work Part-time at the library
s_2 = Join the volunteer club
h_5 = Get Health promotion Service
m_1 = Meet the doctor for advice and treatment for stress of overdose.

For each student, when being invited to meet a counselor to determine whether the problem that may arise or occur, then there is a solution or not, which can be divided into 3 cases. The case is solved by using incubation methods as prescribed or cannot be resolved or delay the correction by requesting additional evaluation results.

Follow-up incubation evaluation: Students who are on the Watch List (WL) and have been incubated will be in the Incubate List (IL). There must be a follow-up that has been recommended for action or service and receive each service at any time. The incubation results will be summarized at the end of each term whether the problem persists or not. If there is still, may offer additional methods or the student's problem has been resolved, the student's name will be removed from the IL and WL account from the committee's consideration.

User interface design [19] from the process of providing student support services when designing the user interface according to the designed procedure, the result will be shown in Fig. 5

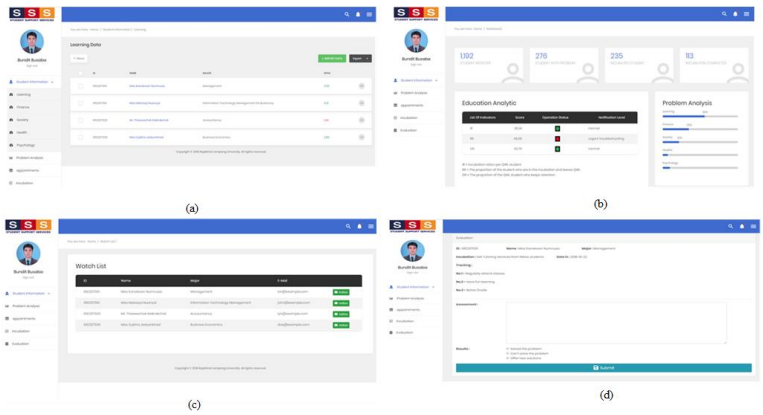

Fig. 5 User Interface of warning system for Student Support Service

In Fig. 5 shows the demonstration of the student support service system as follow: (a) The display of data collection (b) the screen of data analytic and problem classification (c) the display of warning and appointment making and (d) the display of incubation and evaluation.

System Evaluation

Results of the efficacy evaluation of the warning system for student support services by experts found that the level of system performance is satisfied with an average of 4.23, the standard deviation is 0.57. When consider each aspect it was found that service efficiency had the highest mean ($\bar{X}$ = 4.33) and information security had the lowest mean ($\bar{X}$ = 4.12) as shown in Table 1

Table 1 Results of the efficacy evaluation of the warning system for student support service

Performance evaluation	$\bar{X}$	SD	Interpretation
In response to user needs	4.16	0.60	satisfied
The ability to work according to the steps	4.32	0.56	satisfied
The difficulty of using the system	4.24	0.52	satisfied
Service efficiency	4.33	0.49	satisfied
Information security	4.12	0.62	satisfied
Average	**4.23**	**0.57**	**satisfied**

As a result in Table 1, the performance evaluation result of the student support service (SSS) warning system is evaluated by 15 experts. The result shows that the system performance is satisfied with an average of 4.23. The service efficiency aspect gains the most average score with mean equal to 4.33 because of collecting student data for problem classification such as study result, financial, social, health and mental health. After the problems are classified by the warning system, the appointment has been sent to the students for incubation in their individual problem. This is an advantage of the warning system because each student can get the best solution to their own problem. Moreover, the monitoring and evaluation of the solution are summarized. These processes and outputs are according to Tinto [3] that the personal characteristics, background, and family affect the dropping out midway of the students. As well as Astin [4], the financial and the parent degree are affected the dropping out midway of the student also. Therefore, the designing of SSS warning system process can make a good solution for the problem student.

4. Conclusion

Student Support Service (SSS) is necessary to integrate the work of many departments together. Besides, SSS also needs to think of various new service methods that help solve problems for students so that students can successfully complete the course for a specified period of time. Design of warning system for student support service will help to monitor the problems of students since beginning to report to become a university student in order to use the data to analyze individually to create a Watch List (WL) for students who need to be incubated and summarizing the results of each student's assessment of the incubation until graduation according to the curriculum.

The results of the efficacy evaluation of the warning system for student support service from 15 experts, summarizing the evaluation results of service alerts at 84.60% from mean 4.23, which is a preliminary confirmation that providing student support services according to this design procedure will continue to increase the rate of retention and help increase the chances in graduation of students according to Tinto [3] and Astin [4] who explain about factor of dropping out midway of students. In

future work, these designed SSS warning system process can be implemented to service and support for problem students individually and it would be work to retain the student retention rate in practical.

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