CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Counselling unit in Universiti Malaysia Pahang uses Mooney Problem Check List (MPCL) as an aid in identifying Pemulihan 1 (P1) and Pemulihan 2 (P2) students. P1 and P2 are the indicator for student academic achievement in every semester. MPCL contains a list of questions for students to answer. Currently, MPCL is printed out on a piece of paper.

MPCL is a list of questions to identify a student problem. Current implementation is the counselor will conduct session with student P1 and P2 and student answer a set of paper which contain MPCL. After that, the counselor will propose a solution to identify student's problem. In MPCL will access student related to academic, and family.

The manual process of student *Pemulihan 1* and *Pemulihan 2* are the counselor will get list from the system. After that the counselor will contact that student to inform them to see the counselor for appointment answering the Mooney Problem Check List (MPCL). Then, the student will meet the counselor on that an appointment to answer a group of question. After the student answer the question from MPCL, the counselor will calculate the total from the answer make by student.

1.2 PROBLEM STATEMENT

i. Counselor not able to determine student problem every semester using MPCL manually. Mrs. Paridah is a counselor at the UMP. She was placed on the campus of Pekan and Gambang campus will be on when the work in Gambang campus. So if she has a session with students of *Pemulihan 1* and *Pemulihan 2* (P1 and P2), she will be with the students at the university campus in Gambang campus or Pekan. Now she handled P1 and P2 students met with students and provide students with questions MPCL which has a range of questions covering a variety of factors to identify problem students. It is a problem faced by counselors UMP because according to statistics, 65% of students who got P1 and P2 is from Gambang campus. Therefore, the existing implementation, counselor UMP, which has a total of six counselors, cannot treat all students with P1 and P2 systematically. Usually counselor will work with 100 students to a counselor.

ii. Difficult to maintain and retrieve back in management system to record much more easily. Nowadays, after finishing a session with a counselor students get P1 and P2, the counselor will analyze and determine the student's problem. So the information and record all information about students' problems by using paper. Situations like this usually will have disappeared and do not record information system.

1.2 OBJECTIVES

i. To develop counseling decision support system based on MPCL.
ii. To implement Rule Based Decision Support System.
iii. To evaluate the system using user feedback and testing.

1.4 SCOPE

- Assist student problem P1 and P2 (*Pemulihan 1 & Pemulihan 2*)
- Use Mooney Problem Check List (MPCL)

1.5   THESIS ORGANIZATION

This thesis consists of five (5) chapters. First (1st) chapter will discuss on the introduction of the project, second (2nd) chapter will discuss about the project literature review from related materials, the third (3rd) chapter will cover on the methodology used through the project, fourth (4th) chapter will shows the implementation and result discussion and fifth (5th) chapter will conclusion. The list of chapter same as below:

i.   Chapter 1 (INTRODUCTION)

ii.   Chapter 2 (LITERATURE REVIEW)

iii.   Chapter 3 (METHODOLOGY)

iv.   Chapter 4 (IMPLEMENTATION AND RESULT DISCUSSION)

v.   Chapter 5 (CONCLUSION)

vi.   REFERENCES

vii.   APPENDICES

CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

This chapter will study an important part which is called literature review. This chapter is very consequential part to be done in order to obtain more information and comparison about the existing research in order to become the best project. In this chapter, we will discuss about the review and approve related to the reference and other related finding about the research. This is necessary because, it will help to improvise our project to become more efficient. Moreover, it also states other approaches that will utilize in this project after doing some comparison and analysis with existing research.

2.2   Analysis of Decision Support System

Nowadays, Decision Support Systems (DSS) are a class of computerized information system that support decision making activities. The DSS can be categorized into five types.

1. Communication driven DSS

    Communication driven DSSs are targeted at internal teams, including partners. Its purpose are to help conduct a meeting, or for users to collaborate. The most common technology used to deploy the DSS is a wed or client server. Examples: chats and instant messaging software, online collaboration and net-meeting systems.

1. Data driven DSS

   Data driven DSSs are targeted at managers, staff and product suppliers. It is used to query a database or data warehouse to find specific answers for purposes. Examples: computer based databases that have a query system to check.

2. **Document driven DSS**

   Document driven DSSs are targeted at a broad base of user groups. A purpose of such a DSS is to search web pages and seek document on a specific set of keywords.

3. **Knowledge driven DSS**

   Knowledge driven DSSs our knowledge-base are a catch all category covering a broad range of systems covering users within the organization setting it up. Also include others interacting with the organization- for example, consumer of a business.

4. **Model driven DSS**

   Model driven DSSs are complex systems that help analyze decisions or choose between different options. For a number of purposes depending on how the model is set up – scheduling, decision analyses. Be deployed via software/hardware in stand-alone PCs, client or the web.

2.2.1 Mooney Problem Check List Decision Support System (MPCL DSS)

  The all information about student P1 and P2 is getting from counselor Universiti Malaysia Pahang which is a raw data and get 400 student from all faculty in UMP include Gambang and Pekan campus. The method to collect raw data is identified *Pemulihan 1* and *Pemulihan 2*   (P1& P2) student and record on the paper by counselor UMP.
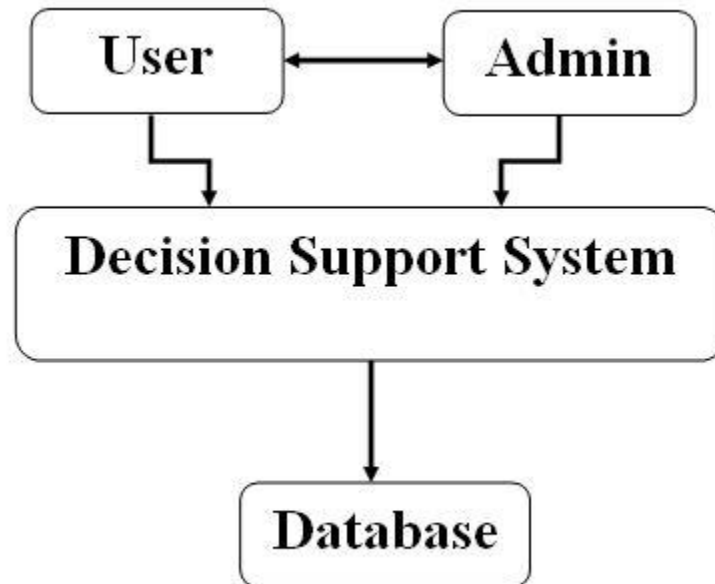

Figure 2.1 System Design Framework

Mooney Problem Check List (MPCL) based on rule based of decision support system is a system direct with database to record the information to identify category's student problem. The user is divide into two user are admin and student. A counselor Universiti Malaysia Pahang (UMP) as admin to use the MPCL method to determine the student problem depend on academic *Pemulihan 1* and *Pemulihan 2* (P1&P2) student. A student is as main user to login into the system to answer the questionnaire from getting the output based on MPCL. The database will record the output of determining student problem after answering MPCL. And the decision support system knowledge based is to interact with the counseling unit. It is essentially used to provide management advice or to choose the category after counselor determine the student problem.

2.2.2   THE MPCL DSS FRAMEWORK

Applying a MPCL DSS for effectively tackling the project evaluation and selection problem is not only desirable, but also important. The MPCL DSS provides the decision maker with effective mechanisms to better understand the decision problem and the implications of their decision behaviors of the organization by allowing them to interactively exchange information between the system and themselves [5]. Due to the diversity and complexity of the selection criteria, their interrelationships, and the volume of information, the MPCL DSS has to be efficient, effective and flexible in effectively solving the general project selection problem. This section presents a MPCL DSS for solving the project selection problem. The MPCL DSS is designed to help the decision maker choose the appropriate project in a flexible and user-friendly manner by allowing the decision maker to input values to express his/her requirements and to fully explore the relationships between the criteria, the alternatives, the methods available and the outcome of the selection process. Through interactive exchange of information between the decision maker and the MPCL DSS, the MPCL DSS helps the decision maker adopt a problem-oriented approach in the problem solving process in which the MPCL DSS lets the problem that it is trying to solve determines the appropriate method it is going to apply [5, 13]. This problem-oriented approach is vital for effectively and efficiently solving the IS project evaluation and selection problem in an organization. The MPCL DSS consists of three major subsystems, namely, (a) the dialogue subsystem, (b) the input management subsystem and (c) the knowledge management subsystem which is consistent with the general architecture of MPCL DSS. The dialogue subsystem serves to integrate various other subsystems as well as to be responsible for user-friendly communications between the MPCL DSS and the decision maker. The subsystem coordinates all functions or commands selected by the decision maker. The interface allows the decision maker not just to apply one of the available MA methods, but also to edit or visualize the data. To provide flexibility for customizing the system by the decision maker, the interface is designed so that the decision maker can create, modify or eliminate criteria, or even define which

criteria he/she intends to inquire about. A decision maker utilizes the database through the dialogue subsystem for analyzing different alternatives using the knowledge management subsystem. The input management subsystem organizes and manages all the inputs for solving the project evaluation and selection problem. The type and the quantity of data inputs for solving the problem vary typically from one problem to another. These input data can be classified into primary and secondary types. The primary input data include the alternatives, the criteria, the decision matrix, and the pairwise comparison matrices. The secondary data include the criteria weightings. The input data are entered into the system for processing and they can also be edited after they have been entered into the system. It should be noted that the system is flexible to allow new data types to be added to the system due to the possible addition of new MA methods in the MPCL DSS. The knowledge management subsystem manages all the MA methods available in the DSS. For the sake of describing the proposed MPCL DSS, six MA methods have been included in the proposed DSS for helping assist the decision maker select the most appropriate MA method in solving a specific project evaluation and selection problem. These six methods include the simple additive weighting (SAW) method, the technique for order preference by similarity of an ideal solution (TOPSIS) method, the elimination et choice translation reality method, the analytical hierarchy process (AHP) method, and others. One of these MA methods can be invoked directly by the decision maker or selected automatically by the proposed DSS through the knowledge management subsystem. The proposed MPCL DSS consists of six phases, including (a) identification of the decision makers' requirements, (b) determination of criteria weights, (c) determination of performance ratings of alternative projects with respect to each criterion, (d) selection of the most appropriate MA method, (e) evaluation of the IS project, and (f) selection of the appropriate a project alternative. Figure 1 shows the overall MPCL DSS framework for solving the problem.
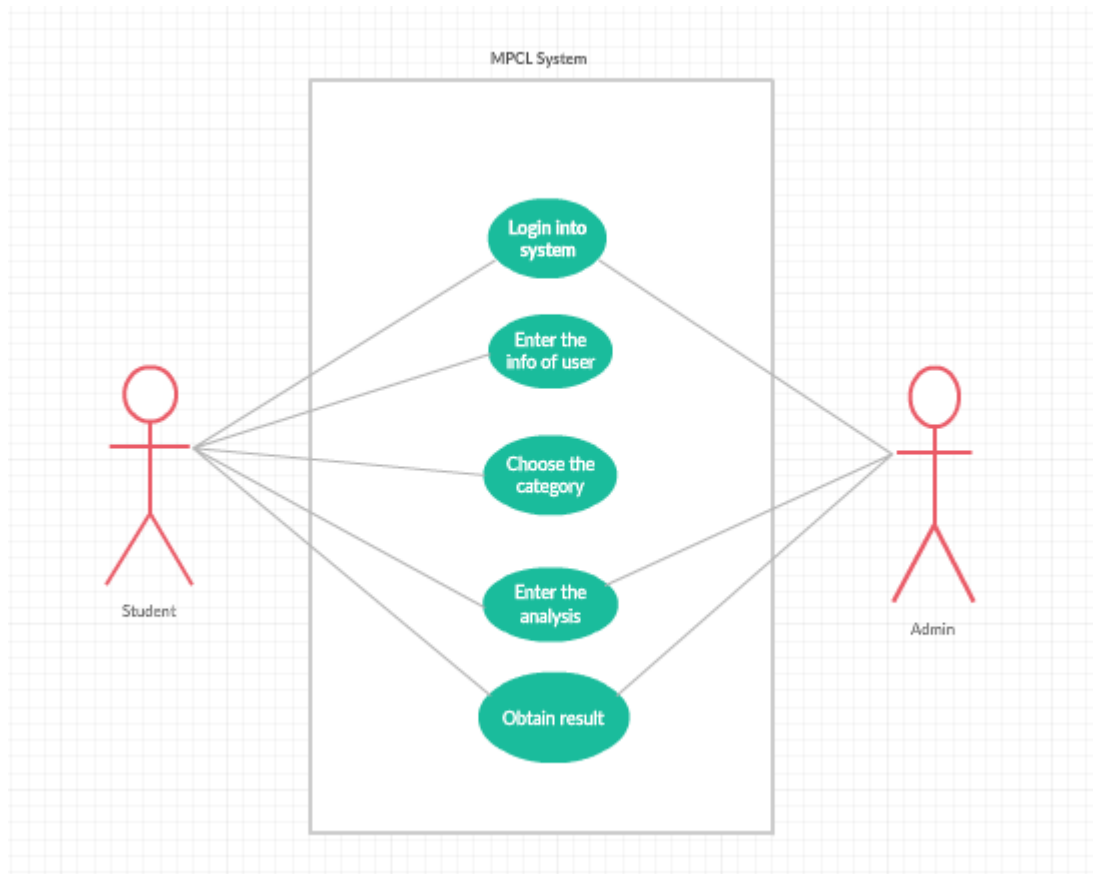
Figure 2.2: The Use Case of Mooney Problem Check List (MPCL) system

This use case of Mooney Problem Check List (MPCL) system divided into two user. First user is admin is identify by counsellor Universiti Malaysia Pahang and second user is student is identify by Pemulihan 1 and Pemulihan 2 student. The process by both of this user are to login first as admin and the student will answer the Mooney Problem Check List (MPCL) question into the system in front of the counsellor. The function of this use case is login into the system, enter the info of user, choose the category of student, enter the analysis of the student's answer, and obtain result according the student answer.

2.3   Comparison of Rule Based and Case Based

This two existing approach has been chosen for the literature study because it related and use the same method in term of its function and the purpose of the application. The differences will be divided into several scopes as shown in the table 2.1 below:

Features	Rule-based	Case-based
Learning	Not Relevant	Through creation of new cases
Search Strategy effectiveness	Exhaustive	Popular technique : K-Nearest Neighbour
User Feedback	Not Relevant	Through creation of new cases
Incomplete input	Not Accepted	Accepted
Knowledge base expansion	Manually	Automatically
Knowledge Representation	IF – THEN structure	Cases

Table 2.1 Comparison of Two Existing Approaches

Besides, there are some disadvantages of the rule based expert system. The first disadvantage is opaque relations between rules. Although the individual production rules are relatively simple and self-documented, their logical interactions within the large set of rules may be opaque. Rule-based systems make it difficult to observe how individual rules serve the overall strategy. Second disadvantage is a rule based decision support system have ineffective search strategy which the inference engine applies an exhaustive search through all the production rules during each cycle.

Rule based expert systems with a large set of rules (over 100 rules) can be slow, and thus large rule-based systems can be unsuitable for real-time applications. In general, rule-based expert systems do not have an ability to learn from the experience. Unlike a human expert, who knows when to "break the rules", a rule based system cannot automatically modify its knowledge base, or adjust existing rules or add new ones. The knowledge engineer is still responsible for revising and maintaining the system. Similar to the above, the rule based reasoning technique also has their advantages and disadvantages. In this rule based, the system can be created where the rule solutions can be combined into new ones and rule based can also be used in a different level of abstraction providing innovative solutions. The system can work as a tutoring in which it provides some notes to the students according to the chapter based on the rules. Rule based also has a learning feature where learning can be done without human interference. It can learn the student performance from the questionnaire taken by the student. From the performance the system can determine, which technique is suitable to teach the student for the next chapters. Decision support systems can become robust and provide better solutions. The feedback is easily incorporated in the reverse phase. Rule based also can recognize when no answer exists for a problem by simply defining a threshold from which a solution is no longer acceptable. In decomposable problem domains, a solution can be created from the combination of partial solutions. However, there is some limitation in this Rule based. Currently, the system only has 20 rules that already stored into the database. This is the limitation of the rule based. By adding more rules, the system can easily provide solutions to the new rule based. Due to the opinion from the domain experts themselves that evaluating a student is a subjective and there are still no exact way how to measure a student's level. The rule given from by experts is based on their experience in teaching students, so it may be different from another.

CHAPTER 3

METHODOLOGY

3.1   Introduction

This chapter discusses the overall workflow and approach for the research which termed as project methodology. This chapter will cover all method, technique or approach to be used in the research. Methodology is called as operation or systematic of lifecycle for software, including process and activities during development or the research. Basically, methodology is declaration of understanding and technique to use as a guideline to complete all the tasks with specific time and date. In surveys, there are many varieties of methodology, methods that suit to the research requirements needs.

3.2   MOONEY PROBLEM CHECK LIST DECISION SUPPORT SYSTEM

Decision Support Systems (DSS) are a class of computerized information system that support decision-making activities. The DSS are interactive computer-based systems and subsystems intended to help decision makers use communications technologies, data, documents, knowledge and/or models to complete decision process tasks.

A decision support system may present information graphically and may include an expert system or artificial intelligence (AI). It may be aimed at business executives or some other group of knowledge workers.

Typical information that a decision support application might gather and present would be, (a) Accessing all information assets, including legacy and relational data sources; (b) Comparative data figures; (c) Projected figures based on new data or assumptions; (d) Consequences of different decision alternatives, given past experience in a specific context.

The rule based implement into the Mooney Problem Check List because the manual form want to computerize into the system. The student will access into the system in front of the counselor during an appointment. Counselor will consult the Pemulihan1 and Pemulihan 2 (P1 and P2) student to answer the Mooney Problem Check List by the system.
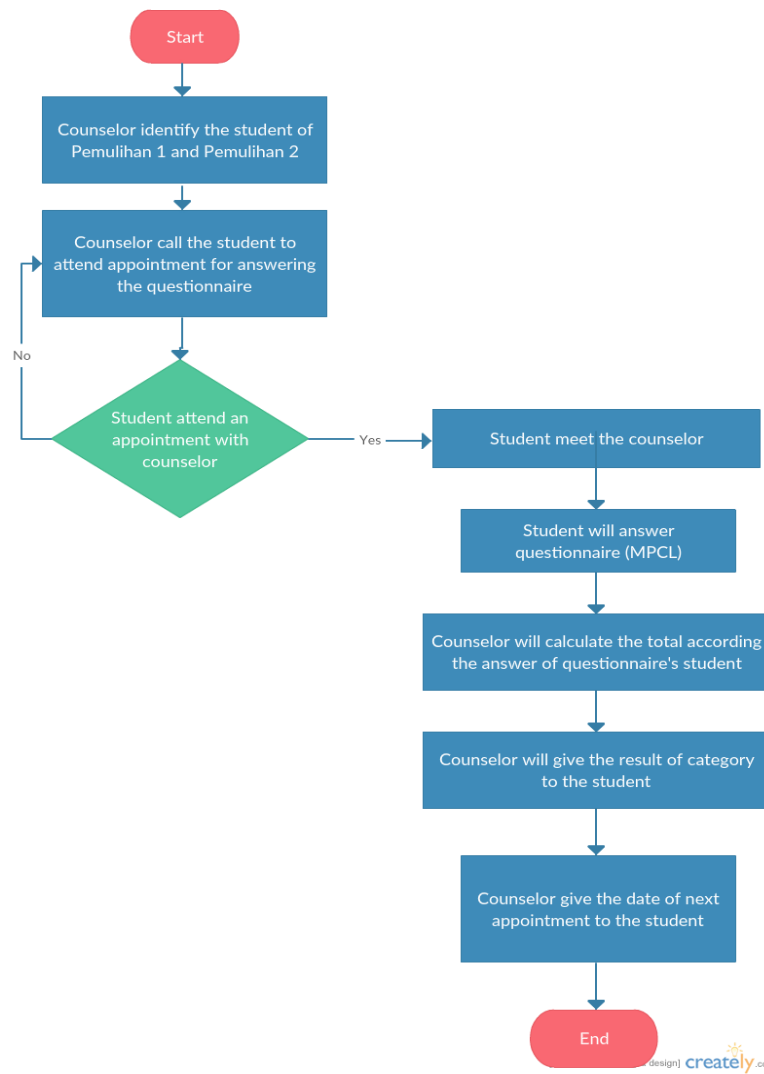
Figure 3.2.1: Flowchart of manual procedure MPCL system

The manual flow procedure using Mooney Problem Check List (MPCL) is starting with counselor will identify the result of student which is Pemulihan 1 and Pemulihan 2. After that, the counselor will call the specified student to attend an appointment for answering the questionnaire from Mooney Problem Check List (MPCL). If student attending the appointment, he/she will meet the counselor and answer all question. After student is finish answering the question, counselor will calculate the total according answer of Mooney Problem Check List (MPCL) by student. Then, the counselor will tell the category of problem to the student. The category consist three type of category which is family, academic, and financial. Lastly, counselor will give the date of appointment to the student depends on category of problem.
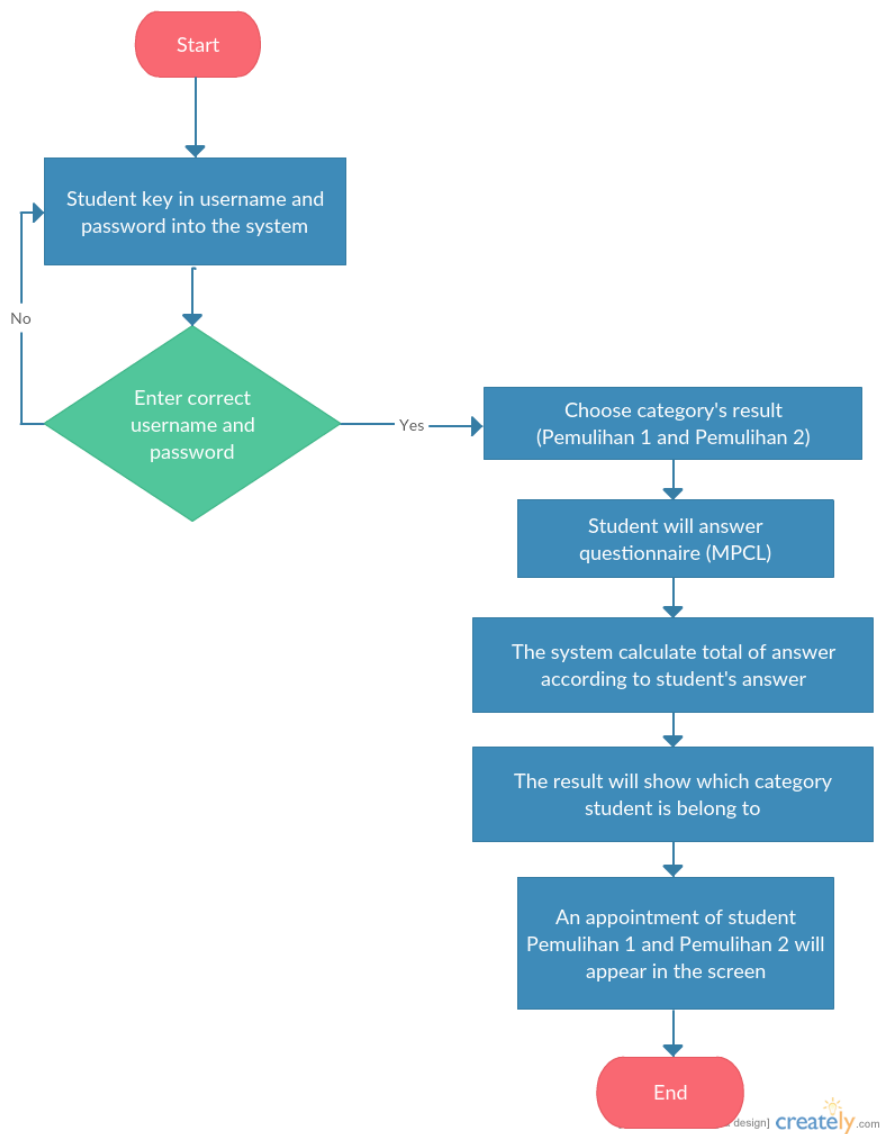
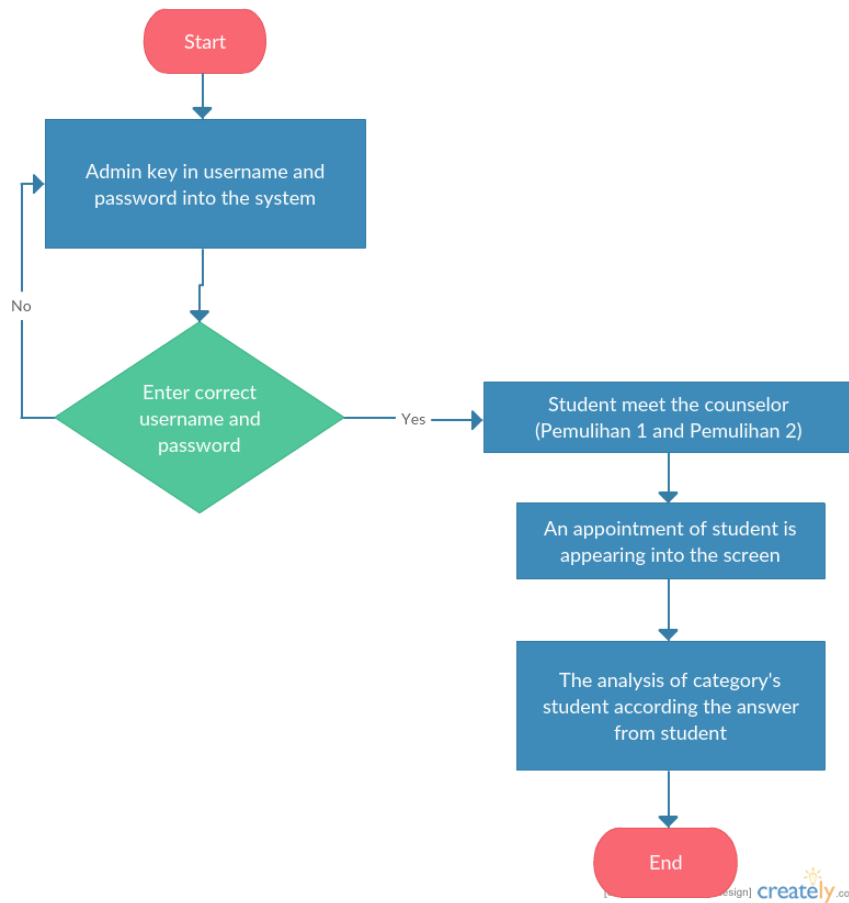**Figure 3.2.2: Flowchart of procedure MPCL system by Student**

Figure 3.12: Flowchart of procedure MPCL system by Admin

The figure of 3.1.1 and figure 3.1.2 are the flow of procedure Mooney Problem Check List (MPCL) system by student (user) and admin (user). The flow Mooney Problem Check List (MPCL) for student is student has to key in he/she name and ID number, then choose the category which is Pemulihan 1 or Pemulihan 2. After that, student will click on button "Attempt MPCL Question". The student will go to next page for click on the button Start to answer the Mooney Problem Check List (MPCL) question. After he/she finished answer all question, click on the button Submit to obtain the result of the category pf problem and the date of an appointment. The flow Mooney Problem Check List (MPCL) by admin is admin has to login by username and password correctly. If do not correct, admin will re-enter again username and password. Admin will go to next page and there are two button which is Student and Admin button. If admin want to get an analysis of student category after answer Mooney Problem Check List (MPCL) question, admin will click on admin button.

3.3   RULE-BASED MOONEY PROBLEM CHECK LIST DECISION SUPPORT SYSTEM

In a rule based, the process is slightly different. Instead of translating expert knowledge into rules, we have to collect data and information which represent domain knowledge. Rules were chosen to be the knowledge representation because rules manage to express relations, recommendation or solution, directive, and strategies. All the information has been structured in rules in order to come out with the result that been processed by the system. The process of constructing the rules involves collecting data from a number of students. All information is verified by the expert. All the information has been structured in the standard form of rules and stored in the database for further use in the system. These are some example of rules that being constructed.

Rule 1 - From 1st until 10th question and from 111st until 120th question, that's for physical and health category.	**Rule 6** - From 51st until 60th and 161st until 170th question, that's for physiology problem category.
Rule 2 - From 11th until 20th and 121st until 130th question, that's for financial category.	**Rule 7** - From 61st until 70th and 171st until 180th question, that's for religion and moral category.
Rule 3 - From 21st until 30th and 131st until 140th question, that's for social category.	**Rule 8** - From 71st until 80th and 181st until 190th question, that's for family category.
Rule 4 - From 31st until 40th and 141st until 150th question, that's for marriage category.	**Rule 9** - From 81st until 90th and 191st until 200th question, that's for academic category.
Rule 5 - From 41st until 50th and 151st until 160th question, that's for socialism category.	**Rule 10** - From 91st until 100th and 201st until 210th question, that's for suitable workplace category.

	Rule 11
	- From 101st until 110th and 211st until 220th question, that's for curriculum and teaching planning category.

Figure 3.3 Example rules based for student

An algorithm is a procedure for solving a problem in terms of the actions to be executed and the order in which those actions are to be executed. An algorithm is merely the sequence of steps taken to solve a problem. The steps are normally "sequence", "selection", "iteration", and a case-type statement. Therefore, pseudocode is an artificial and informal language that helps programmers develop algorithms. Then, pseudocode is a "text-based" detail (algorithm) design tool. The algorithm of all the rule of Mooney Problem Check List (MPCL) are:

Type of Rule	Pseudocode of Rule

Rule 1	If student's answer the question 1 until 10 and 111 until 120 is greater than 40 or equal to 40
	
	    Print "Your category is Physical and Health"
	else
	    Print " Not in Physical and Health category"

Rule 2	If student's answer the question 11 until 20 and 121 until 130 is greater than 40 or equal to 40
	
	    Print "Your category is Financial"
	else
	    Print " Not in Financial category"

Rule 3	If student's answer the question 21 until 30 and 131 until 140 is greater than 40 or equal to 40
	
	    Print "Your category is Social"
	else
	    Print " Not in Social category"

Rule 4	If student's answer the question 31 until 40 and 141 until 150 is greater than 40 or equal to 40
	
	    Print "Your category is Marriage"
	else
	    Print " Not in Marriage category"

Rule 5	If student's answer the question 41 until 50 and 151 until 160 is greater than 40 or equal to 40
	
	    Print "Your category is Social Psychology"
	else
	    Print " Not in Psychology category"

Rule 6	If student's answer the question 51 until 60 and 161 until 170 is greater than 40 or equal to 40
	
	    Print "Your category is Psychology Problem"
	else
	    Print " Not in Psychology Problem category"

Rule 7	If student's answer the question 61 until 70 and 171 until 180 is greater than 40 or equal to 40
	
	    Print "Your category is Religion"
	else
	    Print " Not in Religion category"

Rule 8	If student's answer the question 71 until 80 and 181 until 190 is greater than 40 or equal to 40
	
	    Print "Your category is Family"
	else
	    Print " Not in Family category"

Rule 9	If student's answer the question 81 until 90 and 191 until 200 is greater than 40 or equal to 40
	
	    Print "Your category is Academic"
	else
	    Print " Not in Academic category"

Rule 10	If student's answer the question 91 until 100 and 201 until 210 is greater than 40 or equal to 40
	
	     Print "Your category is Suitable Workplace"
	 else
	
	     Print " Not in Suitable Workplace category"

Rule 11	If student's answer the question 101 until 110 and 211 until 220 is greater than 40 or equal to 40
	
	     Print "Your category is Curriculum"
	 else
	
	     Print " Not in Curriculum category"

3.4   RESULT & DISCUSSIONS

The Mooney Problem Check List by rule based was implementing to provide a system that can help student Pemulihan 1 (P1) and Pemulihan 2(P2) to study the performance that determine student problem at their own pace. The two techniques that have been applied have several strength and weaknesses. For the rule based decision support system, the rule can easily identify with the origin knowledge representation where the advance usually describes the problem solving procedure with such expression as this "in such-and-such situation, I do so-and-so". These expressions can be represented quite naturally as IF-THEN production rules. The production rules have the uniform IF-THEN structure. Each rule is an independent piece of knowledge. The very syntax of production rules enables them to be self-documented.

CHAPTER 4

IMPLEMENTATION, TESTING AND RESULT DISCUSSION

4.1 INTRODUCTION

This chapter elaborate on the implementation of the design and methodology for this research paper to achieve to its objective. After that, testing is conducted to validate and verify the results obtained. The results obtained from the Mooney Problem Check List (MPCL) system is also stated in this chapter that will be explained and support the objective of this research.

4.2   IMPLEMENTATION OF MOONEY PROBLEM CHECK LIST (MPCL) SYSTEM

Mooney Problem Check List (MPCL) is a [22] system to help student Pemulihan 1(P1) and Pemulihan 2 (P2) and is also useful for increasing counsellor understandings of students and for preparing students for counselling sessions. Moreover, MPCL also classifies to differentiate the category of Pemulihan 1 (P1) and Pemulihan 2 (P2) student from a piece of paper into a system.

CHAPTER 5

CONCLUSION

5.1   INTRODUCTION

This chapter will summarize all the content of this research and discussing the summary of the whole chapter.

Mooney Problem Check List has provided an underground research over the past twenty-seven years. Some of these systems have been display to have a very big impact on educational outcomes in field motivational, including effective motivational rate, increasing learning levels and motivation (Corbett, Koedinger & Anderson, 1997). From the two techniques that we have discussed before, based on the prototype, we can say that each technique has their strengths and weaknesses. Rule based decision support system makes the student P1 and P2 can identify their problem study every semester and identify the problem it before go to the next semester. It is excellent because the student can strengthen their understanding what they have learnt and get in the examination result. Meanwhile, using rule based decision support system, the student will learn quite well about the problem of herself/himself because the MPCL DSS will skip certain problem based on the rule. These techniques also are more economic and not wasting time. For coming works, we recommend doing a system which combines rule based and database. Rule based decision support system uses induction rules to determine whether a new problem should learn further or just in basic. Rule based decision support system performs similarity based matching to find the most same case in case base (Lee, 2007). Besides, the implementing of decision support system by rule based also can use network techniques to identify the student academic result for every semester they have get and provide a better motivation for the coming semester.

The decision support system based on MPCL for the improvement of Pemulihan 1 (P1) and Pemulihan 2 (P2) system has fulfil of this research objective as follows.

   i.   To develop counseling decision support system based on MPCL.

  ii.   To implement Rule Based Decision Support System.

 iii.   To evaluate the system using user feedback and testing.

5.2   RESEARCH CONSTRAINTS

Constraint for this research are:

i.   Limited Time

Time always become our challenges to finish this research because with this many risk at every phase, the step that we take must considered and analyses first, it like the use of decision support in this research that are decision support by Mooney Problem Check List (MPCL) system that make a confusion which system will be real use. Then, to handle this situation we integrate the decision support system to be called decision support by MPCL system.

ii.   Resources

To provide prototype with more functionality usually we need more resources because in this research we just have a few resources and when the problem arise it get us into some situation where we do not know where the suitable place that we can refer. Generally, in this research the use mature software system namely MPCL system become our platform to question and answer if there any problem when this software system has been use or it is new version and not crack that will damage the laptop when running the system.

5.3   FUTURE WORKS

The future work that can be done is to find a new method like use the system or tool that better and good or others to help the counsellor to identify the Pemulihan 1(P1) and Pemulihan 2 (P2) student. The new software system of MPCL system is good and easy software to use during the student answering the questionnaire. Therefore, the software system in this research can be improved by applying powerful mature software system for the Mooney Problem Check List (MPCL).

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APPENDIX

GANTT CHART

Task		Sep				Oct					
		Sep 4	Sep 11	Sep 18	Sep 25	Oct 2	Oct 9	Oct 16	Oct 23	Oct 30	Nov
− Planning research				Planning research							
Planning to find suitable research				Planning to find suitable research							
− Analysis Research Framework						Analysis Research Framework					
Framework of the research						Framework of the research					
Analysis existing method of rule based						Analysis existing method of rule based					
− Design Prototype Development											
System interface											
Database connection designed											
− Implementation development											
Mooney Problem Check List implement into rule based											
− Maintenance the analysis of result											
Analysis result											