

# Identifying Students' Awareness and Difficulties in Acquiring Decision Making Skill for Engineering Technology Education

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**Abstract.** Graduates in technical and technology engineering education are expected to achieve a certain level in decision-making skill. This skill are very important for those in the technical area and also in multi engineering disciplines. However it is difficult to identify students' awareness and difficulties in decision-making skill. Thus, in order to explore students' awareness and the challenges in acquiring decision-making skill, an exploratory study was carried out. Questionnaires were handed out and collected for this study. In addition, students' written solutions in their project report as well as observations made during the monitoring of their work progress were also examined. Data transcriptions were analyzed to gain information students awareness of decision making-skill and the challenges faced. The findings issues of students' awareness and difficulties in acquiring decision-making skills and can be used to determine the development of teaching and learning techniques.

**Keywords:** Decision Making, Difficulties, Awareness.

## 1. Introduction

Decision-making, often viewed as a form of reasoning toward action, has raised the interest of many scholars including philosophers, economists, psychologists and computer scientists for a long time [1]. Decision-making process is a term which means a process of choosing one alternative out of more. This term can be described as a process of looking for some dominant structure, while one alternative is better than the other ones, at least in one attribute; moreover all its disadvantages are eliminated in different ways. From behavioristic point of view, decision-making process is defined as a process which happens in situations where it is possible to choose out of different stimuli and responses [2].

The purpose of this study was to describe technical students' awareness of decision making and the challenges faced in developing decision-making skill in engineering technology learning. This is because our previous experienced has shown that students' do not know how to make a decision in working out the solutions to given problems. Thus in order to understand the students' awareness and challenges in acquiring decision making skill, the exploratory was carried out.

The objectives of this study are to identify students' awareness and difficulties in acquiring decision-making skill for diploma level engineering technology education. This study is part of the major study on enhancing the decision-making skill among technical students. So, to meet the objectives of this study, the following research questions were used as a guide:

- Does are diploma level engineering technology students' aware of decision making skills?
- What are the difficulties students' faced in acquiring decision making?

## 2. Theories on Decision Making

Modern education systems aim to develop the competency to approach problems with responsibility and make the right decision about the solutions [3]. One of the main goals of engineering education is to equip students' with the skills required to succeed in their profession. Students must be trained to be problem

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solvers who are able to apply their knowledge of science and technology to create products or systems that meet human needs [4].

According to Watson (1980) decision-making process should be a major emphasis in any science curriculum and studies to develop strategies helping students decision making are required in science education [5]. Many science educators acknowledged the importance of decision making but little work that has been performed in this area are in limited domain and context [6]. Understanding the usefulness of better decision-making strategies when problem-solving and incorporating them into the curriculum helps improve student achievement [7]. Not only in academic, but also decision-making skill inevitable processes that go on throughout the life of an individual.

Decision-making requires people who have higher order thinking skills to apply value judgments and other knowledge [8]. Decision-making is perceived as a process that has to do with issues, solutions, values, and action taking. As a process, decision making is the making of reasoned choices from among alternative courses of action that concerning a personal or public issues, which require judgements in terms of ones values. Normative decision making models give a logical structure of step-by-step processes which should be undertaken if rational decision making is to take place [9]. In general, practical idea of normative decision making model is a step wise of procedure of identifying the nature of problem, developing criteria, generating and evaluating alternatives, and finally choosing and implementing the best solution. The common themes of the normative decision making model could be concluded as containing six steps as shown in Figure 1.

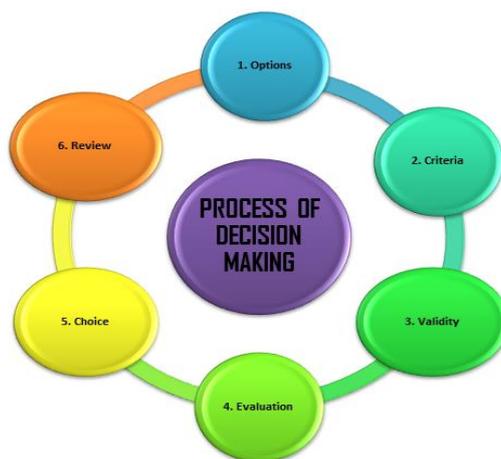


Fig.1: Steps in normative decision making

- Options: List or identify the possible alternative way of action in considering the problem or issues.
- Criteria: Develop or identify suitable criteria to use for comparing these alternative ways of action. The nature of these criteria is left open discussion.
- Validity and Clarify: Clarify the information known about possible alternatives, with particular reference to the criteria identified and to any scientific knowledge or evidence.
- Evaluation or survey: Evaluate the advantages and disadvantages of each alternative against of the criteria identified.
- Choice: Choose an alternative based on the analysis undertaken.
- Review: Evaluate the decision making process undertaken, identifying and possible improvement.

Goal of science education expected students to understand the relationship between science, technology and society [10]. The framework of normative decision making model suggests how to support students to consider the factor of relationship between science, technology and society. Final year project may give chance students to learn the decision- making whether in group or individual. Here, students can develop and enhance their decision-making skill if they are really understand and aware of the usefulness decision-making strategies.

### 3. Findings and Discussion

Qualitative approach was chosen to answer the research question regarding to students awareness of decision making skills and the difficulties faced in acquiring the skills. In qualitative research, the researcher is essentially the instrument for data collection [11]. Questionnaires were handed out and collected for this study. In addition, students' written solutions in their project report as well as observations made during the monitoring of their work progress were also examined.

The respondents were drawn from one of Majlis Amanah Rakyat (MARA) Technical Institutions in Malaysia, with students from year 3 in Diploma Technology Engineering Programme (undergraduate students). The reason for selecting third year students was because they had undergone the final year project and could thus make sharing in terms of their experience in decision making process. Table 1 is the data related to the demography of the participants. The demographic factors include gender, age and the education history that is the academic qualification upon entrance to the MARA Technical Higher College.

Table 1. The Demography of the sample

PARAMETER	SUB		TOTAL
Gender	Male	Female	40 Samples
	35	5	
Age (Year)	18 - 21	22 - 25	
	37	3	
Previous Education	SPM	Others	
	34	6	

To answer the research questions, students needed to answer the question in section A. Each of the question designed with “YES” or “NO” answer. The questionnaires in this study are adapted from consumer awareness questionnaires with modification to ensure it related with decision making process because as people make decision, they participate in different types of decision making behavior. Consumers may apply effort and time in making their decisions, but this will vary according to the individual and the current environment. Therefore this section is basically to explore their emotional awareness toward decision making process as shown in Figure 2(A). Data gathered indicate 82% of respondents are not aware of decision-making skill meanwhile 18 % respondents indicate they are aware of decision-making skill. The summary result as shown in Figure 3.

- **A. Circle the answer for the awareness question below:**

1. Do you use try and error method when make a decision? a.yes b.no
2. Have you learnt the sytematic startegies in decision making? a.yes b.no
3. Do you make a quick or "on the spot" decisions to solve the problem? a.yes b.no
4. Do you analyse all the solution before make a solution or decision? a.yes b.no
5. Are you aware of the decision making strategies? a.yes b.no

- **B. List the difficulties you identify during your Final Year Project:**

- 1.....
- 2.....
- 3.....

Fig. 2: Sample of students questionnaires

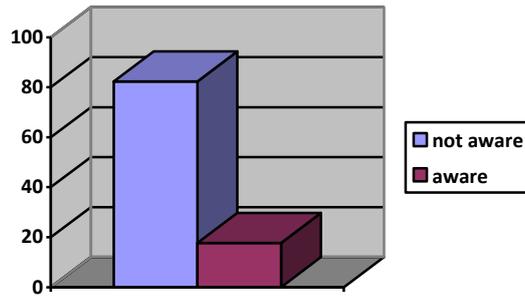


Fig. 3: Results of student awareness in decision-making

Furthermore, the students were asked to list their difficulties while acquiring the decision making during their project in section B as shown in Figure 2(B). The designed survey for students' comprises an open ended questionnaire. Moreover most of the difficulties mentioned by students were related to skills. Students indicate most of them lack of practical skills and practice, no information skills and less of communication skills. Teaching and learning approach used was more on theoretical rather than practical. Many students mentioned they are not confidence to make a decision and also less of cooperation from team members as well as no supporting and encouragement. These factor will influence their decision making skills because most of the time the group members will arguing to defining the objective and concept of their project. Additionally, students also not exposed to the systematic procedure and systematic strategy in decision making process and also lack of industrial sector exposure.

Another difficulty reported by students was unavailability of resources where there is no internet connectivity at their residential college, unstable internet connection in academic campus, inadequate learning instrument, software, hardware and also some of the equipment still under maintenance. Thus, most students had to find the alternative solution such as go to cyber cafe outside the campus. Some students talked about heuristic factor. They tend to decide according to past experience. This factor actually did not help them to be skillful or confidence in making decision on project or problems that they have to solved. The summary of the difficulties in acquiring decision making skills are shown in Figure 4.

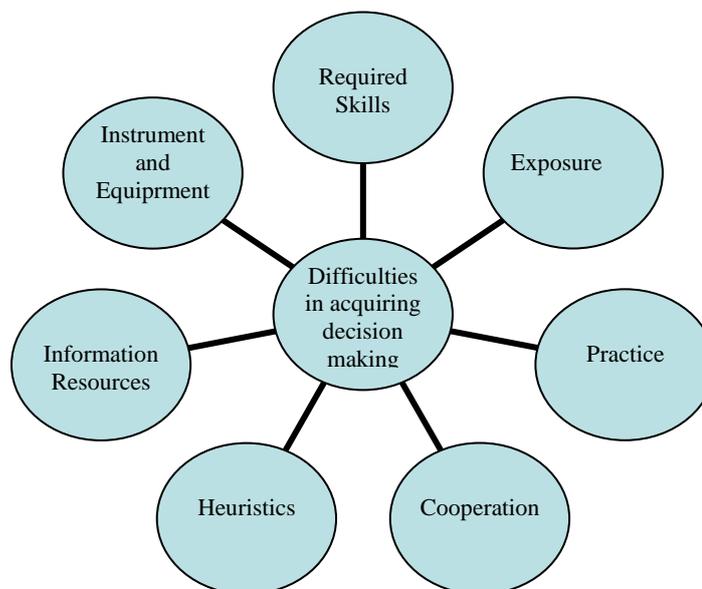


Fig. 4: Interrelations difficulties in acquiring decision making skills

#### 4. Conclusion

By identifying students' awareness and difficulties in decision making skills, it can be used to determine the development of teaching and learning techniques. It can be concluded that decision making module need to be embedded in students learning curriculum to enhance students' decision making skills.

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