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**SYSTEMS-THINKING SKILLS  
EXHIBITED BY UiTM SARAWAK DIPLOMA STUDENTS  
IN SOLVING PROBLEMS**



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## TABLE OF CONTENTS

<b>CONTENTS</b>	<b>PAGE</b>
Title Page	i
Letter of Submission	ii
Research Group	iii
Acknowledgements	iv
Table of Contents	v
List of Tables	viii
List of Figures	x
Abstract	xi
<b>CHAPTER 1 INTRODUCTION</b>	<b>1</b>
1.0 Background of the Study	1
1.1 Problem Statement	6
1.2 Objectives of Study	7
1.3 Significance of Study	8
1.3.1 To UiTM Sarawak	8
1.3.2 To the Students of UiTM Sarawak	8
1.3.3 To the Researchers	8
1.4 Scope of Study	9
1.5 Definition of Terms	10
<b>CHAPTER 2 LITERATURE REVIEW</b>	<b>12</b>
2.0 Introduction	12
2.1 Education System	12
2.2 Problem Solving	15
2.3 System and Systems Approach	19
2.4 Systems Thinking	22
2.5 The Seven Essential Skills of Systems Thinking	26
2.6 Development of the Framework for Measuring Problem-solving Skills	29
2.7 Development of Framework for Measuring Systems-thinking Skills	30
2.8 Systems Thinking and Problem Solving	32
<b>CHAPTER 3 RESEARCH METHODOLOGY</b>	<b>37</b>
3.0 Introduction	37
3.1 Research Design	37

## Abstract

This study examines the conceptual and theoretical basis for developing a framework to measure systems-thinking skills and subsequently designs scoring rubrics to measure the performance level of the respondents' problem solving and systems thinking. It is hypothesized that systems thinking can play a leading role by facilitating the attainment of important problem-solving skills. As part of the initial effort to determine if there is any basis for saying so, this exploratory study seeks to investigate whether an association exists between problem-solving and systems-thinking skills. It employed the survey methodology to gather data through a paper-and-pencil test and questionnaire. Four performance tasks were constructed to measure these skills. Following that, two scoring rubrics were created based on two pre-determined frameworks. Findings indicated that the general population performed poorly for problem solving and systems thinking. The mean score for systems thinking was even lower than that of problem solving. These skills were also analyzed according to three selected demographic characteristics. It was found that problem solving was not affected by gender and *Gugusan* whereas CGPA did show dependency. On the other hand, systems-thinking skills show no dependency with respect to gender but was found to be dependent upon *Gugusan* and CGPA. Interestingly enough, the data indicated that there was a linearly strong and positive association between problem solving and systems thinking. Another finding worth noticing was the hierarchy of these systems-thinking skills ranked according to their mean scores. Respondents scored rather lowly in the higher-level skills like forest, operational and closed-loop skills as compared to that of the lower-levels skills such as dynamic and system-as-cause skills. The data revealed that respondents found closed-loop skill to be particularly difficult. The limitations of this study were also discussed. The findings have implications of great importance in this field of study. The applications of the results are many but await more focused studies for some of the outstanding issues to be addressed. The report ended with some general recommendations for future research.

# CHAPTER ONE

## INTRODUCTION

### 1.0 Background of the Study

The education system throughout the world in the last decade has come under intense scrutiny for its failures to produce more acceptable outcomes commensurate with the billions of dollars that has been expended (Reily, 2000; Senge, 1998; Finn & Ravitch, 1996; Forrester, 1994; Morrison, 1991). The growing calls by corporate, economic, social, political, and international organizations for a far more effective educational process must not be ignored.

We have formulated an education system that was much suited to the industrial age. Today's needs in producing a workforce who can deal with great uncertainties and complexities argues for an about turn in its approach to the handling of old and new issues. Consequently attention ought to focus on a totally different paradigm that seeks understanding through seeing the interrelatedness of the different components in our education system and its emergent properties resulting from the interactions of its part while at the same time not forgetting the dynamic nature of the system that by itself continuously changed and evolved. (Sweeney & Sterman, 2000; Reily, 2000; Senge, 1998; Richmond, 1993; Forrester, 1990).

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.0 Introduction**

In this chapter, we review the literature on the possibility of systems thinking as a learning paradigm to enhance problem-solving skills in our education system. It is true to a great extent that organization managed by a team of systemic people would be able to survive and function well in a dynamic world at a time like now (Maani & Cavana, 2000).

#### **2.1 Education System**

As mentioned in the previous chapter, many have lamented the disappointing outcome of education system which does not seem to justify the immense financial investment committed to it. Expenditures spent have not brought significant quality learning outcome (Reily, 2000). The growing calls by both public and private sectors for a far more effective educational process must not be ignored (Flood, 1999).

This call echoes the rapid change in our society which will address our education needs as well. The main reason for the change in our education needs is that our current education system is actually suited to the industrial age purpose of sorting