Learning Style Inventory System:

A Study on Improving Programming Language Subject

By

Aritha Shadila Binti Sharuddin

Dissertation submitted in partial fulfillment of

the requirement for the

BACHELOR OF TECHNOLOGY (Hons)

(INFORMATION SYSTEM)

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Universiti Teknologi PETRONAS

Bandar Seri Iskandar

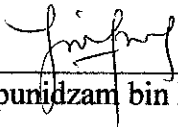31750 Tronoh

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CERTIFICATION OF APPROVAL

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Approved by,

_____

(Mr. Saipunidzam bin Mahamad)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

November, 2004

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or person.

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ARITHA SHADILA BINTI SHARUDDIN

ABSTRACT

Learning Style Inventory System is developed to computerize Learning Style Model which indicates the learning style of each person through a set of question. Concurrently, the system will analyze the result and give recommendation to fit one learning style towards learning a programming subject. The output of the system will help students be more responsible of their studies, thus doing well with all their curricular activities as well as co-curricular activities. The main objective of this project is to study various style of learning and come up with a good solution to improve learning skill in order to increases UTP student's quality of examination result focusing in programming subject. The development of the project consists of five main phases which are Planning, Analysis, Design, Development and Implementation. Development phase is divided into two main parts. The first part is system development while the second part is system integration. For the data collection, a survey is conducted through a distribution of questionnaire to get student's feedback, reviewing articles and research done by some intellectual. With this, the author would like to conclude that this project meets its objective and will spread the awareness of Learning Style Preferences among UTP student and concurrently guide students to excel in programming subject.

ACKNOWLEDGEMENT

I would like to express my appreciation to the people who have contributed to the success of my final year project. First, I would like to give my utmost gratitude to the lord almighty that has given me the strength, wisdom, patience and opportunity to complete this project on time.

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SPECIFIC DEFINITION AND ABREVIATIONS

1	FYP	Final Year Project
2	IT	Information Technology
3	LSIS	Learning Style Inventory System
4	MBTI	Myers Briggs Type Indicator
5	MI	Multiple Intelligence
6	UTP	Universiti Teknologi PETRONAS
7	VAK	Vision, Auditory and Kinesthetic
8	VB	Visual Basic

CHAPTER 1

INTRODUCTION

1.1 Background of Study

The main concern of this project is to deliver a system which adapts, learning style models (David A. Kolb [2]). This system will provide a set of simple question about student's preferences on learning and students are required to complete the test. Then, the system will analyze all the answers and come up with one specific learning style that most suitable a student's personality. The system also will encourage and gives recommendation to change one's personal learning style to cope up with programming language subject. This system is crucial to help UTP freshies as these new student will facing transition period from secondary school student to a university student. Once students are actively engaged in their own learning process they begin to feel empowered and their personal achievement and self-direction levels rise. Indirectly, this system will help them on gaining good results in the future namely programming language subject.

1.2 Problem Statement

Currently, UTP students never practice learning style preferences and some never heard about it. Problem may occur later in their life as university student because as one climbing the senior years, one will have difficulties to cope up with all commitment such as attending classes, laboratory, tutorial with all project work, assignments, tests as well as quizzes. Some may lose control and can't maintain good results in each semester. The most obvious subject that facing the highest failure rate is programming language subject. There is a need of this system to improve the student's result of this particular subject. With the implementation of this system in their early years of studying, they will know their learning style and this style will guide them on how to capture their studies and at the same time going parallel with extra curricular activities such as sports and games.

Time constrains would be the next problem for students and lecturers to conduct such learning style workshop and counseling. Lecturers and students already burdened with so many obligations, and practically the idea to attend and conducting such workshop is not a good one. This system will come in handy as the student can take the test without any supervision of lecturers at their own sweet time. From that, students can adapt with the best way of their learning style with the guidance of the Learning Style Inventory System.

The need for this Learning Style Inventory System is to guide both students and lecturers. Students will appreciate this system as it helps with their study while the lecturers will appreciate this system as it helps them on reaching their student's the best way on lectures with the most percentile of student's learning style preferences.

1.3 Objective and Scope of Study

1.3.1 Objective

The objectives of this project are as follow:

- To study Learning Style Model (Kolb [2]) and analyze the most suitable learning style which fits a student's personality.

- To embed the strategies of moving between two continuum approach in developing new learning style preferences focusing on language programming subject.

- To develop a functional Learning Style Inventory System prototype.

1.3.2 Scope of Study

This project will involve the production of a system to represent the original learning style models, a model built by Professor David A. Kolb. It focuses on delivering the exact model which describes the way a person learns and deals with ideas and day-to-day situation in life. Based on the research identified, here are the project scopes which are as follows:

- Research based on learning style models which will be adapted in the system – to indicate original learning style type of a person

- Research based on the strategies of changing one's learning style from the original learning style by suggesting ways of moving between two continuums.

- Determined and designed main elements of the system – interface design, data structure design as well as system design modeling

- Develop a prototype system – provide a test, analyze the test's answers and give the learning style result. The system also captured the personal information and the result into a database for analyzing purposes.

- Implement the system and deliver the final product.

CHAPTER 2

LITERATURE REVIEW

The objective of this project is to develop a Learning Style Inventory System based on learning style models (David A. Kolb [1]). The author focuses on developing a functional system which provide set of question and analyze the answer to get the exact result as well as capture the data and stored in the database. In the design of this system, the concept of human-computer interaction will be studied and addressed.

A key to getting and keeping students actively involved in learning lies in understanding learning style preferences, which can positively or negatively influence a student's performance (Hartman [3]). It has also been shown that adjusting teaching materials to meet the needs of a variety of learning styles benefits all students (Kramer-Koehler, Tooney & Beke [4]).

2.1 Learning Style Model

Kolb's learning styles model [2] is based on two lines of axis, human approach to a task (preferring to do or watch), and human emotional response (preferring to think or feel), refer Figure 1. The east-west axis is called the Processing Continuum, and the north-south axis is called the Perception Continuum. The theory sets out these four preferences, which are also possible different learning methods:

- Doing – active experimentation
- Watching – reflective observation
- Feeling – concrete experience
- thinking – abstract conceptualization
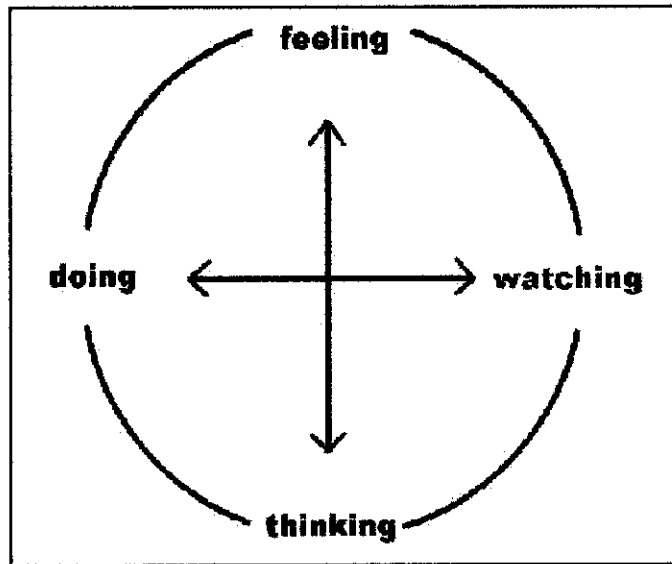
Figure 2.1: Incomplete Learning Style Model – two continuums

Knowing a person's learning style enables learning to be orientated according to the preferred method, refer figure 2. That said, everyone responds to and needs the stimulus of all types of learning style. It's a matter of using emphasis that fits best with a person's learning style preferences:

- Activist (dynamic learners) – hands-on, relies on intuition rather than logic, uses other people's analysis, and likes practical, experiential approach.

- Reflector (innovative learners) – able to look at things from different perspectives, sensitive, prefers to watch rather than do it, gathers information and uses imagination to solve problems.

- Theorist (analytic learners) – concise, logical approach, ideas and concepts are more important than people, requires good clear explanation rather than practical opportunity.

- Pragmatist (common sense learner) – can solve problems and will use learning to apply to finding solutions to practical issues, prefers technical tasks, less concerned with people and interpersonal aspects.

feeling

activist   reflector

doing ←——————→ watching

pragmatist   theorist

thinking
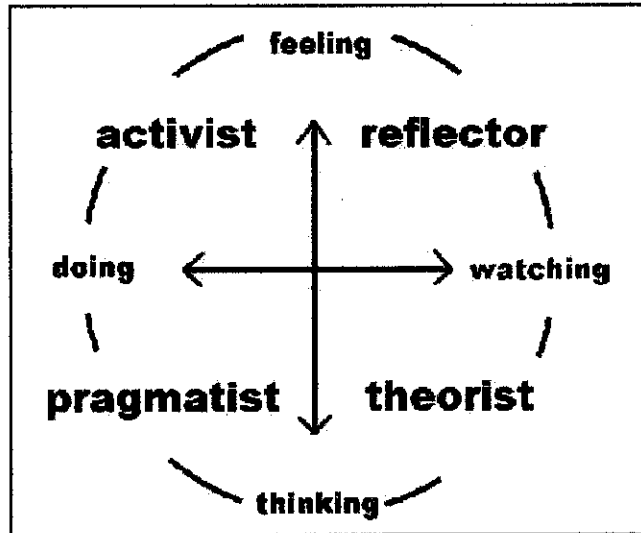
Figure 2.2: Complete Learning Style Model

To capture a person's learning style, Kolb have built a set of survey question which consist of 12 questions with a choice of four endings. The survey can be view in Appendix A. After all the calculation has been done, the next step would be referring to the Learning Style – Type Grid, Appendix B. The brief description of each learning style type is shown in Appendix C.

2.2 Experiental Learning Cycle

Kolb's also did represent his Experiential Learning Circle [6], refer figure 3. He argues that the learning cycle can begin at any one of the four points - and that it should really be approached as a continuous spiral. However, it is suggested that the learning process often begins with a person carrying out a particular action and then seeing the effect of the action in this situation. Roger Fry [7] agrees with Kolb and indicates that the process continues with the second step, which is to understand these effects in the particular instance so that if the same action was taken in the same circumstances it would be possible to anticipate what would follow from the action. In this pattern the third step would understand the general principle under which the particular instance falls.
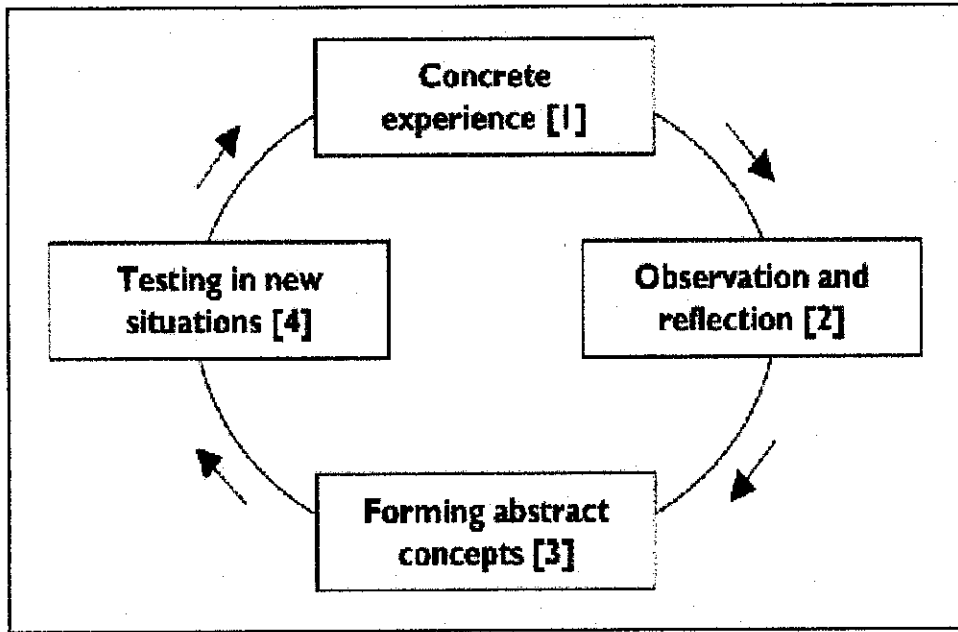
Figure 2.3: Experiential Learning Cycle

2.3 Other Learning Style

Throughout the project, the author came across several learning style that are done scholars from various country. Each model has their own weaknesses and strengths. According to Schroeder [5], the typical student learning style profile is changing on campuses today and there is a much greater variation in the range of learning style preferences to be considered. Therefore it would be wise to understand what learning style preferences are, and how to address them when preparing instructional materials for adults. Therefore, it is not enough to only know the Kolb's model, instead the knowledge of other model is important as well.

2.3.1 Multiple Intelligence

Multiple Intelligence (MI) theory (David Lazear [2]) states that there are at least seven different ways of learning anything. These intelligences are group as body/kinesthetic, interpersonal, intrapersonal, logical/mathematical, musical/rhythmic, verbal/linguistic and visual/spatial. However, in education, it is more emphasize two of the ways of learning which are logical/mathematical and verbal/linguistic. In addition most all people have the ability to develop skills in each of the intelligences, and to learn through them. These seven intelligences are described as below:

- Body/kinesthetic – This intelligence is related to physical movement and the wisdom of the body including the brain's motor cortex, which control bodily motion. Body/kinesthetic intelligence is awakened through physical movement such as in various sports, dance, physical exercises as well as by the expression of oneself through the body, such as inventing, drama, body language, and interpretive dance.

- Interpersonal – This intelligence operates primarily through person-to-person relationships and communication. Interpersonal intelligence is activated by person-to-person encounters in which such things as effective communication, working together with others for a common goal, and noticing distinctions among persons are necessary and important.

- Intrapersonal – This intelligence relates to inner states of being, self-reflection, metacognition and awareness of spiritual realities. Intra-personal intelligence is awakened when we are in situations that cause introspection and require knowledge of the internal aspects of the self, such as awareness of our feelings, thinking processes, self-reflection, and spirituality.

- Logical/mathematical – This intelligence is called scientific thinking and deals with inductive and deductive thinking/reasoning, numbers, and the recognition of abstract patterns. Logical mathematical intelligence is activated in situations requiring problem solving or meeting a new challenge as well as situations requiring pattern discernment and recognition.

- Musical/rhythmic – This intelligence is based on the recognition of tonal patterns, including various environmental sounds and on sensitivity to rhythm and beats. Musical/rhythmic intelligence is turned on by the resonance or vibrational effect of music and rhythm on the brain, including such things as the human voice, sounds from nature, musical instruments, percussion instruments, and other humanly produced sounds.

- Verbal/linguistic – This intelligence, which is related to words and language both written and spoken, dominates most Western educational systems. Verbal linguistic intelligence is awakened by the spoken word, by reading someone's ideas thoughts, poetry, writing ideas, as well as by various kinds of humor such as jokes and twisted language.

- Visual/spatial – This intelligence, which relies on the sense of sight and being able to visualize an object, includes the ability to create internal mental images/pictures. Visual/spatial intelligence is triggered by presenting the mind with creating unusual, delightful, colorful designs, patterns, shapes, pictures, and engaging in active imagination through such things as visualization guided imagery, and pretending exercises.

According to this theory, not only do all individuals possess numerous mental representations and intellectual languages, but individuals also differ from one another in the forms of these representations, their relative strengths, and the ways in which these representations can be changed.

2.3.2 VAK Learning Style

The VAK learning Style (Dawna Markova [8]) uses the three main sensory receivers which are Vision, Auditory, and Kinesthetic (V-A-K) to determine the most dominate learning style. Learners use all three to receive information. However, one or more of these receiving styles is normally dominant. This dominant style defines the best way for a person to learn new information by filtering what is to be learned. This style may not always to be the same for some tasks. The learner may prefer one style of learning for one task, and a combination of others for another task. From this model, there are six type of learning styles as describe below

- Show and Tellers (V-A-K) – Natural persuaders who learn best through reading and light up when telling stories. Good students who shy away from sports.
- Feelers (V-K-A) – Empathetic children who learn best by doing what they are shown and asking endless questions. Generally prefer working in groups.
- Leaders of the Pack (A-K-V) – Natural powerhouses who learn by teaching others. Though they have extensive speaking vocabularies, they tend to have difficulty learning to read and write.
- Verbal gymnasts (A-V-K) – Effective and articulate communicators whose words pour out in logical order. They love facts, history and ideas of all kinds, and have to talk to understand. Sports may be difficult.
- Wandering wonderers (K-V-A) – Quiet Einstein who learns best in solitude. Can learn physical tasks easily without verbal instruction. Can become overwhelmed by listening.
- Movers and groovers (K-A-V) – Athletes who need to be allowed to use their bodies in order to learn, often labeled hyperactive. Reading and writing may be very difficult.

2.3.2 Carl Jung and Myers Briggs Type Indicator (MBTI)

The MBTI (Carl Jung and Myers Briggs [9]) can be an aid in understanding the individual differences. This is why it is more complicated than the other models. It is more towards personality model rather than learning model. However, personality does play an important role in determining learning style. This model consists of four series which each have two different attitudes as describe below.

- Extroversion versus Introversion – This indicates whether a learner prefers to direct attention towards the external world of people and things or toward the internal world of concepts and ideas. This preference tells us from where people get their energy.

- Sensing versus Intuition – This indicates whether a learner prefers to perceive the world by directly observing the surrounding reality or through impressions and imagining possibilities.

- Thinking versus Feeling – This indicates how the learner makes decisions, either through logic or by using fairness and human values.

- Judging versus Perceptive – This indicates how the learner views the world, either as a structured and planned environment or as a spontaneous environment.

The MBTI model would have two dimensions, height and width, similar to Kolb's and other models, but it have a third dimension which is depth. Extroversion/Introversion would be on the horizontal axis, while Feeling/Thinking would be on the vertical axis. The depth (third dimension) of Extroversion/Introversion would be Judging/Perceptive while the depth (third dimension) of Feeling/Thinking would be Sensing/Intuition. This is represented by the model below.

Due to lack of knowledge, a student usually can't move along the two continuums. However Richard M. Felder and Barbara A. Solomon [11] have done their research to help students by giving some strategies so that they can move between active experimentation – reflective observation and concrete experience – abstract conceptualization.

- **How can active experimentation learners help themselves?** – If an active learner stuck with little or no class discussion or problem-solving activities, try to compensate these lacks by studying in groups where members takes turns explaining different topics to each others. Group discussion or questioning and answering question sessions will retain the information better for active learners.

- **How can reflective observation learners help themselves?** – If a reflective learner stuck with little or no class time for thinking about new information, try to compensate by write short summaries of readings or class notes in your own words. Doing so may take extra time but will enable to retain the material more effectively. Stop reading or memorizing the material.

- **How can abstract conceptualization learners help themselves?** – If conceptual learner happens to be in class that deals with memorization and substitution formula, he will face boredom. Do ask instructor for interpretation or theories that links the facts or try finding the connection itself. Be patient with details.

- **How can concrete experience learners help themselves?** – If experience learner happens to be in a class where most of the material is abstract and theoretical, he will face difficulties. Do ask instructor fro specific example of concept and procedure and find out how the concepts apply in practice. If instructor does not provide enough specifics, try to find some course text or other references or by brainstorming with friends or classmates

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CHAPTER 3
METHODOLOGY

3.1 Procedure Identification

Each project needs a methodology in order to develop it systematically so that the final product is not a failure. Methodology of a project is an important area to be considered as it shows every step taken undergoing overall research and project work.

The author decided to apply a methodology which consists of several phases to accomplish the project right on time. This model is built and revises to suit the development of LSIS project itself. This model provides sequential approach of software development which consists of five main phases which are planning phase, analysis phase, design phase, development phase and implementation phase.

Referring to the methodology that has been chosen earlier, the author has created the project timeline to ensure that all tasks complete systematically within the timeframe. The project timeline and planned milestone can be view as in Appendix A.

Planning Phase
▪ Proposal Submission ▪ Project Scheduling

↓

Analysis Phase
▪ Data Gathering ▪ Data Analysis ▪ Requirement Specification

↓

Design Phase
▪ Interface Design ▪ Data Structure Design ▪ System Design Modeling

↓

Development Phase	
Phase 1	**Phase 2**
▪ Interface Development ▪ System Development ▪ Database Development	▪ System Integration

↓

Implementation Phase
▪ System Implementation ▪ System Delivery

Figure 3.1: Project Framework

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3.1.1 Planning Phase

- Proposal Submission – the author submit the project proposal and getting the approval topic from FYP committee
- Project Scheduling – the author schedule the whole project timeline to ensure that the project will finish without any delay

3.1.2 Analysis Phase

- Data Gathering – the author collect and gathered various data to attain information which supports the project and the researched sustaining documents
- Data Analysis – the author analyze and segregate collected information as only partial information are important to aid the design and development phase
- Requirement Specification – the author analyzes and selects the right tools in developing the system. It is divided into two main components which are software and hardware.

3.1.3 Design Phase

- Interface Design – the author involve in designing the system's interface to ease end user and at the same time cater functional, non-functional specification.
- Data Structure Design – the author design relational scheme, to store captured data such as personal information and result from the system
- System Design Modelling – the author starts designing various level of form for ease of system navigation flow

3.1.4 Development Phase

- Interface Development – the author develop the system's interface to fulfill the specification and meanwhile keep the integrity of user friendly criteria

- System Development – the author involve in developing the coding behind the form of VB application in order to make the system functioning

- Database Development – the author developing the system database and capturing the field in the form and swap it into the databases

- System Integration – the author involves in integrating all the system's component and tests it to ensure the compatibility and overall system performance.

3.1.5 Implementation Phase

- System Implementation – the author will implement the integrated system at the real platform to prepare the system before the usage of end-users

- System Delivery – the author will deliver the integrated system to the end-user and collecting feedback as well as evaluating the system performance.

3.2 Tools and Equipment

Tools and equipment are important to ensure development of the system. With the correct tools used, development process will be much easier. Tools are all the software that used throughout the development process while equipments are the hardware specification of the computer for the development of LSIS.

3.2.1 Hardware

Table 3.1: List of Hardware Specification

Device	Requirement
Operating System	Microsoft Windows XP, Home Edition
Processor	Pentium 4, 2.60 GHz
Disk Space	20 GB
Memory	240 MB of RAM
CD-ROM drive	56X speed
Sound	Crystal WDM Audio
Other peripheral	Mouse, Printer, Keyboard, External CDRW writer

3.2.2 Software

Table 3.2: List of Software Specification

Software	Description
Microsoft Visual Basic 6.0	A powerful software which used to create windows application and provides graphical user interface. It cater both object oriented programming as well as event driven programming. The program emphasize on the objects included in the interface and the events that occur on those objects
Microsoft Access	A reliable application which have the ability to build databases and capable of integrating very well with Microsoft Visual Basic 6.0 and other Microsoft product. The application is very user-friendly and suitable to be used by beginner.

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CHAPTER 4
RESULT AND DISCUSSION

4.1 Introduction

The author is responsible to develop a system called Learning Style Inventory System which will be used for UTP students especially on their early years of studying. The system is basically the automation of Learning Style Model done by Professor David A. Kolb. During the analysis phase of this project, the author involved in various stages such as data gathering and data analysis. The main objectives of distributing the questionnaires together with the survey form are as follow:

- To capture the information regarding the knowledge of their own learning style preferences
- To identify students history of learning and their personal view towards programming subject.
- To determine the type of learning style for each respondents.

4.1.2 Data Gathering

The author is responsible to do a set of questionnaire in order to capture the information needed for analysis phase. The questionnaire can be view as in Appendix F. The questionnaire has been distributed to two areas of study which are students of Foundation Year of UTP and students of First Year students for 4-year Degree Program in UTP as well. The summary of Data Gathering Activity can be refer at Table 4.1.

Table 4.1: Summary of Data Gathering Activity

Description	4-year Degree Program, UTP	Foundation Program, UTP
Number of Respondents	48 persons	58 persons
Class	Business Statistic	Business Management
Lecturer Involved	Puan Haslida Abu Hassan	Mr. Azhan Hasan
Date	17th August 2004	11th August 2004
Time	2.30 pm – 3.00 pm	3.30 pm – 4.00 pm
Venue	Seminar Room, Block 21	Lecture Room 6

4.1.2 Data Analysis

From the questionnaire, the author collects raw information and then analyzes it. The objective of this analysis is to capture the awareness of the student towards the existence of Learning Style Preferences. Figure 4.1, as shown below is the result of the analysis drawn from the answers in the questionnaires which indicates if the respondents have the knowledge of this particular Learning Style Model.
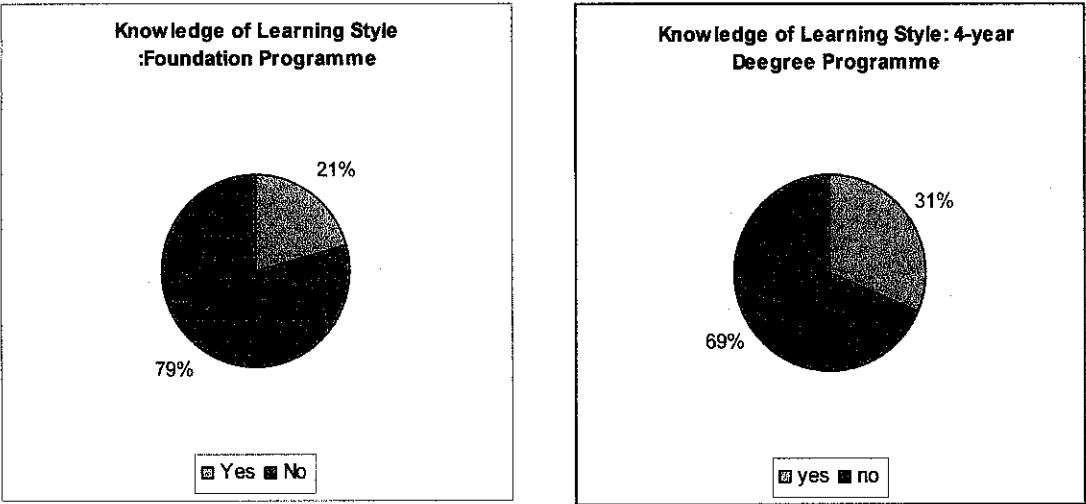
Figure 4.1: Knowledge of Learning Style Preferences

The answers from the questionnaires also successfully indicate whether the respondents know their own learning style type which can be view as illustrate in Figure 4.2. The purpose of this analysis is to know the awareness of the students upon their own self learning style type.

For the foundation program, 25 respondents say that they have no idea about their learning style type while 33 respondents say that they know about it. From the 33 respondent, only 6 respondents have the correct learning style after evaluating the completed survey form which indicates only 10% from 58 respondents.

For the first year students for 4-year degree program, 24 respondents say that they have no idea about their learning style type while 24 respondents say that they know about it. From the 24 respondent, only 8 respondents have the correct learning style after evaluating the completed survey form which indicates only 17% from 48 respondents.
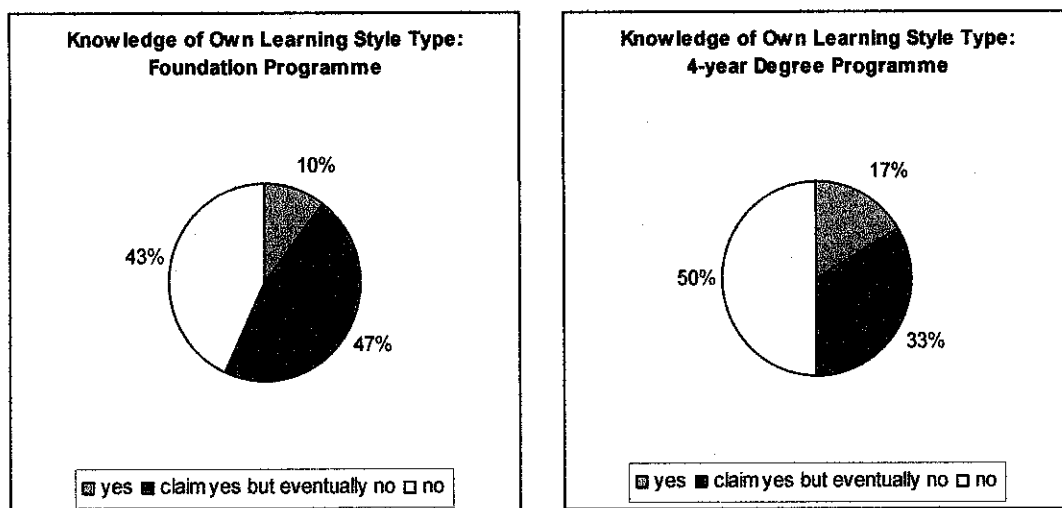
Figure 4.2: Knowledge of Own Learning Style Type

The survey form/test that has been answered by all respondents to indicate their own learning style type can be view as Appendix E. The objective of this analysis is to collect the quantity of each type of learners in order to represent the percentage of UTP student as a whole. Through the analysis, then UTP lecturers can think of the most suitable way of delivering lectures to suit the most percentage of student type. Figure 4.3 below illustrate the result of the survey, which are the numbers of person for each learning style type, consist of four categories – dynamic, innovative, analytic and common sense learner for both samples. For further understanding of each type and its description, please refer to Appendix C and Appendix D.
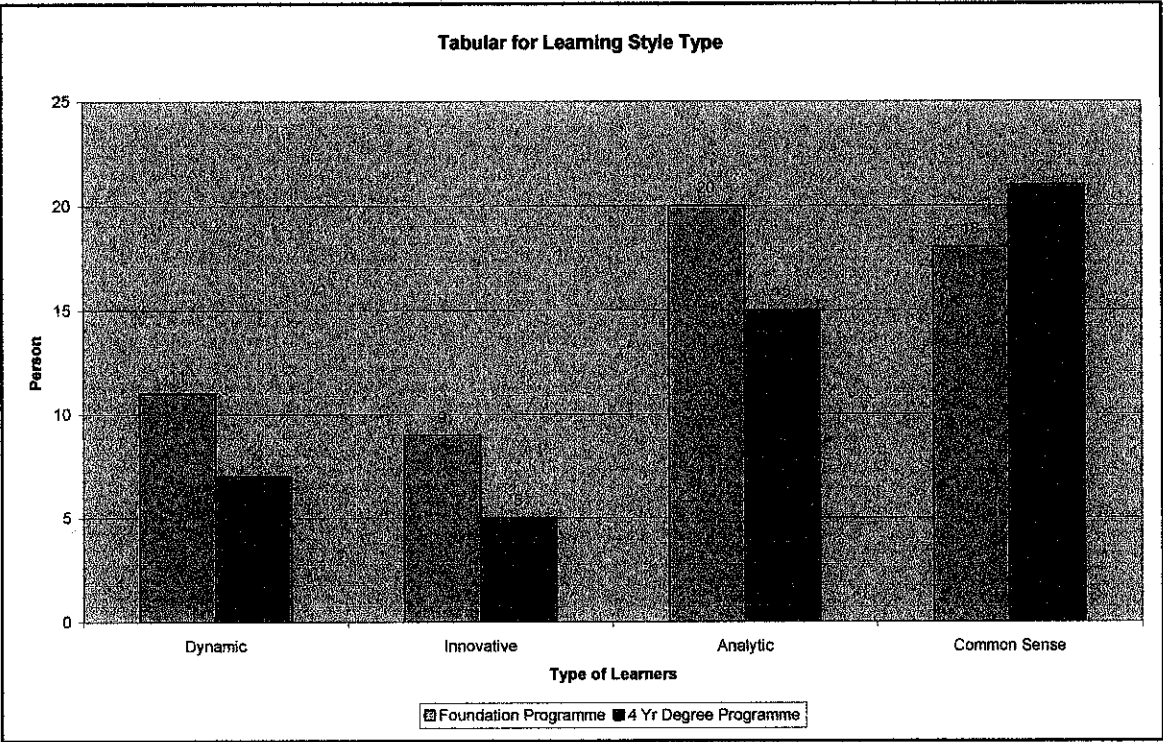
Figure 4.3: Tabular for Learning Style Type

Through further analysis of the questionnaires as well, the author generates a statistic as shown in Table 4.2. The objective of this analysis is to determine the mentality state of student's likeness towards programming language subject. From the statistic, it clearly shows that 90 respondents like programming subject which take up almost 85% of all respondents compare to respondents which dislike programming subject. This is good news because lecturer will be at ease on tackling students as most students have positive attitude towards programming subject.

Table 4.2: Statistic on Likeness towards Programming Subject

Likeness	A	A-	B+	B	C+	C	D+	D	F	taking	TOTAL
Yes	14	7	8	7	3	3				48	90
No	2	1		2	2	1				8	16

The questionnaires also captured other valuable information which is clearly shown, in Table 4.3. The purpose of this analysis is to determine the level of difficulties that being face by the respondents while learning programming subject. Evaluation from the statistic shows that up to 56% (59 respondents) think that learning a programming subject is challenging. This means that student have to struggle more and study hard to ensure that they excel the programming subject.

Table 4.3: Statistic on Level of Difficulties to Learn Programming Subject

Level	A	A-	B+	B	C+	C	D+	D	F	taking	TOTAL
Very easy	2									2	**4**
Easy	1	2								3	**6**
Medium	6	4	1	2	1	3				16	**33**
Challenging	5	2	7	7	4	1				33	**59**
Hard	2									2	**4**

Greater understanding and evaluation towards the questionnaire produces the statistic as shown in Table 4.4 and Table 4.5. The objective of this analysis is to capture the number of student who already learned programming language before taking a programming course in UTP. Referring table 4.4, only 24% (25 respondents) have learned programming subject before entering UTP. It also clearly shows that the experience of learning a programming language before entering UTP is not important matter at all. This is because student without basic knowledge of programming also scored quite well in examinations. However, the advantage of having experience is useful during early stage of a course as they already understand the basic compared to those inexperienced who have to work harder. Table 4.5 shows the dispersion of learning method before entering UTP and the most famous method is attending professional class or tuition.

Table 4.4: Statistic on Experience of Learning Programming Language

Study	A	A–	B+	B	C+	C	D+	D	F	taking	TOTAL
Yes	8			2	1					14	**25**
No	8	8	8	7	4	4				42	**81**

Table 4.5: Statistic on Learning Method of Programming Language

SPM Subject	Professional Class/Tuition	Self-Study	TOTAL
4	14	7	25

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4.2 System Design

The Learning Style Inventory System (LSIS) is a standalone program that is being developed using Microsoft Visual Basic 6.0. This LSIS consists of several forms which indicate different levels of navigation. All forms used the same background color and navigation style in order to maintain its consistency.

4.2.1   System Flow

The overall system flow is represented in the Appendix B. The flowchart showed the systematically flow and functionality of each form together with its predecessors as well as its apprentice. The most crucial phase in this flow is the completion of survey form/ test as this form result have to be calculated to determine a person learning style type, hence impact the recommendation towards learning programming language subject

4.2.2   System Functionality

The system is developed with the functionality to meets its objective. The system functionality is listed below:

- To provide a test which will be answered by students/ users
- To calculate and analyze the test answers and produce result of the person learning style type ,together with the type description
- To give recommendation to change a person's original learning type to suit on learning programming language.

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4.2.3 System Prototype

LSIS prototype is a functional system that automates Learning Style Model. The purposes of this system are to help students discover their Learning Style Type and manipulate it, in order to increase their ability of learning through personal learning preferences. Apart from that, the system also will give recommendation towards each type of learners to maximize the skills upon studying programming subject in particular.

As for interface design on the prototype, the author sticks to with the same background and navigation style in order to maintain the system continuity and consistency. The author also used the combination of grey, white, black and dark blue color to get the formal look towards the system output. Figure 4.4, as shown below is one of the screen shots for the system output. Please refer to Appendix G to view all the screen shot of the user interface for Learning Style Inventory System (LSIS) together with its brief description of each. For clearer view and further understanding of the system, user can start using LSIS prototype as user manual is provided in Appendix H.
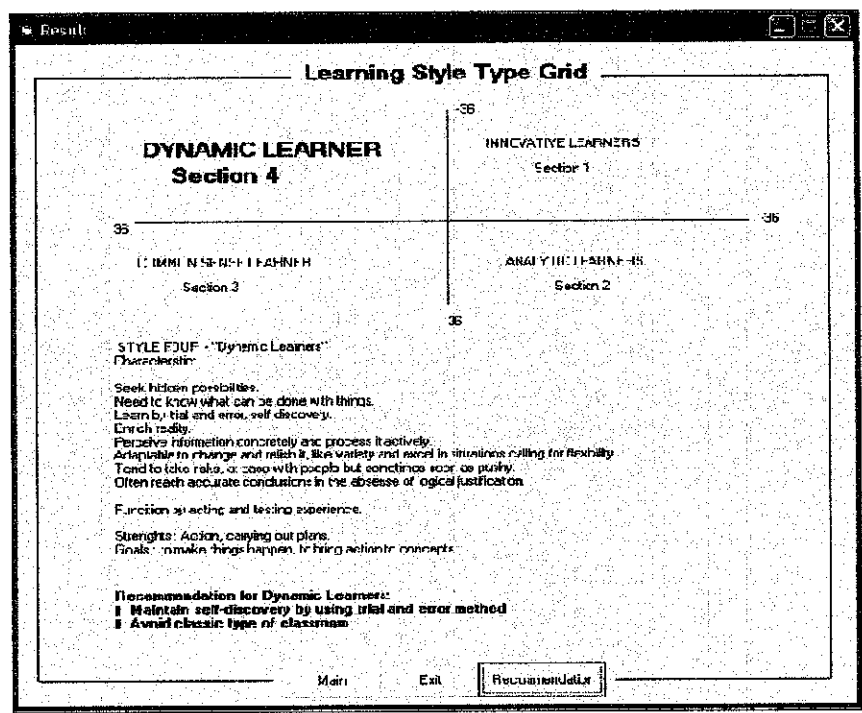

Figure 4.4: Screen Shot for the LSIS Result Form Interface

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1   Conclusion

Research and analysis activity indicate that UTP student lack of knowledge of Learning Style Preference and their own Learning Style Type itself. Although several steps have been taken by UTP management to absorb this Learning Style towards the learning process in the classroom, students seems to ignore its importance. With this, the author would like to conclude that this project meets its objective and will spread the awareness of Learning Style Preferences among UTP student and concurrently guide students to excel in programming language subject. The successful implementation of the system will help students cope up with daily educational routine as well as increases the confident on learning programming subject. Furthermore, the project is fully automated which synchronized with the technological era in Malaysia which more and more people are IT literate.

Undergoing the implementation of the course, the author has gained enormous amounts of valuable experience and lesson of life, both technically and non-technical. The objectives of the course have been fulfilled successfully with total co-operation from all parties. The author has acquired a blend of technology knowledge, exposure to working culture, communication and management skills through good project planning as well as diligent work with supervision from the lecturer in charge. After being exposed in such a critical working environment, the author has now developed a strong will, mentally, physically and emotionally to overcome the odds and obstacles in the future. The author has learnt that any process of gaining knowledge must come from the proactive approach by the author herself. If the author were not aiming to accumulate those skills and ability, then the implementation of this course would certainly be a failure.

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5.2 Recommendation

Although this project is completed, there were still rooms of improvement for both areas namely research and the product itself. It is suggested that improvement should be done immediately to remedy all weaknesses for the benefits of all parties.

In terms of research, the author would like to suggest that the research can be conduct in more detail focusing on other learning style done by professional researchers for educational purposes. From the different angle of scope, the author strongly believed that the research on white papers and journal regarding on changing learning style to suit and fit in programming language classes. These researches will definitely help a lot to enhance the ability of oneself learning method.

From the author view, the product itself can be enhanced to improve its quality and precision. Currently, the system only caters one type of learning style. For future enhancement, the system can be added with several different type of learning model. In that way, users can view their learning type from various model of learning type. The system also can be added with more features and function. The features of advising towards learning programming subject should be improved by providing step by step on moving between the two continuums. Other than that, the interface of the system can be design in such a way that follows human computer interaction components in details. The interface can be improved in terms of font color, background color, layout, icon, space as well as consistency to ensure it is more attractive and user-friendly.

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APPENDICES

APPENDIX A:

PROJECT SCHEDULING

ID	Task Name
1	**1.0 Planning Phase**
2	1.1 Proposal Submission
3	1.2 Preliminary Report Submission
4	1.3 Project Sceduling
5	**2.0 Analysis Phase**
6	2.1 Data Gathering
7	2.2 Data Analysis
8	2.3 FYP poster submission
9	2.4 Requirement Specification
10	2.5 Progress Report Submission
11	**3.0 Design Phase**
12	3.1 Interface Design
13	3.2 System Design Modelling
14	3.3 Data Structure Design
15	**4.0 Development Phase**
16	4.1 Interface Development
17	4.2 System Development
18	4.3 Database Development
19	4.4 System Intergration
20	4.5 SV Final Draft Submission
21	**5.0 Implementation Phase**
22	5.1 System Implementation
23	5.2 Product Demonstartion
24	5.3 System Delivery
25	5.4 Final Delivery

Legend:
- Task
- Split
- Progress
- Milestone
- Summary
- Project Summary
- External Tasks
- External Milestone
- Deadline

Project: LSIS-study
Date: Wed 11/10/04

Page 1

APPENDIX B:

SYSTEM FLOW

```
                    ┌──────────┐
                    │  Start   │
                    └─────┬────┘
                          │
                          ▼
                    ┌──────────┐
    ┌──────────────▶│   MAIN   │
    │               │   PAGE   │
    │               └─────┬────┘
    │                     │
    │                     ▼
    │               ┌──────────────┐
    │    ┌─────────▶│  PERSONAL    │
    │    │          │ INFORMATION  │
    │    │          │    FORM      │
    │    │          └──────┬───────┘
    │    │                 │
    │  error/              ▼
    │ incomplete        ◇ PI FORM ◇
    │    └────────────◇ submission ◇
    │                   ◇         ◇
    │                     │
    │              completed form
    │                     ▼
    │               ┌──────────────┐
    │    ┌─────────▶│ SURVEY / TEST│
    │    │          │    FORM      │
    │    │          └──────┬───────┘
    │    │                 │
    │  error/              ▼
    │ incomplete        ◇ SURVEY ◇
    │    └────────────◇ submission ◇
    │                     │
    │              completed survey
    │                     ▼
    │               ┌──────────────┐
    │               │  RESULT &    │
    │               │ DESCRIPTION  │
    │               └──────┬───────┘
    │                      │
    │                      ▼
    │                 ◇ Main Page/ ◇
    └─────────────────◇   Exit?    ◇
                         │
                         ▼
                    ┌──────────┐
                    │   End    │
                    └──────────┘
```
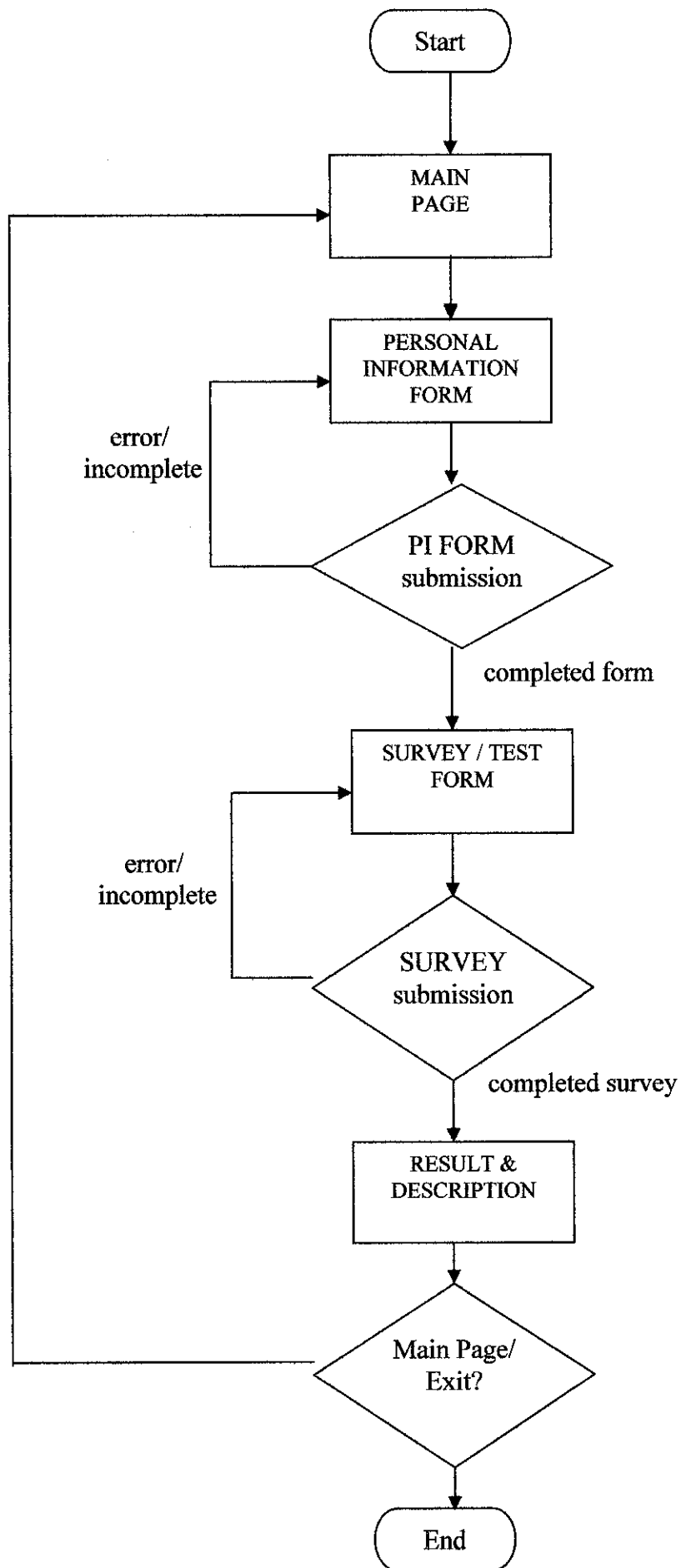
APPENDIX C:

LEARNING STYLE – TYPE GRID

concrete experience

	active perimentation									reflective observation

(4)

DYNAMIC
LEARNERS

(1)

INNOVATIVE
LEARNERS

-27

-6

3

active
perimentation

reflective
observation

28   18   10   4   5   0   -10   -21

4

(3)

COMMON SENSE
LEARNERS

(2)

ANALYTIC
LEARNERS

14

29

abstract conceptualization
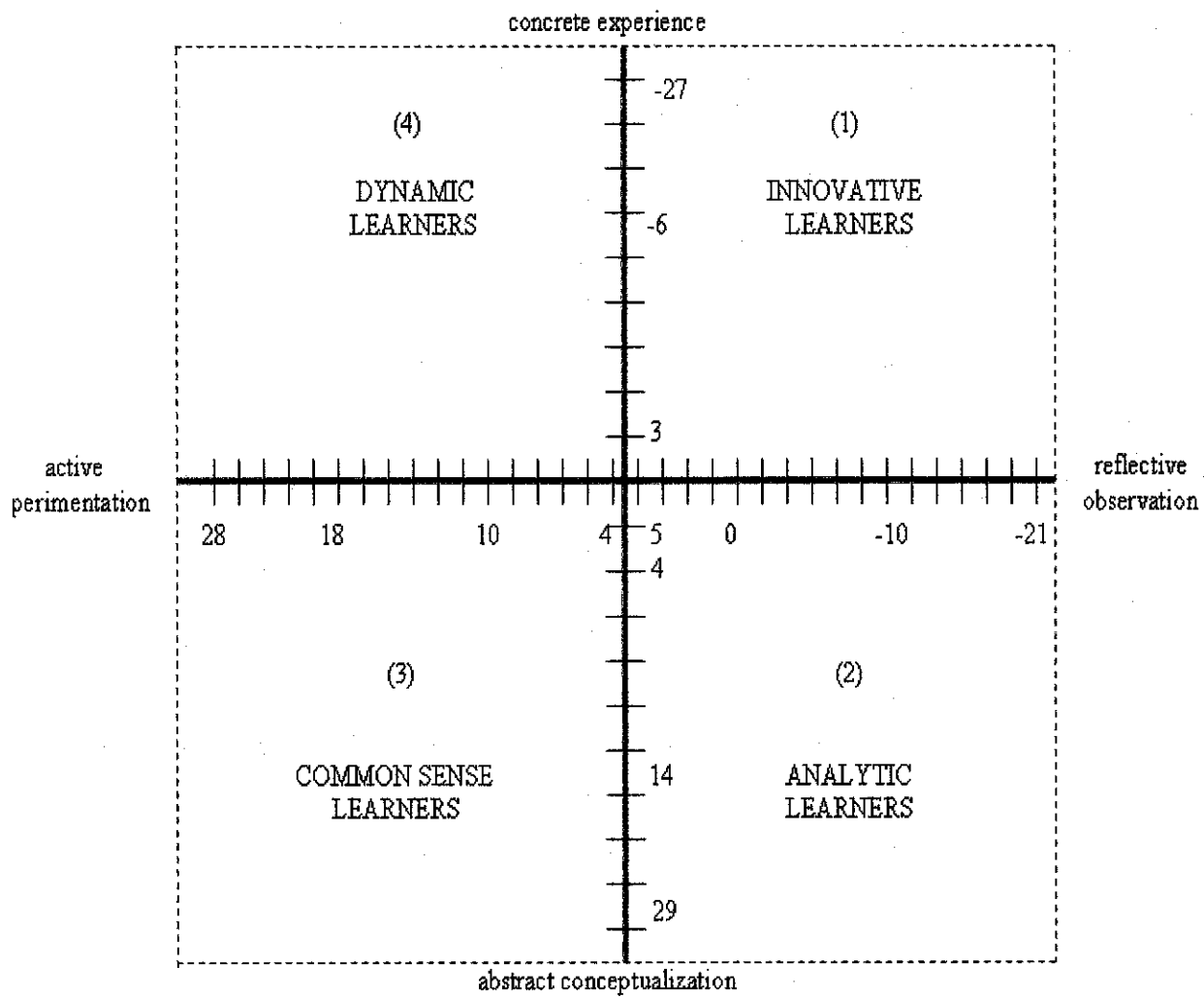
APPENDIX D:

LEARNING STYLE – TYPE DESCRIPTION

The Learning Style Inventory helps you to know how you learn, the way you find out about and deal with ideas and situations in your life. **Different people learn best in different ways. The aim of this model is to describe how you learn, not to evaluate your learning ability.** Below are the types of learner with its learning style description.

DYNAMIC LEARNERS	INNOVATIVE LEARNERS
- seek hidden possibilities - need to know what can be done with things - learn by trial & error, self-discovery - enrich reality - perceive information concretely, process actively - reach accurate conclusion without logical justification - function by acting & testing experience Strength: Action, carrying out plans Goal: to make things happen, bring action to concepts Favorite question: "What can this become?"	- seek meaning - need to be involved personally - learn by listening and sharing ideas - absorb reality - perceived information concretely, process reflectively - divergent thinker-view situation from many perspective - function through social interaction Strength: Innovation & imagination – idea people Goal: self-involvement in issues, bringing unity to diversity Favorite question: "Why or why not?"
COMMON SENSE LEARNERS	ANALYTIC LEARNERS
- seek usability - need to know how things work - learn by testing theories in sensible way - edit reality - perceive information abstractly, process actively - restrict judgment to concrete things, needs hands-on - function by inferences drawn from sensory experience Strength: practical application of ideas Goal: to bring their present view into future security Favorite question: "How does this work?"	- seek facts - need to know what the experts think - learn by thinking through ideas - form reality - perceive information abstractly, process reflectively - interested in ideas & concept, data collectors - function by adapting to experts Strength: creating concepts & models Goal: self satisfaction and intellectual recognition Favorite question: "What?"

APPENDIX E:

SURVEY FORM / TEST

LEARNING STYLE INVENTORY

The learning style inventory describes the way a person learns and how you deal with ideas and day-to-day situations in life.

- Below are 12 sentences with a choice of four endings. Rank each sentence according to how well you think it fits you.
- Rank a "4 " for the sentence ending that describe how you learn best, down to a "1" for the sentence ending that seems least like the way you would learn
- Please do not make ties

Sentence	CE	RO	AC	AE
1. When I learn:	__ I like to deal with my feelings	__ I like to watch things	__ I like to think about ideas	__ I like to be doing things
2. I learned best when:	__ I trust my feelings	__ I listen & watch carefully	__ I rely on logical thinking	__ I work hard to get things done
3. When I am learning:	__ I have strong feelings	__ I am quiet & reserved	__ I tend to reason things out	__ I am responsible about things
4. I learn by:	__ feelings	__ watching	__ thinking	__ doing
5. When I learn:	__ I am open to experience	__ I look at all sides of issues	__ I like to analyze things	__ I like to try things out
6. When I am learning:	__ I am an intuitive person	__ I am an observing person	__ I am a logical person	__ I am an active person
7. I learn best from:	__ personal relationship	__ observation	__ rational theories	__ a chance to try out & practice
8. When I learn:	__ I feel personally involved in things	__ I take my time before acting	__ I like ideas & theories	__ I like to see results from my work
9. I learn best when:	__ I rely on my feeling	__ I rely on my observation	__ I rely on my ideas	__ I can try things out for myself
10. When I am learning:	__ I am an accepting person	__ I am a reserved person	__ I am a rational person	__ I am a responsible person
11. When I learn:	__ I get involved	__ I like to observed	__ I evaluate things	__ I like to be active
12. I learn best when:	__ I am receptive & open	__ I am careful	__ I analyze ideas	__ I am practical

Column Totals	CE =	RO =	AC = AC – CE =	AE = AE – RO =

Result: _____

APPENDIX F:

QUESTIONNAIRES

QUESTIONNAIRE

This questionnaire is one of the methodologies of data gathering for Final Year Project (STB 5013). The main purpose of this questionnaire is to capture the information regarding the knowledge of Learning Style Model and its impact towards a student particularly focusing on programming subject.

1. Have you ever heard about Learning Style Preferences?
   □ Yes   □ No

2. Do you know your personal Learning Style?
   □ Yes   □ No

   if yes.....please specify   □ imaginative learner
                                      □ analytic learner
                                      □ common sense learner
                                      □ dynamic learner

3. Do you like programming subject?
   □ Yes   □ No

4. What do you think about level of difficulties to learn a programming subject?
   □ very easy
   □ easy
   □ medium
   □ challenging
   □ hard

5. What do you score for Introduction to Problem Solving & Programming subject?
□ A	□ A-	□ B+	□ B	□ C+
□ C	□ D+	□ D	□ F	□ currently taking

6. What is your Sijil Pelajaran Malaysia (SPM) result?

   _____

   _____

7. Have you ever learned programming subject before entering UTP?
   □ Yes   □ No

   if yes.....please specify   □ one of the SPM subject
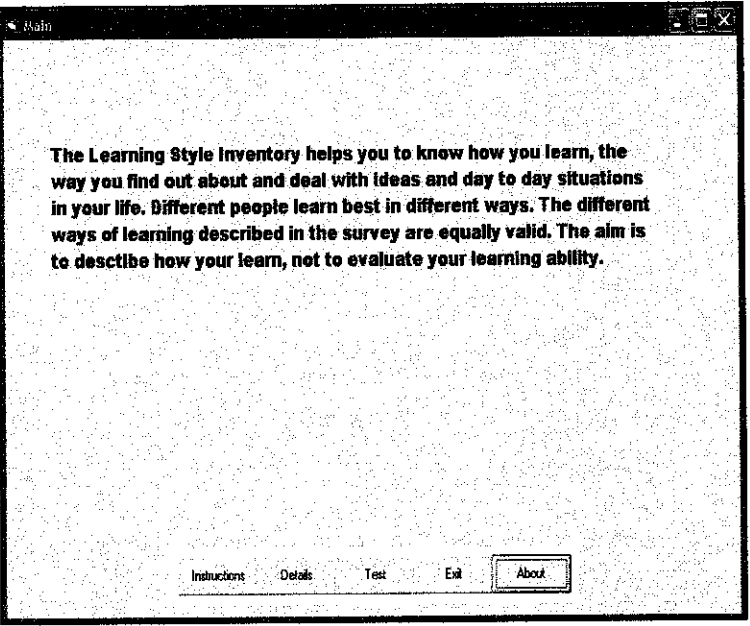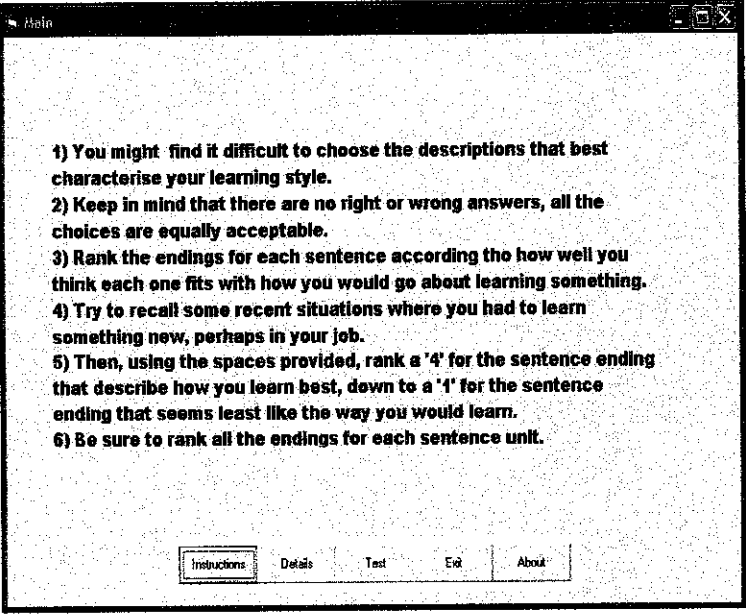   □ professional class / tuition
                                      □ self-study

8. Do you think that your programming lecturer's/tutor's method of teaching is effective?
   □ Yes   □ No

9. Any suggestion to improve lecturer's/tutor's method of teaching

   _____

   _____

   _____

APPENDIX G:

SCREEN SHOT AND DESCRIPTION

| No	Screen Shot	Description
1	The Learning Style Inventory helps you to know how you learn, the way you find out about and deal with ideas and day to day situations in your life. Different people learn best in different ways. The different ways of learning described in the survey are equally valid. The aim is to desctibe how your learn, not to evaluate your learning ability. Instructions Details Test Exit About	The first page when running the system is the main page. This page elaborates briefly on the Learning Style Inventory. This page consists of several buttons for navigation which are Instruction, Details, Test, Exit and About button.
2	1) You might find it difficult to choose the descriptions that best characterise your learning style. 2) Keep in mind that there are no right or wrong answers, all the choices are equally acceptable. 3) Rank the endings for each sentence according tho how well you think each one fits with how you would go about learning something. 4) Try to recall some recent situations where you had to learn something new, perhaps in your job. 5) Then, using the spaces provided, rank a '4' for the sentence ending that describe how you learn best, down to a '1' for the sentence ending that seems least like the way you would learn. 6) Be sure to rank all the endings for each sentence unit. Instructions Details Test Exit About	This is the instruction page. In this page, there is step by step instruction to guide users on doing the Learning Style Inventory Test to determine users Learning Style Type.

3		This is the page that users will get if they click on Details button which is situated at the bottom of the main page. Basically this page required users to fill in all his/her personal information in order for the system to capture it and load it to the database.
4		This page provides a test- set of 12 questions which will determine users Learning Style Type. There are 12 questions and users are required to answer all the question so that the system can start ranking the score and give the result section.
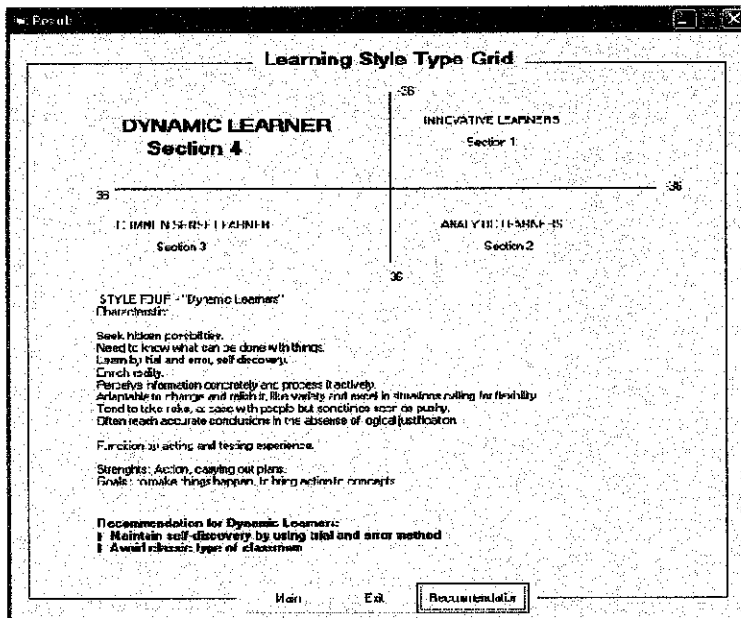
| 5 | | This is the result page which will appear after users click on details button in the test page. This page provides users with their personal Learning Style Type as well as its description together with the best way of learning method and some reccomendation. |

APPENDIX H:

USER MANUAL

USER MANUAL

1. Click on the LSIS.exe icon in the CD-ROM.
   - The main page of the program will appear. It explains briefly about the Learning Style Inventory Model.
   - If you click 'About' button, the main page will appear as the main page and about page is the same.
2. Click on 'Details' button and fill up all the field.
3. Before proceed with the test, please do read the instruction by clicking and the 'Instructions' button.
4. Proceed by clicking at 'Test' button. The test page will appear.
5. Start answering all 12 questions starting from question 1 until question 12. After that, click button 'Rank'.
6. Then, click button 'Result'. Your section result will appear at the text box which is located at the right side of the page.
7. If you wish to do a retest, please click 'Retest' button.
8. If you wish to see details of your section result, please click 'Details' button. After clicking it, result page will appears.
9. For further recommendation towards improving language programming subject, please click 'Recommendation' button.
10. If you want to go to the main page, just click 'Main' button at any page.
11. If you wish to exit the system, just click 'Exit' button at any page.