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## A Web-Based Multimedia Interactive for C Programming

By

Nik Fatimah Zurah bt. Nik Mohd Jamaludin (2362)

Final Dissertation in partial fulfillment of  
the requirement for the  
Bachelor of Technology (Hons)  
(Information System)

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University Technology of Petronas  
Bandar Seri Iskandar  
31750 Tronoh  
Perak Darul Ridzuan

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# **CERTIFICATION OF APPROVAL**

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Nik Fatimah Zurah bt. Nik Mohd Jamaludin (2362)

A project dissertation submitted to the  
Information System Programme  
Universiti Teknologi PETRONAS  
in partial fulfillment of the requirement for the  
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(INFORMATION SYSTEM)

Approved by,

---

(Dr. Wan Fatimah Wan Ahmad)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

Jan 2005

## 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 persons.



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(NIK FATIMAH ZURAH BT. NIK MOAHD JAMALUDIN)

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## **ABSTRACT**

The purposed of this project is to develop a Web-based of Interactive Multimedia for C Programming students. The purposed of multimedia e-book is to provide alternative for student to study at everywhere and anytime as long as there has the Internet facilities. There were several problems that where identified on the traditional learning scenario, (i) it is not practical for student to carry the heavy book anywhere. (ii) The student tends to be bored while study using black and white papers because this subject is quite difficult to understand if the student has no basic in programming language.

The main scope of study is to design an interactive user interface to attract the student to read and gain the interest towards programming. This project will integrate the Macromedia Dreamweaver MX as a platform with the Macromedia Flash MX to combine the text and images in interactive multimedia concept.

The project will adopt Sashimi model which is the used in Rapid Application Development or RAD. Sashimi model is created to modify the Waterfall model because it can result in clearer model than waterfall. As a conclusion, the development of the e-book is the combination from the various applications and methodology to make sure the successful and effectiveness in order to achieve the objective of this multimedia concept.

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# CHAPTER 1

## INTRODUCTION

### 1.1 BACKGROUND STUDY

Interactive Multimedia is the integration of text, images and all kinds of controls software within a single digital format. Multimedia with current technology will help to improve the education environment. It will provide the alternative for student in learning process and replace the traditional learning concept. Although a concept is still new in learning environment but it will introduce something that is difference in current educational environment and make the learning process more fun and less stress.

This Interactive Multimedia for C Programming is a web based basis to enhance the learning process. The traditional way of learning is used of text book sometimes not practical when the student wants to do a revision outside the campus. Nowadays, the variety of study process will help the students to improve their comprehensive in respective subject. At beginning, the web-based will provide one topic only that is 'Arrays' to see the effectiveness and student response toward this subject. The purposed of this product is to present something different for students in order to attract their interest in programming subject especially C programming. According to the book of 'The Complete Reference C' by Schildt, (2000) mentioned that an Array is a collection of variables of the same type that are referred to through a common name. The most common array is the string, which is simply an array of characters terminated by a null.

## **1.2 PROBLEM STATEMENT**

### **1.2.1 Problem with Traditional Way of Learning.**

Traditional way of learning programming will be difficult for average student and for the first timer learner. The students have to learn from text books with long text and explanation and eventually make the study process ended in half way. To master in programming language, the students cannot only depend on lectures and tutorials but their must take the responsibility to do their own revisions frequently. The printed lecture notes usually did not attract the student to revise back about what they have learned in class. According to the author experience, the students usually refer to the lecture notes while their have test or exam but, depend on lecture notes only cannot make the students fully understand with the subject because the lecture notes are tend to present the content in simple and in point method.

Students who are fluent in C can easily acquire the ability to program in C++, thus enhancing their employment opportunities. C++ has been designed as an extension of the C Programming language. C is a programming language that can be used to teach structured procedural programming techniques. It is an excellent language to introduce fundamental principles and techniques of software engineering, including structured program design, programming style, documentation, modular design, code reusability, program verification and testing, and data structuring.

Student must learn how to identify problems that can be solved with computers, how to specify such problems, analyze them and design a method of solution for them. Then the student will learn how to use C to implement the method in a computer environment to the result you want. Student will develop the ability to solve problems. The problem solving ability requires;

- a knowledge of computer fundamentals.
- an understanding of problem-solving strategies and techniques.
- proficiency in using a programming language.

## 1.2.2 Poor User Interface Design.

User interface is the most important element in web-based application. The interface should be user friendly and easy for users to understand while interact with the application. The lack of Human Computer Interactive (HCI) in order to present the content of e-book will result with poor learning performance to students or users. The poor user interface will decrease the efficiency of learning and increase the dissatisfaction. Below is the example of a common user interface of e-book in web-based manner.

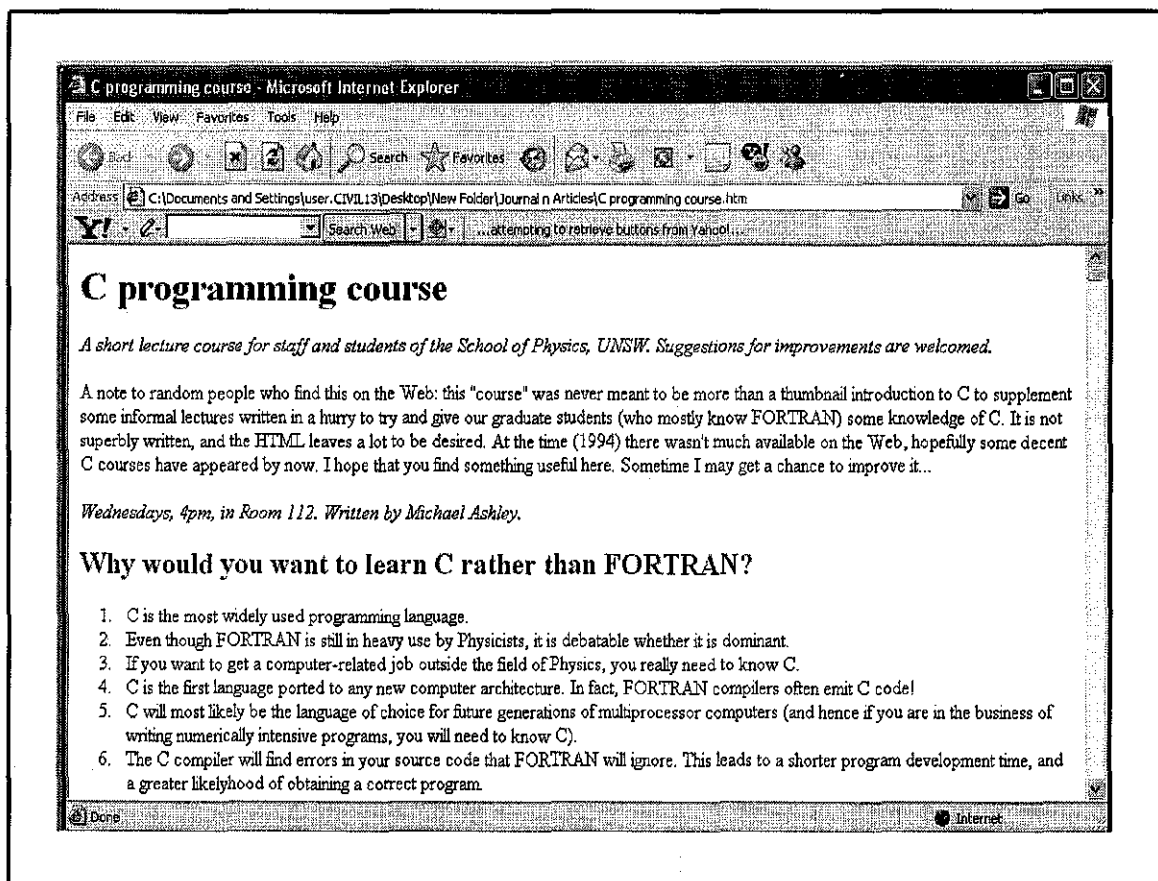


Figure 1.2.2 (a) Example of poor interface design.

The common e-book usually present the content with long text of explanation and it is quite similar with the contents in text book. The used of small font text it's not good for eyes and the color chosen is usually in black and blue with white background color will killed the user attraction. The designer also tends to put all the contents in one page will

make the interface looks crowded with texts. The interface was lack with button but the designer used the index at the top of page as hyperlink for user to navigate the contents of sub topic.

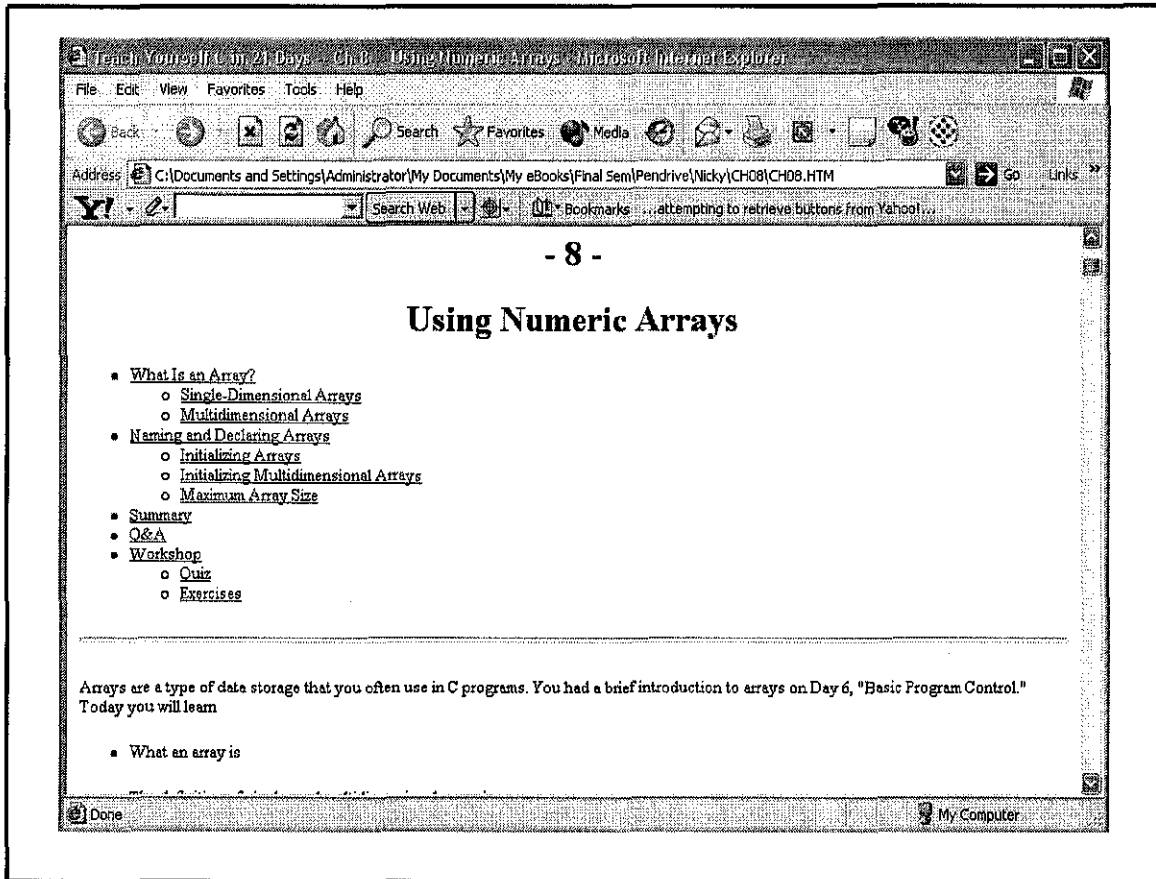


Figure 1.2.2 (b) Example of hyperlink text

### 1.3 OBJECTIVE

The objectives of this project are:

- (i) To develop an application that can integrate and present all the related information for students
- (ii) To come out with interactive and friendly user interface
- *To develop an application that can integrate and present all the related information for students*

The project aims to develop a web-based prototype that is capable to provide related information and lessons for students who want to study and do revision in alternative way. The target user of this product is for first timer learner of programming and for first year student who took this subject. The author tries to integrate all the information in interactive and proper way so that the student will gain experience of learning in different way.

- *To come out with interactive and friendly user interface*

The concept of the web-site should be user friendly and understandable by users. The author tries to come out with new idea of e-book and replace the traditional. Nowadays, the used of Flash MX tools in many multimedia developments such as games and commercial will introduce something new in learning environment. This is the main reason of why the author wants to use Flash element in order to develop an e-book. The presentation of e-book in Flash hopefully will entertain the students while their do a revision.

## 1.4 SCOPE OF STUDY

The scope of study is on how the multimedia environment and web-based application can enhance the learning and teaching process. Nowadays, the internet is a very vital for vast communication and took for information sharing. The integration of multimedia and web-based application can enhance the performance of web content and make the design of the web more user-friendly and interesting. The aimed of this product is to prove that the used of multimedia online can attract the user attention. Currently, the main focuses are:

### 1. Interactive user interface design

- develop a system about 'Array' in C programming in Flash MX.
- design and develop the system in user interface
- test the acceptance and usability of the design with randomly tester.

### 2. Integration of multimedia tools with web-based application.

- design and develop a way how to integrate those two elements within a single product.
- Design and integrate the entire element such as text, button and sound.
- load the product into the server to enable the access to the web.

## CHAPTER 2

### LITERATURE REVIEW AND THEORY

#### 2.1 LEARNING ENVIRONMENT

##### 2.1.1 Definition

Much of our human learning involves some form of face-to-face communication between those that learn and those that teach. The role of the teacher is significant and teaching and learning is seen as a human-to-human interaction. Of course we can learn without a specific person who is the teacher; we can learn from our own observation of the environment around us. However, much human learning both structured and informal, takes place in this context of the passing of knowledge from one human to another (Casey, 1998).

The educational model nowadays sees the Web as an electronic book; simply put the subject material on the Web and students can learn from it. The aim of Web-based education must surely be to develop a model which will enable a relatively large proportion of the student population to learn relatively easily and successfully (Casey, 1998). The World Wide Web has become a medium of education in recent times and a number of models of learning have been used in teaching via the Web.

In today learning environment, the students have a variety of choices of learning purposely to come out with the effective's way and make the learning process more interesting and efficient for both students and teachers or lecturers. Nowadays, the multimedia tools are added as one of the learning alternative. The term of multimedia refers to the sequential or simultaneously use of a variety of media formats in a given presentation or study-program. The goal of multimedia in education and training is to immerse the learner in a multi-sensory experience to promote learning (Heinich, Molenda, Rusell, and Smaldino, 2002).



### **2.1.2 Learning through Internet and Web-based.**

The Internet and web environment allow readers to read online many multimedia books. Reader can annotate, collaborate and discuss content using efficient reading functions. Reading is migrating from printed books to e-books (Wang & Chen, 2004). This product designed purposely as an online learning environment to provide the student of C programming a variety learning tools and hence can increase student's learning performance. Maurer & Scherbakov suggest that multimedia can improve the overall learning experience for a student (Pilgrim, Leung, and Grant, 1997). The content of the notes should be simple but understandable. Thomas, (2000) on her finding regarding the 'Experiences Teaching C++ Programming Online' mentioned that Static online lecture notes are not terribly helpful, especially if a textbook is being used. Student already have a source for reading material, and online lecture notes are just more of the same. So, lecture notes should be short, and should supplement or correct the textbook, not repeat material.

In education, interactivity has transformed the traditional classroom setting into a potential active media environment. As Laurel indicates, interactivity is an important component for learning to take place. Learners learn best when they are actively and continually involved in the learning process (Klassen, Vogel, Moofy, 2001). One of the reasons to develop this product is to provide something different in web-based learning environment. According to the research, no other individual or institutions come out with an idea to develop an e-book using Flash and make the product looks attractive. This course is develop using Macromedia Dreamweaver MX as a platform as well as Macromedia Flash MX as an interactive tool and delivered via World Wide Web. Dreamweaver is an ideal program for anyone involved in designing website; its combination of simplicity and power makes it an excellent choice for the novice and professional alike. (Dreamweaver MX in Easy Steps 2002) Flash MX enables effective development of interactive image presentations for the Internet or other web related document also; it can be viewed on every platform that supports the flash player and this give the developer opportunity to create content such as e-learning or image presentations

viewable on various platform and devices without any special plug-in. One of the advantages of Flash MX for new develop is, she no needs to have any particular programming language.

The World Wide Web (WWW) is revolutionizing the way people work with information. In technical terms, the Web is an easy-to-use graphical user interface to the Internet, the international “network of networks” of computers (Martin & Davis, 1997). In a user-controlled environment that enables students to turn off the program whenever they want, screen design becomes essential to maintaining learner motivation. An effective screen design sets the stage for meaningful ‘deep learning’ to take place and motivates the student to stay engaged (Klassen, Vogel, Moody, 2001).

## 2.2 THE EXAMPLE OF E-BOOKS DEVELOPMENT APPLICATION.

### 2.2.1 E-Book of Monash University

The site below developed by Des Casey from Monash University of Australia. This site developed to teaches a first year undergraduate subject on the design and implementation of Web-based material. The site uses text, graphics, pre-recorded audio and video clips and hyperlinks in its electronic book role.

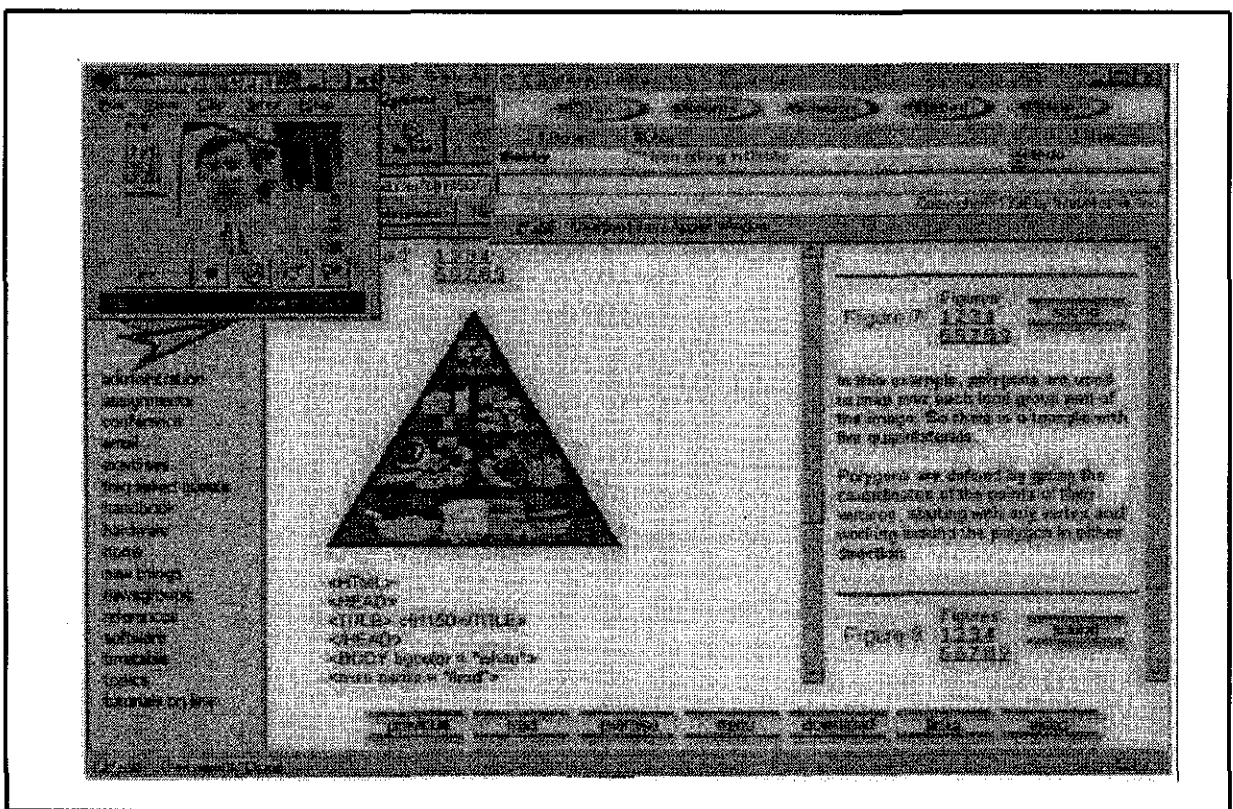


Figure 2.2.1: The interface of e-book in Monash University

Figure 2.2.1 shows the main site navigation menu is positioned down the left hand side, with navigation buttons across the bottom to move between sections of the materials, to related exercises or hyperlinks, or to play pre-recorded audio or video materials. The materials being taught are presented in the two central scrollable windows. In the top left hand corner there is a floating window through which students can see and



Figure 2.2.2 (a) presents some supporting functions on the top of the interface. The functions include the following.

- instruction manual: a document tells the user how to use the system.
- notes: arranged annotations and related referenced document link are stored.
- record of online behavior: information about online reading behaviors of all students is stored.
- questions and answer: users' questions and responses are presented.
- announcement: all announcements are listed in chronological order of posting.

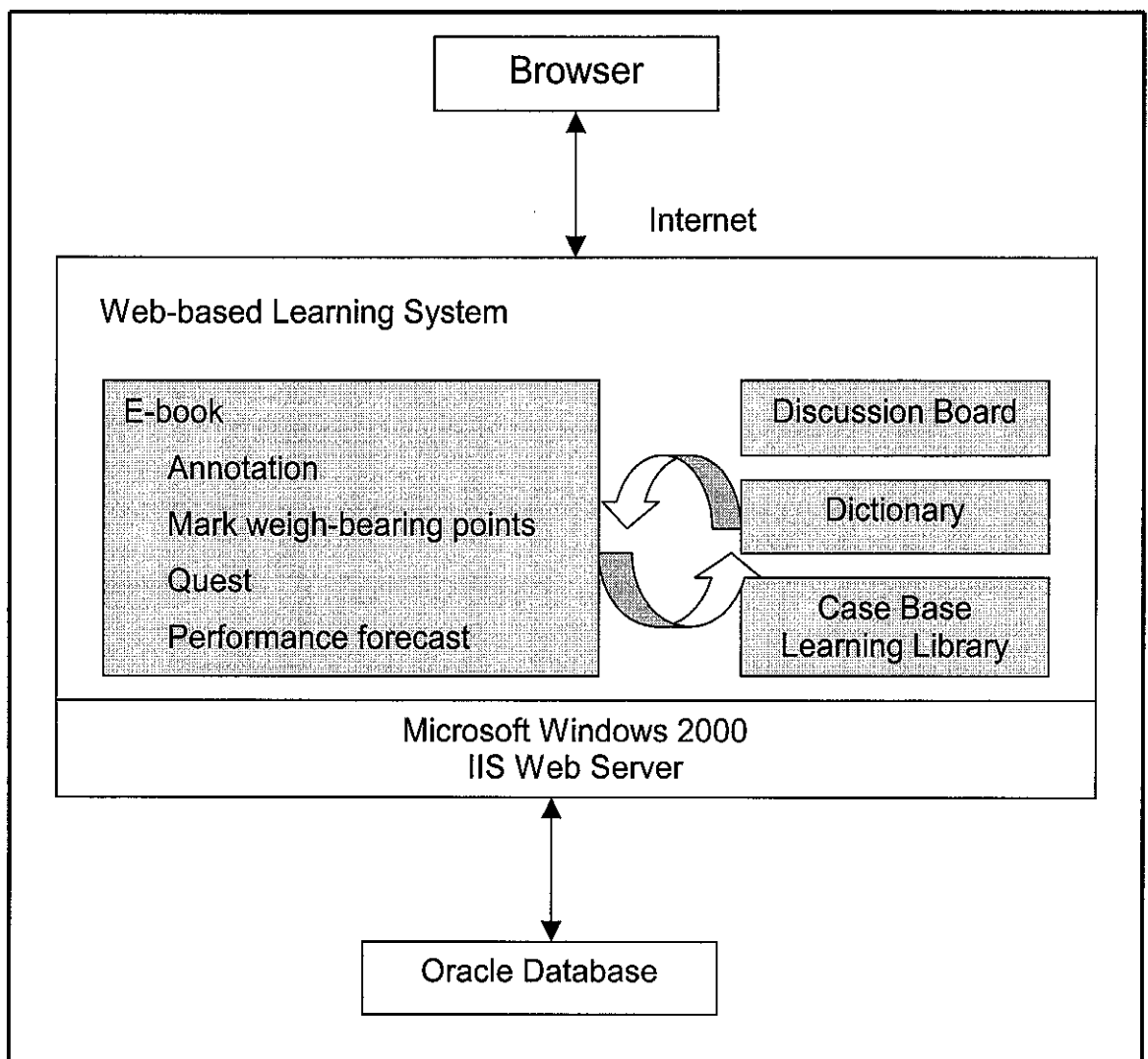


Figure 2.2.2 (b): Architecture of online reading system.

Figure 2.2.2 (b) presents the architecture of the system. This web-based learning system is built using Microsoft Windows 2000 IIS web server and an Oracle database to store e-book content, annotations and information about students' online behaviors. Students can use the Internet browser to interact with the system. The e-book module provides annotation, marking, questioning, and performance forecast. The discussion board content, dictionary and case-based learning library yield responses to students' queries. This system effectively uses online resources to support students' reading. Additionally, students' online annotating behaviors are used to forecast learning performance. In an experiment conducted by University in Taiwan, students were willing to use this online e-book to learn or prepare for an examination. Students also felt that integrated online resources are convenient and efficient in helping them read (Wong & Chen 2004). Besides that, users felt that online reading was uncomfortable for the eyes and unnatural. Students would like to be able to select more natural colors and formats. They also claimed that wider ranging content in the dictionary or the case library would improve their learning. They would prefer a more natural annotation interface that was more like marking a printed book.

## 2.3 LEARNING MANAGEMENT SYSTEM

According to the study done by Nodenot, Marquesuzaa, Lafircade and Salleberry (2004) about the learning situation using Learning Management System or LMS like Blackboard or WebCT. They said that those are monolithic platform and they expect more from Web-based education as new types of LMS such an uPortal or OKI infrastructures in the U.S or such as some CampusSource projects like the OpenUss container in Europe (Nodenot, Marquesuzaa, Laforcade, & Sallaberry, 2004).

- The educational portal “uPortal” implement the “Channel registry” in order to interoperate with other servers according to predefined protocols. This channel allows to communicate with and present to the learner the contents of a channel living in another instance of uPortal, somewhere on the Web (<http://mis105.mis.udel.edu/jasig/uportal/>)
- The OpenUss container is built on top of the J2EE standard (Java 2 Enterprise Edition) that implements Application Service Providers which are necessary for the execution of distributed services, whether educational or not. (<http://openuss.sourceforge.net/openuss/>)

In overall, their aims are towards new approach namely Adaptive Web Based Educational System (AWBES) such as uPortal and OpenUss together with LMS that can managed existing educational components distributed over the web.

## 2.4 CONCLUSION

In conclusion, whatever methodologies and purposes to develop a multimedia learning, the major aim is to provide a mobile education to students as alternative to the traditional classroom. This development has more potential and will make reading become friendly, interactive social and efficient. One of the advantages is that students are not restricted to aligning their lives to real time lectures. They can study when they wish and view at any later time.

Educators are also confronted with high development costs, often in this instance, expressed as the considerable amounts of time needed to prepare Web based materials for their students. Attempting to place on the Web everything that would be said in a semester's series of lectures is tantamount to writing a book. Consequently, the electronic book model quickly becomes impracticable. The Web as communication medium model (with supporting material), on the other hand, is viable. The information that would be passed on verbally is still passed on verbally: no attempt is being made to write it all down (Casey, 1998).



## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 BACKGROUND OF METHODOLOGY**

##### **3.1.1 Waterfall Model**

The waterfall model performs well for product cycle in which it has a stable product definition and when the developer is working with well-understood technical methodologies. The waterfall model works well for inexperienced developer because it provides the project with a structure that helps to minimize wasted effort. The disadvantages of the waterfall model is the difficulty of fully specifying the requirements at the beginning of the project, before any design works has been done and before any code has been written. The waterfall development also does not allow much reflection or revision. Once an application is in the testing stage, it is very difficult to go back and change something that was not well-thought out in the concept stage.

The waterfall model has six stages:

1. Document system concept
2. Identify system requirement and analysis them
3. Break the system into pieces (Architectural Design)
4. Design each pieces
5. Code the system components and test them individually (Coding Debugging and Unit Testing)
6. Integrate the pieces and test the system (System Testing)
7. Maintenance.

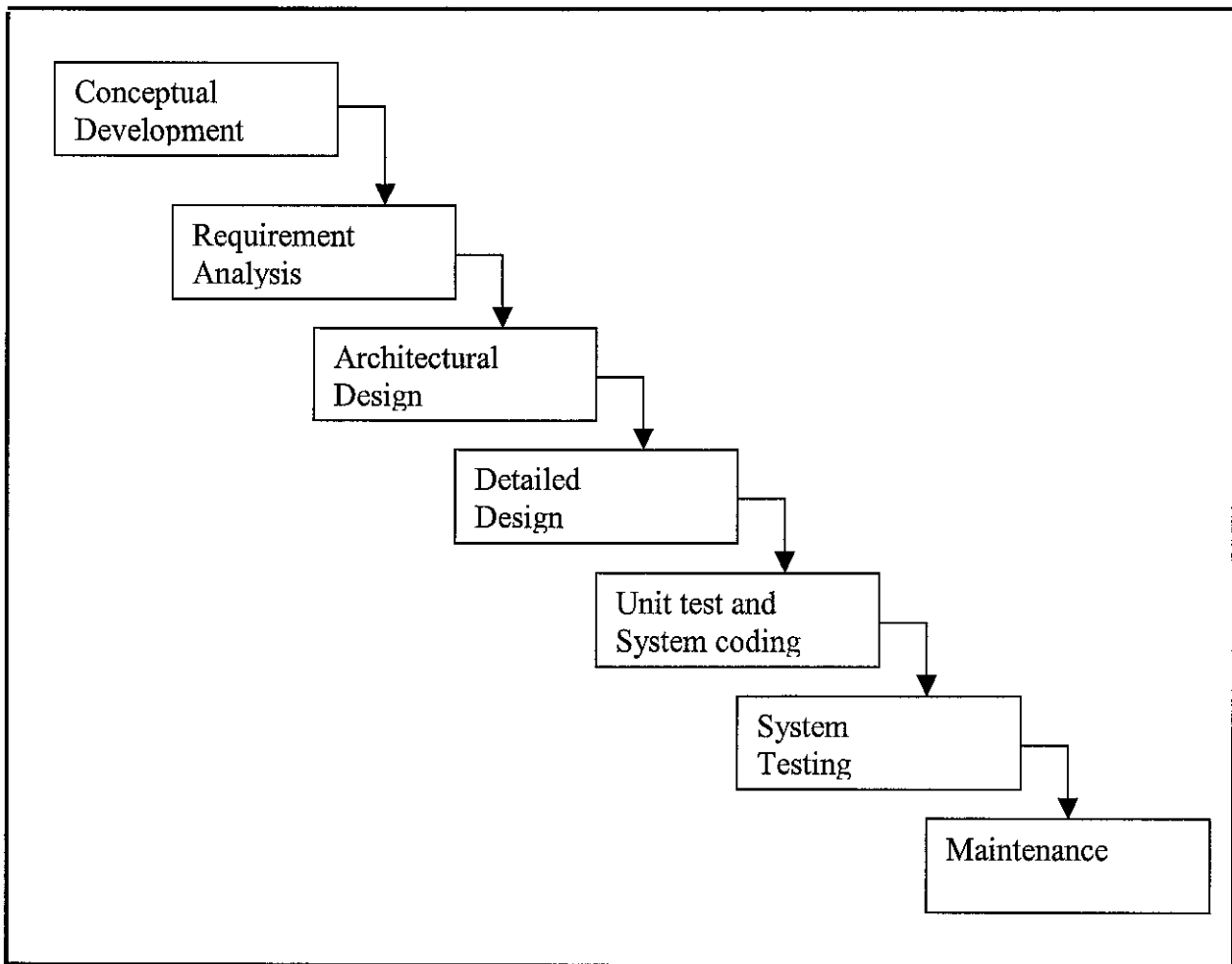


Figure 3.1: Waterfall model

### **(i) Conceptual Development**

Conceptual Development refers to the consideration of all aspects of the system function or process. The goal is determining how each of those aspects relates with one another, and which aspects will be incorporated into the system

### **(ii) Requirements Analysis**

Requirements are high level. The requirements for the Web-based of C Programming might be “The student will be able to learn programming language using Interactive

Multimedia application”. In term of software, the application that might be choose must be able to understand and use by the developer and suit with the topic provided

### **(iii) System and Software Design**

Once the developer has laid out the problem and requirement, she can get down to the process of designing the solution. According to the experienced, she always does the developing process in an “ad hoc” manner. That is, start putting Lego in the brick until she think she has something stable and modify as necessary. This document is more specific than the requirements, as user should be able to use the system to learn that is equivalent to what her envision. This process involves sketching out how the program will work or writing out the pieces of the program and what each will do.

### **(iv) Coding**

This phase involves the creation of the system software. Requirements and systems specifications from the System Design step are translated into the system development and implementation.

### **(v) Testing.**

Testing is performed to ensure that it is working correctly and efficiently. From the testing session, the developer will know the weakness of the system whether it meet the user requirement or not and from the testing session, the system will be modified according to necessary and user needs.

### **(vi) Maintenance.**

Software maintenance is one of the processes of enhancing and optimizing deployed software as well as remedying defects. The software maintenance phase involves changes to the software in order to correct defects and deficiencies found during field usage as well as the addition of new functionality to improve the software's usability and applicability.

### **3.1.2 Sashimi Model**

The Sashimi model is a methodologies used in RAD or Rapid Application Development. RAD is a part of a methodology that specifies incremental development with constant feedback from the customers. The point is to keep projects focused on delivering value and to keep clear and open lines of communication. . Sashimi model is designed to overcome the weakness of Waterfall model by overlapping the stages. The stages involved in this model are still the same as Waterfall model, the difference is on how this model works compared to the Waterfall Model. The reason of choosing Sashimi model is because this model is suitable for small project. The developer can iterate back to previous stages to improve the development.

### **3.1.3 Evolutionary Model**

Another model that is going to use is Evolutionary Delivery Model. This is one for the model also used in RAD process. This model requires the developer of the system to show the product to the user in successively stages. User then will test and recognize any buy or error function that does not meet the requirement. After that, the developer will modify and enhance the product according to the user needs and expectations.

### **3.2 COMBINATION OF METHODOLOGIES**

In order to complete this project, the student decided to follow the traditional Waterfall model as a basic guidance. The Waterfall model used by the developer consists 6 stages excluding the operation and maintenance because in this project, the developer only responsible until the testing session and the last stage from the actual Waterfall model (operating and maintenance stage) was eliminated. As a result, the stages of waterfall model used by the developer are: Conceptual Development, Requirement Analysis, Architectural Design, Detailed Design, Unit Test and System Coding and System Testing.

The sashimi model is an enhancement from waterfall model, the reason why the developer used this model because, it enable the developer to iterate back to the previous stage in order to improve the design and development process. For example, let say the developer has a problem in detailed design in order to create the actual interface, she can back to the architectural design phase and redo or modified the flow of design and interface structure to solve the problem. Sashimi model is very suitable for small and well-defined project.

Finally, the Evolutionary model has been put under the Detailed Design and Unit Test and Coding stage of waterfall model. The used of Evolutionary model is to ensure the effectiveness of the design because for every successfully stage development will be shows to the user or supervisor and the unnecessary things regarding the design will be eliminated hence reduce the potential of inaccuracy due to the user requirement.

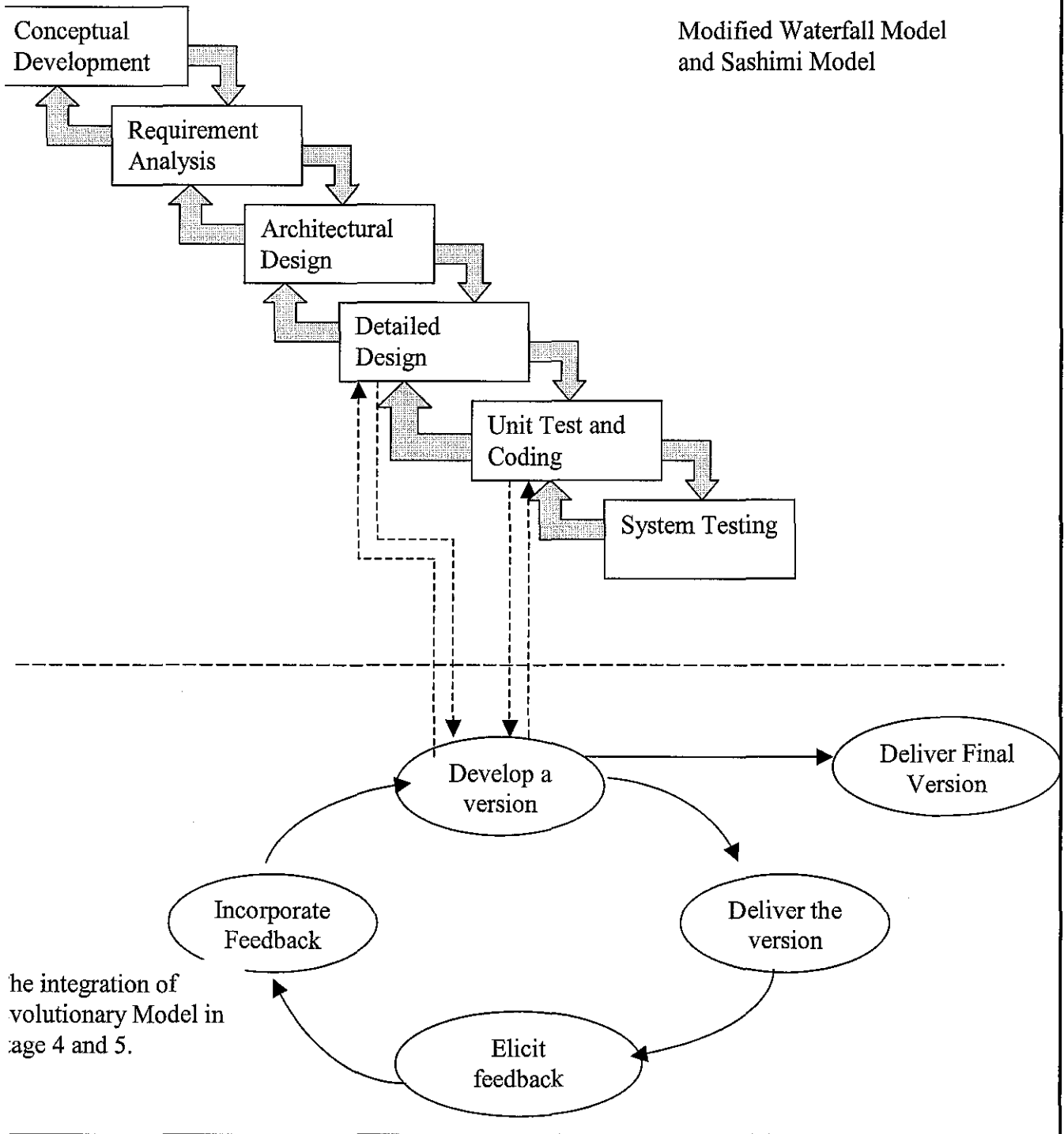


Figure 3.2: The modified Waterfall Model integrate with Evolutionary Model

### **3.3 METHODOLOGY**

#### **3.3.1 Requirement and Feasibility Study Phase**

This phase is a vital for developer to study and determine the project requirement and how should she do the project. In this phase, the developer has the opportunities to analyze the relevancy of the project based on feasibility study and how they can develop this project based on requirement analysis. It will give a big picture of the project and can prevent the developer from misunderstanding.

##### **1. Preliminary study**

Basically, the background of study is how to combine the multimedia interactive application with C programming subject taken by first year student and how this learning alternative can give benefits for users. Next, the developer needs to identify the main objectives, which are:

- To develop an application in interactive yet attractive way and present all the necessary information related with Array in C programming for users.
- To come out with interactive and friendly user interface.

The objectives are very important in order to guide the developer to achieve the product's target then she can clearly identify the scopes of project to develop an enhancement of learning process.

##### **2. Feasibility Study**

In this phase, the time, scope and budget must be clearly identified. As for time aspect, the time given in order to finished the project is quite relevance and from previous experience by students who were taken final year project (fyp), this is not be the issues. In term of budget, the developer was preferred to use her own resources or money upon completion of this project because she already had the basic requirements such as

software of Macromedia Flash MX and Macromedia Dreamweaver MX. The feasibility study is used to identify any constraints or issues upon completion the project.

### **3.3.2 Logical analysis and design phase**

This stage involved the early of designing web-based, which includes arranging the data flow, producing the storyboard to see the clear picture of interface and identification of software and tool requirements. Below is the detail of description of each work that has been done.

#### *Designing the flow of web-based*

It is necessary to design the flow of the project before proceed for the actual design because it can help the developer to see the clear views of the overall design and how the project is looks like and making the development of actual design more easy and done according to the planed. The developer should determines the several aspects of the design such as what the necessary things should be included in the product and how to organize the materials needed as well as the contents that should be included in every single interface.

#### *Designing the storyboard*

The purpose of designing the storyboard is to get the clear and better picture of the interface layout of web-based. The necessary elements such as the arrangement of icons, buttons and others will be designed here to meet the interface more towards hci (human computer interaction).

#### *Modifying the designed of storyboard*

The storyboard then would be presented to supervisor for her to check for improper design. From the elicit comments, the student then will re-design the storyboards until it



meet the requirement needed and satisfaction. The modification that were made such as the placement of buttons and also the arrangement layout of interfaces

#### *Identifying of software needed in developing the web-based*

Before starting the actual design, the developer must be identifying the tools and software needed in order to complete the development. Below is the selected software to develop the project

- Macromedia Dreamweaver MX - to design templates in web-based
- Macromedia Flash MX - to be used as a main tool in developing the application
- SWISH MX - to design and create the text animation

### **3.3.3 Actual Design and Development Phase**

Actual design and development of the project should be done in this stage. In this phase, the student has used the evolutionary model means for every phase of development, the system was presented first to supervisor for her to comment and then the student will do the necessary changes according to the requirement

#### *Designing button*

After developer has clearly identified the flow of the work as well as the storyboard, the work is stated with designing the button. Those buttons are: “Menu” button, “Next” button, and “Previous” button. These buttons were designed in a same color to maintain the standard and suitability.

#### *Designing the background and layout.*

The background for every interface was designed before the developer can integrate the button and sound elements into the design. The background should be simple with soft

color to make the proper design and looks professional. This phase is a crucial phase because the developer is not familiar and expert in using Flash MX. The developer took sometime to learn the Flash application before proceed with the system and it sometimes difficult to integrate the ideas with the methods in order to made the product be in interactive way.

*Integrate all the elements including buttons, contents and sounds.*

Integrate all the elements including buttons, contents and sounds into the interface according to the storyboard. It requires the used of action script available in Flash MX in order to make all the elements functioning.

*Integrate the Dreamweaver with Flash*

After completed the product in Flash, the last phase is to integrate the Flash tool with Dreamweaver application to enable the user browse the product developed. This product only can be access trough UTP intranet

## CHAPTER 4

### RESULTS AND DISCUSSION

#### 4.1 THE CONTENT OF THE WEB

The contents of the website need to be evaluated well-prepared in order to ensure the delivery information will understandable by users. The aim is to survey whether the content is suitable and necessary to provide the lesson and information for learner. Based on the discussion with the supervisor, the developer has agreed to select the topic that the most students have a problem with. At this early stage of the development, the 'Arrays' topic of C programming is chosen. Below are listed sub-topics of Array that would be included into the product:

- What is an Array?
- Single-Dimensional Array
- Multidimensional Array
- Naming and Declaring Array
- Initializing Arrays
- Initializing Multidimensional Arrays
- Q & A
- Exercises

## 4.2 THE DESCRIPTION OF THE PRODUCT'S CONTENTS

### 4.2.1 The Main Page

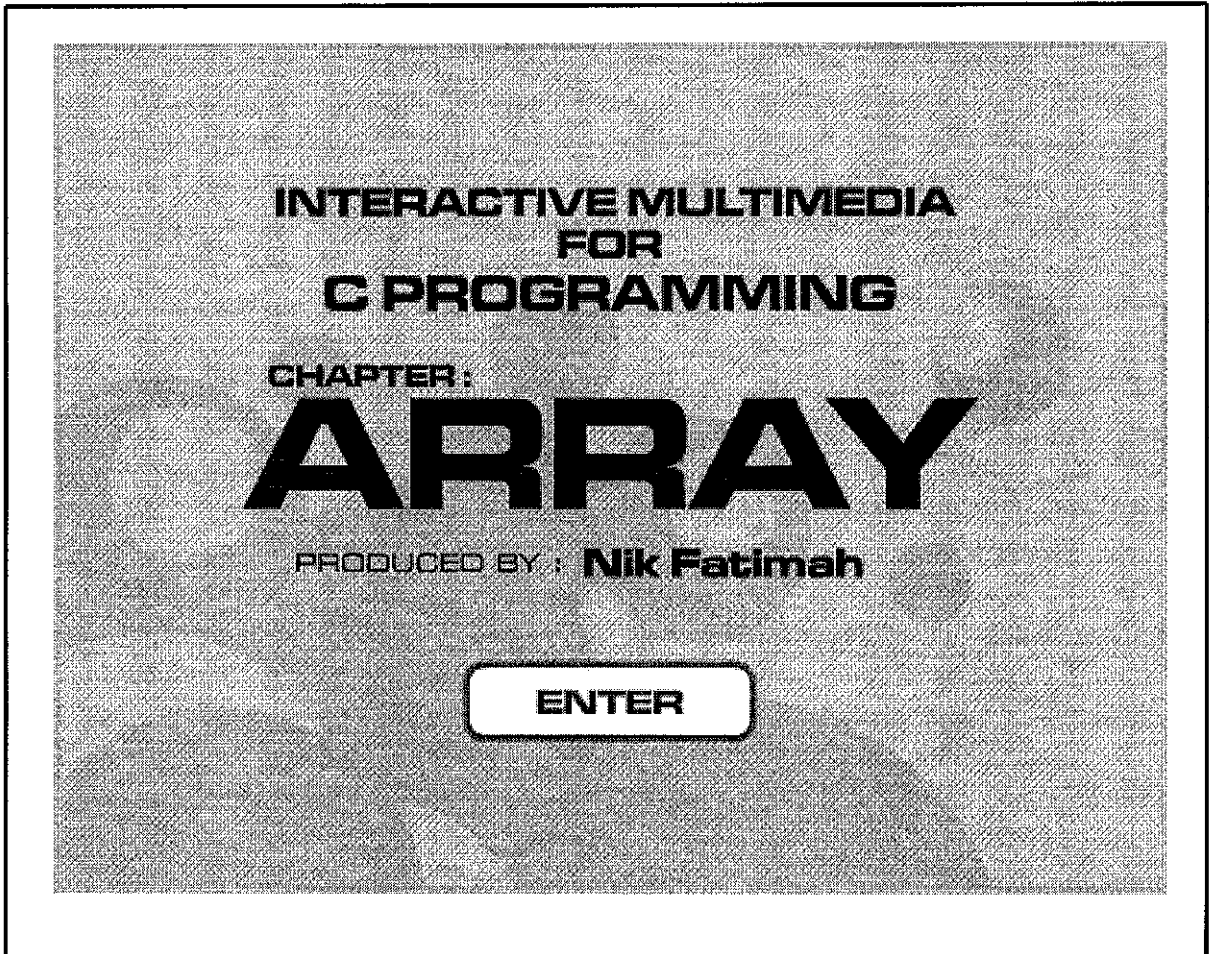


Figure 4.2.1: The main page

Figure 4.2.1 shows the main page of the site. The page contains the short montage about the topic that will be included. The users then can press the 'Enter' button to go to the 'Main Menu'

## 4.2.2 The Main Menu Page

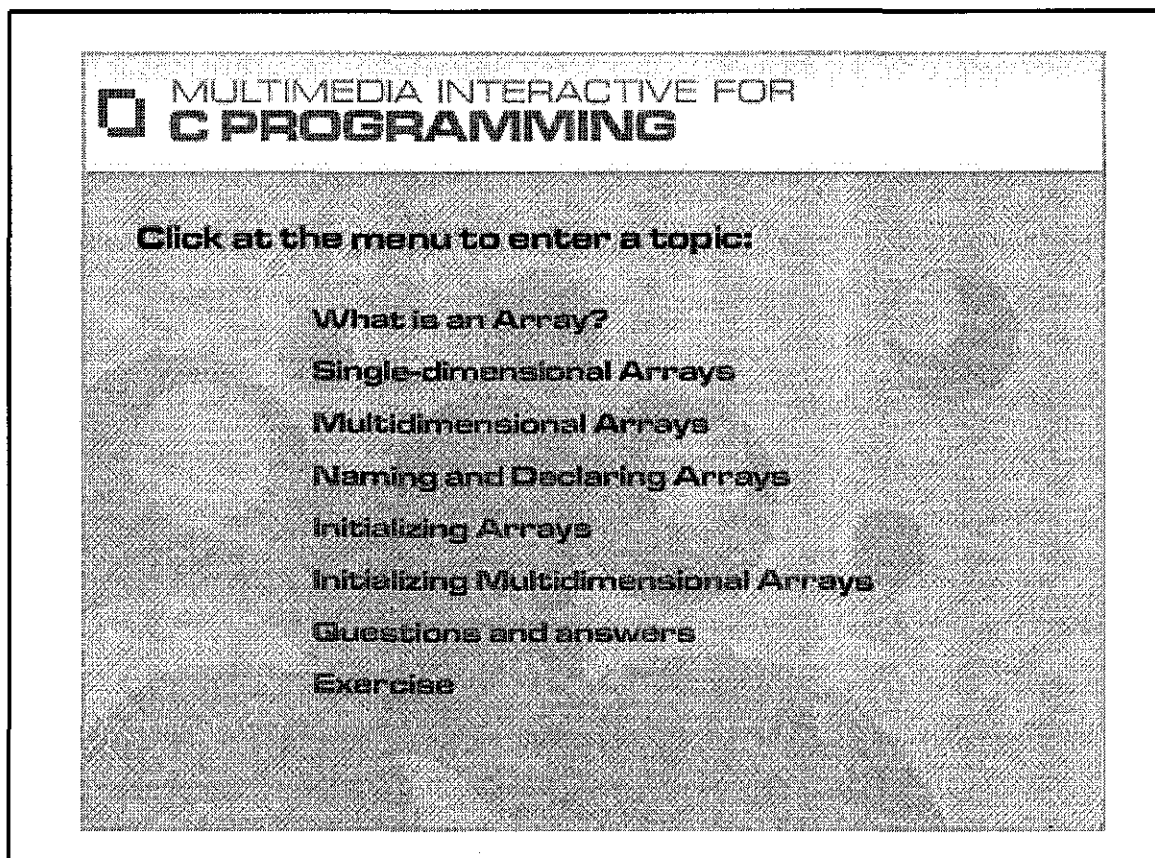


Figure 4.2.2: The Main Menu page

Once the user presses the 'Enter' button, he/she will see this page. . The user is free to click any menu but it is advisable if user can read by sequence to better understanding. The topic given was listed according to the syllabus on the preferred textbook. It started from the definition of Array, the types of Arrays, how to initialized an Array into program as well as a few exercises to measure the user ability to understand the topic.

### 4.2.3 The Example of Array's Contents.

**ARRAY:**  
What is an Array?

1/2

An array is a sequence of elements of the same type that share a common name and that are distinguishable by their positions within the array. A subscript or index indicates the position in the array.

`int x [50];`

Example:  
x containing five elements, all of which are integer.

x :	?	?	?	?	?
Index :	0	1	2	3	4

\*Memory allocation after declaration int x[5]

MENU NEXT

Figure 4.2.3 (a): The content of Array definition

**ARRAY:**  
What is an Array?

2/2

Assign value to the elements

`x [0] = 58;`  
`x [1] = 63;`  
`x [2] = 49;`  
`x [3] = 18;`  
`x [4] = 7;`

x :	58	63	49	18	7
Index :	0	1	2	3	4

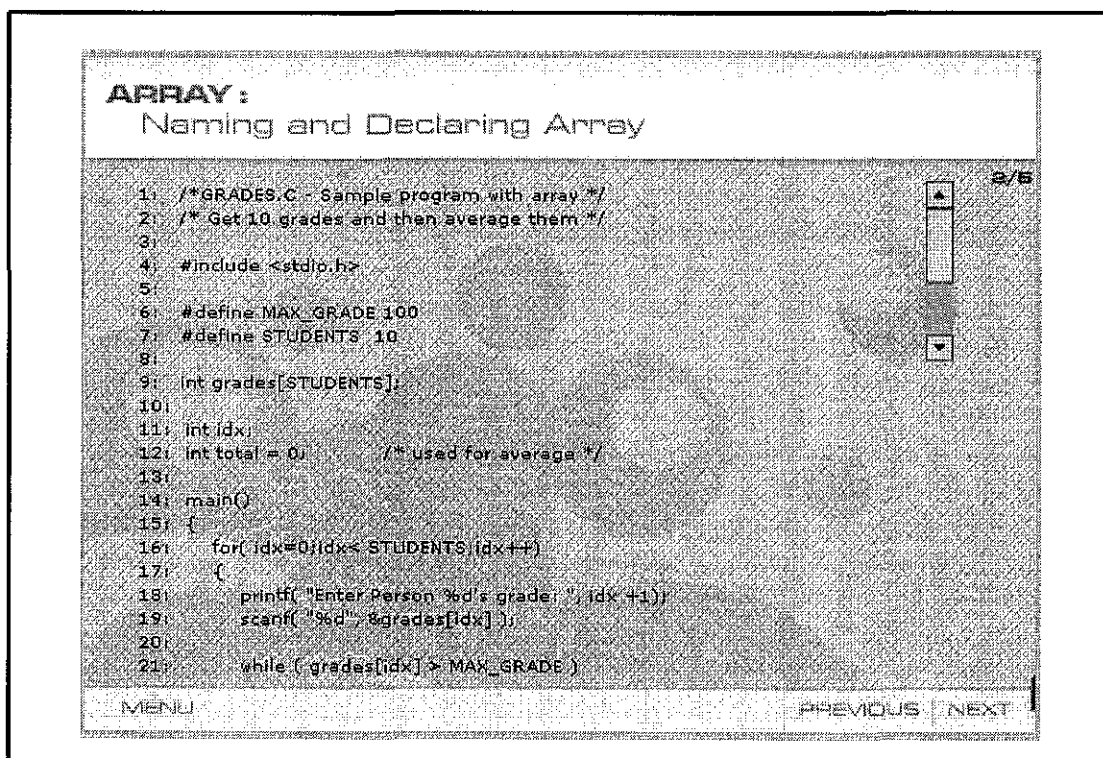
\*Memory after assignment

MENU PREVIOUS

Figure 4.2.3 (b); The continuation of Array's definition.

The figures of 4.2.3 (a) and 4.2.3 (b) shows about the example of Array content that have been out into the product. The notes given are quite short yet understandable by users because the developer tends to use simple languages and drawn pictures to elaborates the information and ideas

The figure below depict about the sample program that developer want to shows for users to make them know how they can used Array element into C programming. The next figure however, will show the output from the previous sample program.



```
ARRAY :
Naming and Declaring Array

1:  /*GRADES.C - Sample program with array */
2:  /* Get 10 grades and then average them */
3:
4:  #include <stdio.h>
5:
6:  #define MAX_GRADE 100
7:  #define STUDENTS 10
8:
9:  int grades[STUDENTS];
10:
11:  int idx;
12:  int total = 0;      /* used for average */
13:
14:  main()
15:  {
16:      for( idx=0; idx< STUDENTS; idx++)
17:      {
18:          printf( "Enter Person %d's grade: ", idx +1);
19:          scanf( "%d", &grades[idx] );
20:
21:          while ( grades[idx] > MAX_GRADE )

```

MENU PREVIOUS NEXT

Figure 4.2.3 (c); The example of sample program of Array

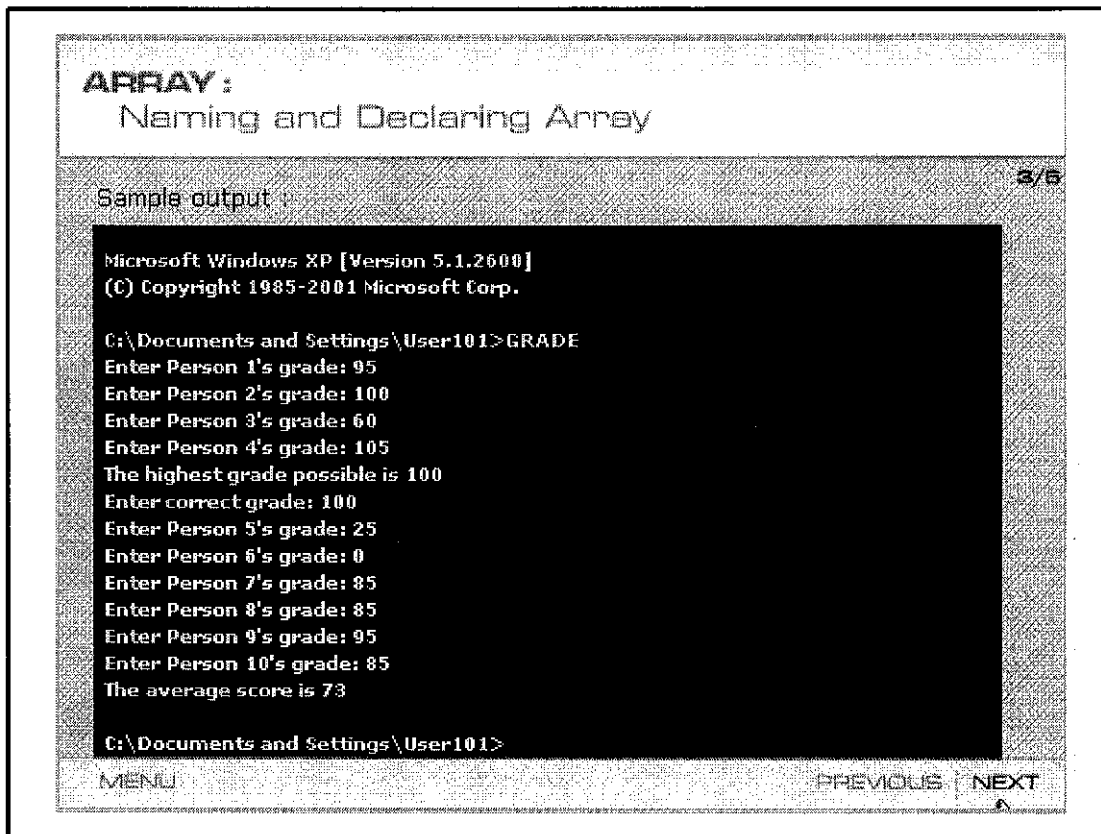


Figure 4.2.3 (d); The sample output of Array

The reason why the developer put the number for every single line on sample program as shown in figure 4.2.3 (c) is because she wants to give the explanation ( as shown in figure 4.2.3 (e) )about the method used by the programmer in order to create the sample programming. The purposed of the explanation is to make users understood about the provided sample and perhaps they can create their own program better.



**ARRAY :**  
Naming and Declaring Array

4/5

Explanation :

**Line 9:** The array for this program is named grades. It should be safe to assume that this array holds grades.

**Line 6 and 7:** Two constants, MAX\_GRADE and STUDENTS, are defined. These constants can be changed easily. Knowing that STUDENTS is defined as 10, then that the grades array has 10 elements. Two other variables are declared, idx and total. An abbreviation of index, idx is used as a counter and array subscript. A running total of all grades is kept in total.

**Line 16 through 30:** The heart of this program is the for loop in lines 16 through 30. The for statement initializes idx to 0, the first subscript for an array. It then loops as long as idx is less than the number of students. Each time it loops, it increments idx by 1. For each loop, the program prompts for a person's grade (lines 18 and 19). Notice that in line 18, 1 is added to idx in order to count the people from 1 to 10 instead of from 0 to 9. Because arrays start with subscript 0, the first grade is put in grade[0]. Instead of confusing users by asking for Person 0's grade, they are asked for Person 1's grade.

MENU PREVIOUS | NEXT

Figure 4.2.3 (e) Explanation about the method used in sample program.

#### 4.2.4 The Q&A Section

**ARRAY :**  
Questions & Answer

1/4

**Q - What happens if I use a subscript on an array that is larger than the number of elements in the array?**

**A -** If you use a subscript that is out of bounds with the array declaration, the program will probably compile and even run. However, the results of such a mistake can be unpredictable. This can be a difficult error to find once it starts causing problems, so make sure you're careful when initializing and accessing array elements.

MENU PREVIOUS | NEXT

Figure 4.2.4 Example of Q&A

The purposed to provide the Q&A section is to give further information about the common problem that the people would face. This section perhaps will help the student to better understand and to prevent them from the mistake while using Array.

### Figure 4.2.5 Exercises and Self-Test.

The last section on Array, as shown at figure 4.2.5 (a), the developer had provided a few multiple choice questions for students to test their understanding about Array as general. To answer the respective questions, the students need to select the appropriate answer and they will tell by the program whether their answer is correct or wrong. This section consists 15 questions and after answer all the questions, the marks will be given (figure 4.2.5 (b)).

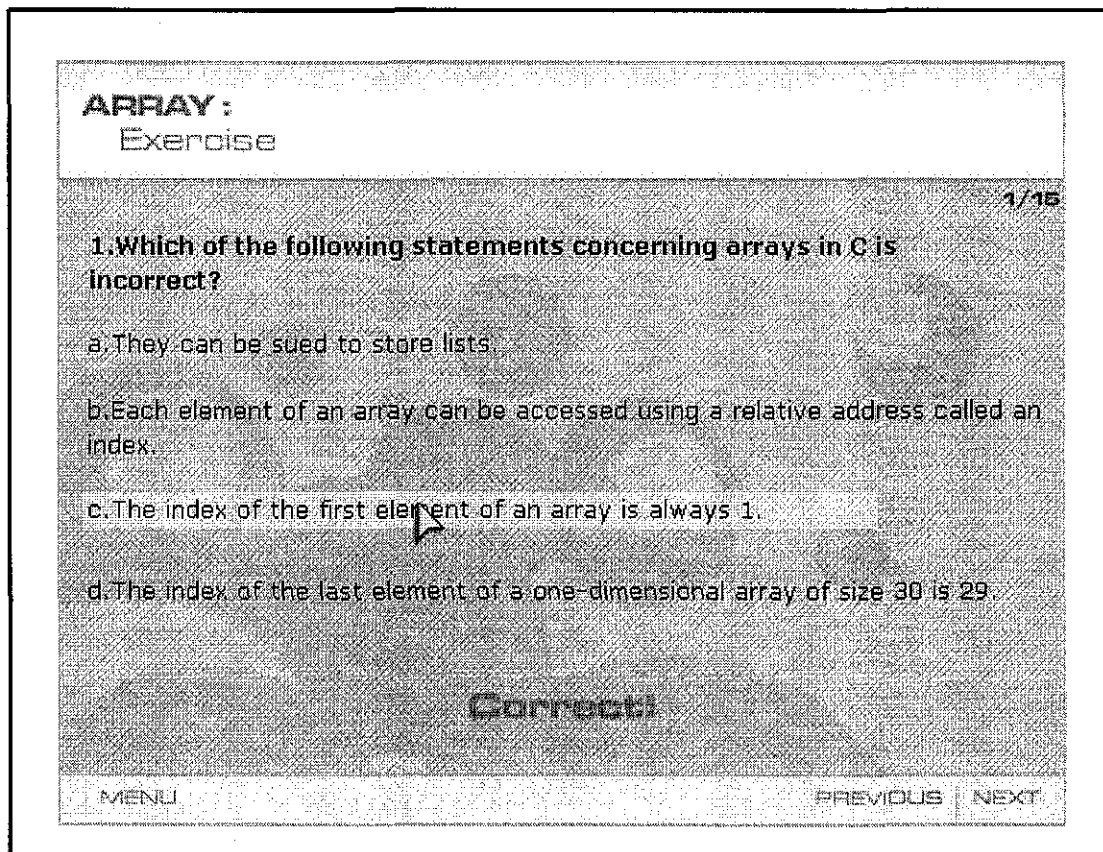


Figure 4.2.5 (a): The snapshot of the exercise part for user revision

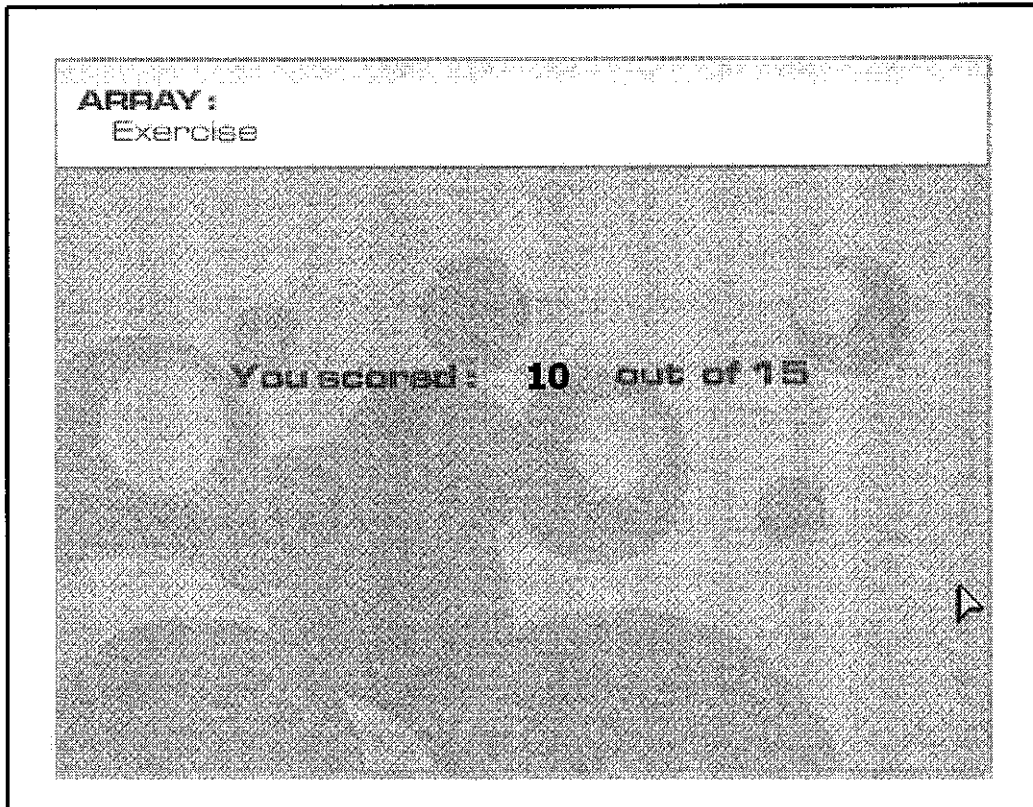


Figure 4.2.5 (b); The snapshot of student's scored

After student have the scored from the multiple choice question, she will be provided to have her own-test (figure 4.2.5 (c)) about how to declare or write the correct array into program, then she can compare her answer by click at the 'Done' button, and the exact answer will be appear at the right side of the page.

**ARRAY :**  
Exercise

**Self Test**

1. Write a declaration for an array fit of 20 elements of type

Try Here	Sample answer :
<pre>float element[20];</pre>	<pre>float fit[20]</pre>

Figure 4.2.5 (c); The snapshot of self-test section.

### **4.3 TESTING**

The purposed of the testing was to evaluate the effectiveness of the product developed. The developer decided to use the questionnaire methods in order to elicit the information from selected evaluators because this method is simple, save time and cost. Below, it the procedures that she was used during testing session;

#### **4.3.1 Preparation of Questionnaire**

There were about 10 set of questions in it, and these questions will asked about the content of the web whether it is understandable by users or not and also the overall layout of the interface to make sure the interface created is user-friendly and meet the usability. The 5 questions were made for each sections which give the total of 10 questions. The questions created should be precise and well defined in order to elicit quality answer from evaluators.

#### **4.3.2 Conduct the Testing and Evaluation**

The evaluator will give the url address for them to access the web-site and the questionnaires were distributed. Overall, the evaluators were taken around 5 to 10 minutes to navigate with the product and then answer the provided questions. They also are free to provide any necessary comments in order to improve the web-based presentation.

There are 10 questions which need to be answered by the evaluators. 5 questions were about the content of the web-based and another 5 were about the overall layout of the interface. Below are the rating provided from 1 to 5 for the evaluators to choose;

- 1 -- Strongly Agree
- 2 -- Agree
- 3 -- Not Sure
- 4 -- Disagree
- 5 -- Strongly Disagree

After the evaluators completed the answers, they need to give back the set of questionnaires to developer for her to do an analysis regarding the results that have been collected.

#### 4.4 RESULTS AND DATA ANALYSIS

The 20 questionnaires provided are actually consisting 2 sections. The questions from section 1 focus about the usability content of the web-based and the questions from section 2 about the layout presentation of the web-based. Below are the results and data analysis for each particular section.

##### 4.4.1 Section 1 – The Content of the Web-based.

The data from section 1 as shows in figure 4.4.1 was based on the answers for the evaluators. The total mean was calculated to get the average of scores and the total mod was gathered to get the most frequent score chosen by evaluator. The total mean in this section is 3 while the total mod is 2 and 3.

<b>Section 1 – The Content of The Web-based</b>						
<b>Questions</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Total</b>
Evaluator 1	2	2	2	2	2	
Evaluator 2	1	1	2	3	3	
Evaluator 3	3	2	3	4	4	
Evaluator 4	2	3	3	4	5	
Evaluator 5	4	4	5	5	5	
Evaluator 6	2	2	2	2	2	
Evaluator 7	4	4	4	3	5	
Evaluator 8	2	3	3	3	5	
Evaluator 9	2	2	5	4	5	
Evaluator 10	3	3	3	3	3	
<b>MEAN</b>	<b>2.5</b>	<b>2.6</b>	<b>3.2</b>	<b>3.3</b>	<b>3.4</b>	<b>3</b>
<b>MOD</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>2 and 3</b>

Table 4.4.1; The data gathered from section 1

According to the score from section 1, the histogram graph was constructed. The figure below shows the distribution of scores for each of the questions in this section.

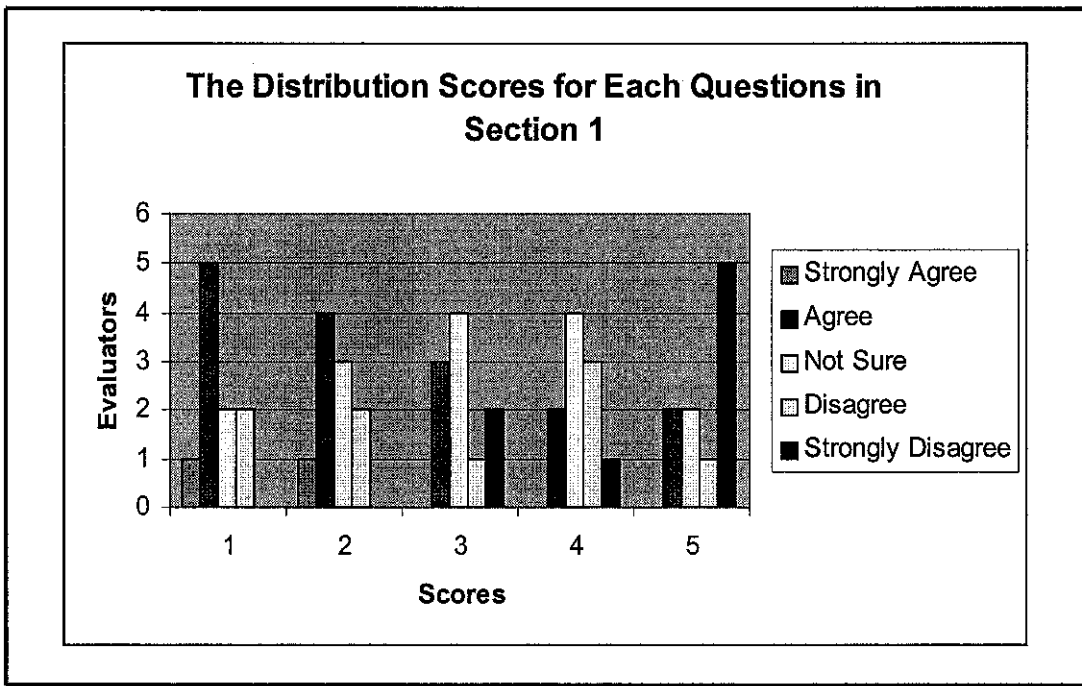


Figure 4.4.1 (a); The Distribution for Each Questions in Section 1

The figure below shows the result from section 1 by using pie chart to give the better view about the percentage gathered from the data analysis.

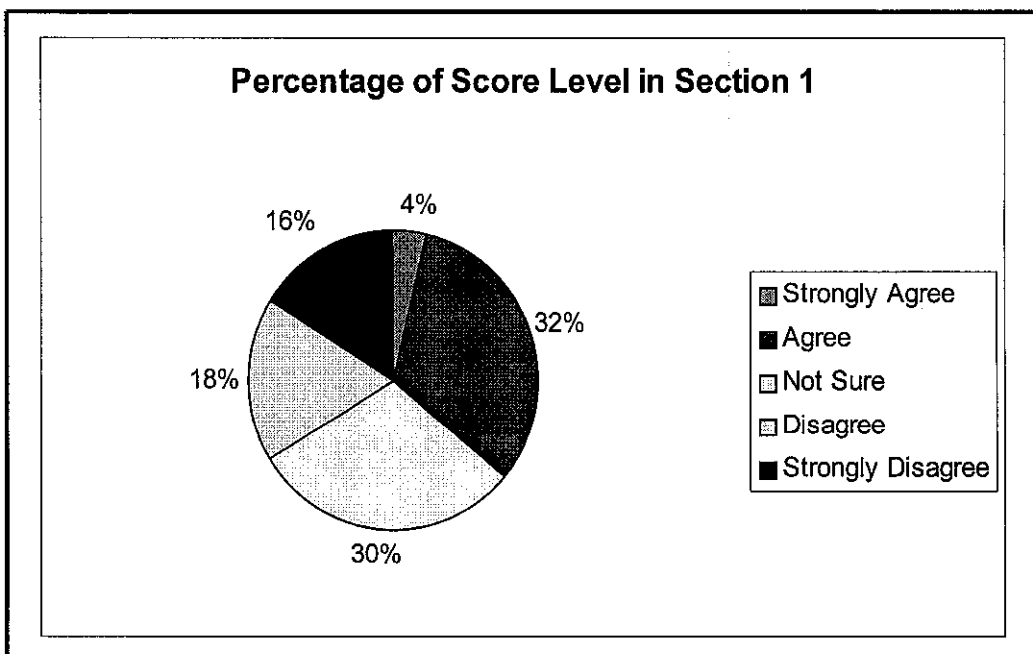


Figure 4.4.1 (b); The Percentage of Score Level in Section 1



**4.4.2 Section 2- The Layout of the Web-based Interface**

The figure below shows the elicited scores from section 2 taken from the respective evaluators. The work done is same as section 1 and the total mean was calculated to get the average of scores while the total mod was gathered to get the most frequent score chosen by evaluator. The total mean in this section is 2.2 and the total mod is 2.

<b>Section 2 – The Layout of the Web-based Interface</b>						
<b>Questions</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Total</b>
Evaluator 1	1	1	1	1	1	
Evaluator 2	2	1	4	2	2	
Evaluator 3	3	2	3	3	3	
Evaluator 4	3	2	3	3	2	
Evaluator 5	3	2	4	4	4	
Evaluator 6	2	2	2	2	2	
Evaluator 7	1	1	1	1	1	
Evaluator 8	2	2	3	2	2	
Evaluator 9	2	2	1	2	2	
Evaluator 10	3	3	3	3	3	
<b>MEAN</b>	<b>2.2</b>	<b>1.8</b>	<b>2.5</b>	<b>2.3</b>	<b>2.2</b>	<b>2.2</b>
<b>MOD</b>	<b>2 and 3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>

Table 4.4.2; The data gathered from section 2

Figure 4.4.2 (b) shows the Histogram regarding the distribution for each question in section 2

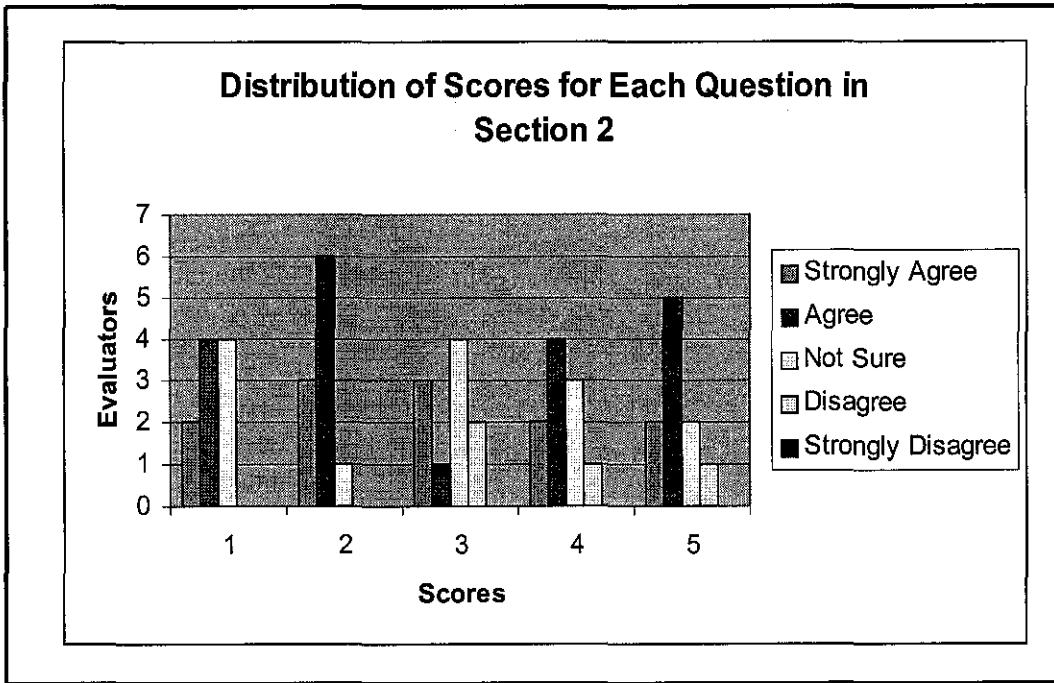


Figure 4.4.2 (a); The Distribution of Scores for Each Question in Section 2

To depict the data more precise, the pie chart was constructed as seen in figure 4.4.2 (c). The results are presented by percentages to see which group would score higher in this section.

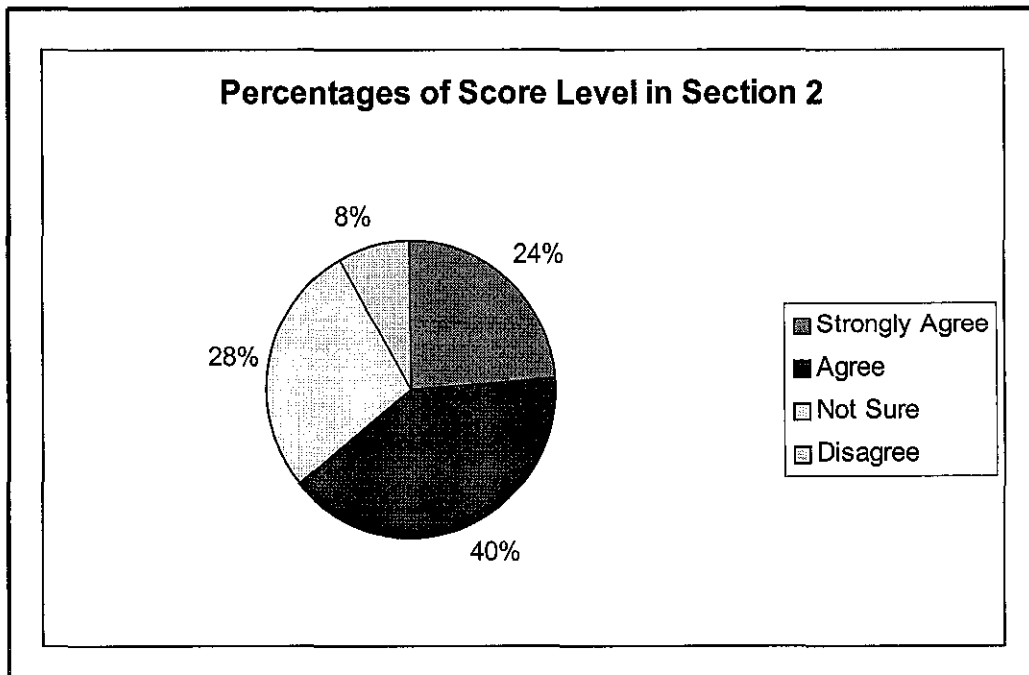


Figure 4.4.2 (b); The Percentages of Score Level in Section

## **CHAPTER 5**

### **CONCLUSION**

#### **5.1 CHALLENGES**

There were many challenges during the completion of this project and one of the major problems is to learn how to use Flash MX because student is not familiar with this application before and needs sometime to learn the basic of software.

Another challenges is during the designing phase including the design of interface, and button. It is challenging because it needs a lot of creativity and idea to make the design attractive.

Finally, the challenge is how to complete the project according to the available time. As mentioned in methodology before, the used of evolutionary model will need sometime until the project can proceed to the next level of development. Besides, the student also has to struggle in order to maintain the work progress and to finish the reports that need to submit in time.

## 5.2 RECOMMENDATION

The web-based development is lack with interactive features and detailed contain of C Programming topics since this project was only a 'prototype' and ii just include 'Arrays' topic as a beginning. The student would like to recommend that the content of the project should include all the relevance topic of C Programming for the future enhancement.

It also recommended enhancing the exercise feature on the project because the existing exercise provided is not quite impressive and the users are not able to do some simulation to test their understanding toward the topic.

Finally, the student would like to suggest so that the system will be available via internet since the previous system is just enable for intranet only. The online forum or discussion can be made so that the users and lecturer can discuss online about anything that relates with the topic and it will make the learning process more interesting and interactive.

### 5.3 CONCLUSION

In UTP, the student has been exposed to the learning environment with LMS or Learning Management System using Blackboard. The differences between this system compare to the Blackboard are, this system no need the student to enter the password and the presentation is in interactive manner while in e-learning, mostly lecturer upload the notes using PowerPoint slide but the student cannot upload the notes as they can in e-learning.

In conclusion, this report introduces the early stage and the overall of the development through the use multimedia. The website can be considered as a reliable method for student to learn the programming language in alternative way as make the learning process more fun and interesting.

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## **APPENDICES**



## QUESTIONNAIRES

All questions must be answered. For all of the questions, evaluators need to give rate from 1 – 5

1-Strongly agree 2-Agree 3-Not sure 4-Disagree 5-Strongly disagree

### Section 1 – The content of the web-based

1. The content of this web-based had really easy for student to understand it

1                      2                      3                      4                      5

2. Do you think the lessons presented in the web-based is attractive

1                      2                      3                      4                      5

3. The content is very suitable to help the new learner of C programming.

1                      2                      3                      4                      5

4. The medium of teachings that were used in the web-based (ex: illustrations ) is very suitable for the new learner and first year student.

1                      2                      3                      4                      5

5. The web-based had provide enough information for student to learn from it

1                      2                      3                      4                      5

**Section 2 – The layout of the web-based interface**

1. The buttons were arranged in a good and suitable position (easy to use)

1                      2                      3                      4                      5

2. User won't have any problems to go from one section to other section, or from one lesson into another

1                      2                      3                      4                      5

3. The contents/information, and illustrations were put in a suitable way for the user to read and learn

1                      2                      3                      4                      5

4. User will not have any problems to use the web-based in terms of the layout designed on the web-based.

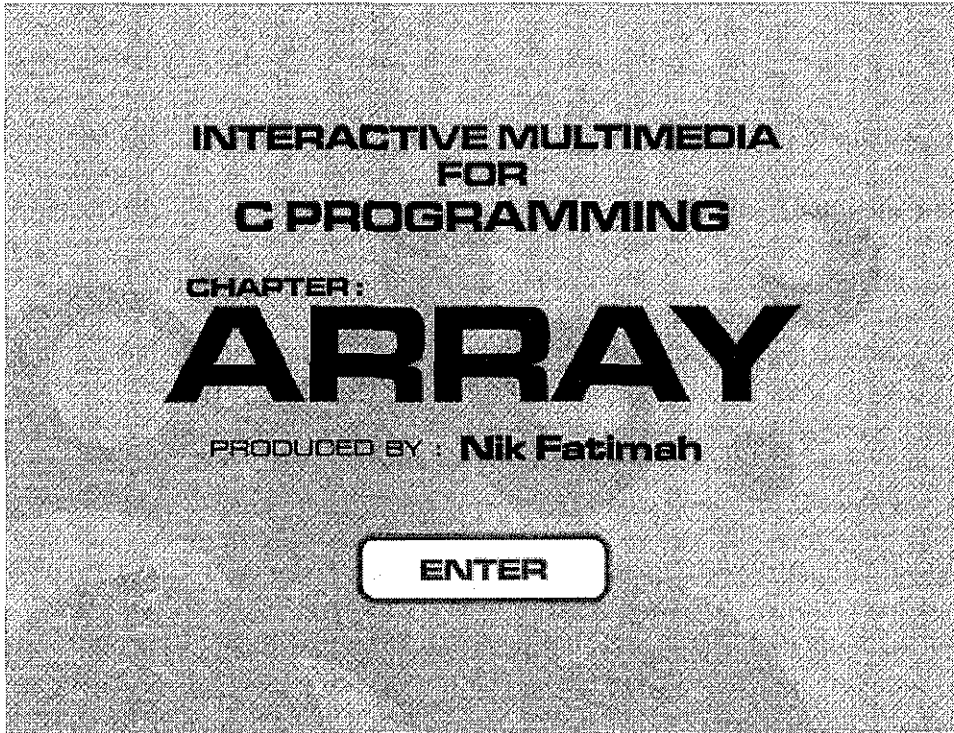
1                      2                      3                      4                      5

5. The overall layout design of the web-based is very good and user-friendly

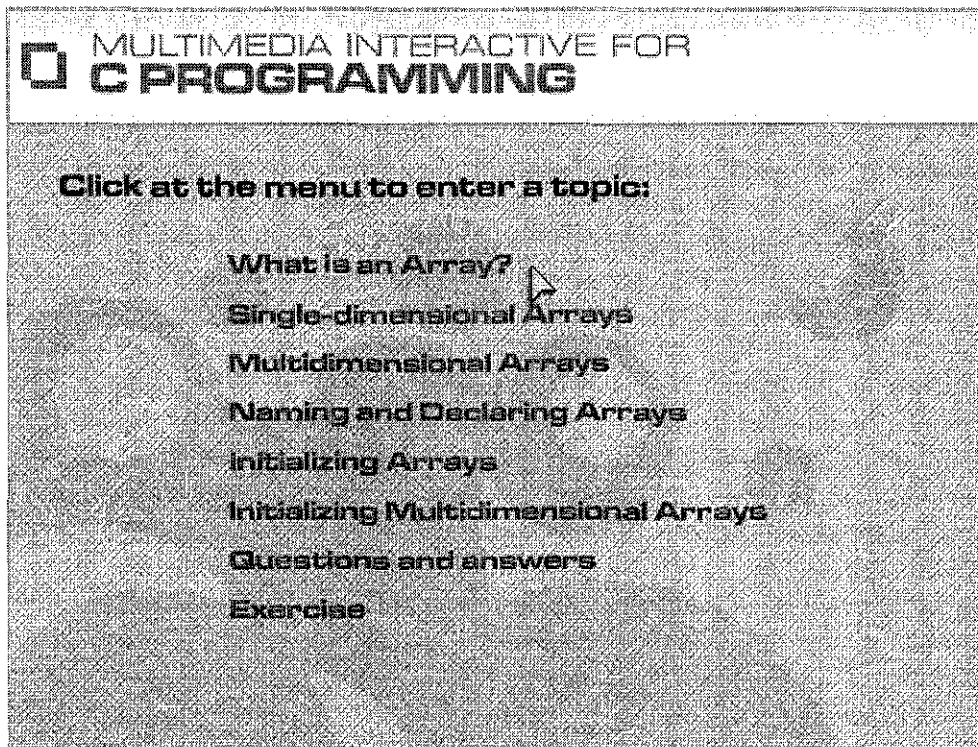
1                      2                      3                      4                      5

## SCREENSHOTS

### 1. The Main Page



### 2. The Main Menu



### 3. Example of a Sub-topic Content In Web-based.

#### Naming and Declaring Array

##### (i) The definition of naming and declaring Array

**ARRAY :**  
Naming and Declaring Array

1/5

An array name must be unique. It can't be used for another array or for any other identifier (variable, constant, and so on). Array declarations follow the same form as declarations of non-array variables, except that the number of elements in the array must be enclosed in square brackets immediately following the array name.

**int checker[8][8];**

When you declare an array, you can specify the number of elements with a literal constant (as was done in the earlier examples) or with a symbolic constant created with the #define directive. Thus, the following:

#define MONTHS 12  
int array[MONTHS];

is equivalent to this statement: int array[12];

(ii) The sample program in 'Naming and Declaring Array'

```
ARRAY :  
Naming and Declaring Array  
2/8  
1: /*GRADES.C - Sample program with array */  
2: /* Get 10 grades and then average them */  
3:  
4: #include <stdio.h>  
5:  
6: #define MAX_GRADE 100  
7: #define STUDENTS 10  
8:  
9: int grades[STUDENTS];  
10:  
11: int idx;  
12: int total = 0; /* used for average */  
13:  
14: main()  
15: {  
16:     for( idx=0; idx < STUDENTS; idx++)  
17:     {  
18:         printf( "Enter Person %d's grade: ", idx +1);  
19:         scanf( "%d", &grades[idx] );  
20:  
21:         while ( grades[idx] > MAX_GRADE )
```

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(iii) The sample output of program

## ARRAY :

### Naming and Declaring Array

Sample output :

3/5

```
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\User101>GRADE
Enter Person 1's grade: 95
Enter Person 2's grade: 100
Enter Person 3's grade: 60
Enter Person 4's grade: 105
The highest grade possible is 100
Enter correct grade: 100
Enter Person 5's grade: 25
Enter Person 6's grade: 0
Enter Person 7's grade: 85
Enter Person 8's grade: 85
Enter Person 9's grade: 95
Enter Person 10's grade: 85
The average score is 73

C:\Documents and Settings\User101>
```

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PREVIOUS | NEXT

(iv) The explanation of sample program

## ARRAY :

### Naming and Declaring Array

Explanation :

4/5

**Line 9:** The array for this program is named grades. It should be safe to assume that this array holds grades.

**Line 6 and 7:** Two constants, MAX\_GRADE and STUDENTS, are defined. These constants can be changed easily. Knowing that STUDENTS is defined as 10, then that the grades array has 10 elements. Two other variables are declared, idx and total. An abbreviation of index, idx is used as a counter and array subscript. A running total of all grades is kept in total.

**Line 16 through 30:** The heart of this program is the for loop in lines 16 through 30. The for statement initializes idx to 0, the first subscript for an array. It then loops as long as idx is less than the number of students. Each time it loops, it increments idx by 1. For each loop, the program prompts for a person's grade (lines 18 and 19). Notice that in line 18, 1 is added to idx in order to count the people from 1 to 10 instead of from 0 to 9. Because arrays start with subscript 0, the first grade is put in grade[0]. Instead of confusing users by asking for Person 0's grade, they are asked for Person 1's grade.

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## ARRAY :

### Naming and Declaring Array

5/5

**Lines 21 through 27:** Contain a while loop nested within the for loop. This is an edit check that ensures that the grade isn't higher than the maximum grade, MAX\_GRADE. Users are prompted to enter a correct grade if they enter a grade that is too high. You should check program data whenever you can.

**Line 29:** Adds the entered grade to a total counter. In line 32, this total is used to print the average score (total/STUDENTS).

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PREVIOUS



#### (v) The Questions and Answer section

## ARRAY :

### Questions & Answer

1/4

**Q - What happens if I use a subscript on an array that is larger than the number of elements in the array?**

**A -** If you use a subscript that is out of bounds with the array declaration, the program will probably compile and even run. However, the results of such a mistake can be unpredictable. This can be a difficult error to find once it starts causing problems, so make sure you're careful when initializing and accessing array elements.



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#### (vi) The Exercises section.

**ARRAY :**  
Exercise

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1. Which of the following statements concerning arrays in C is incorrect?

- a. They can be used to store lists.
- b. Each element of an array can be accessed using a relative address called an index.
- c. The index of the first element of an array is always 1.
- d. The index of the last element of a one-dimensional array of size 30 is 29.

Correct!

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(vii) The Self-test section.

**ARRAY :**  
Exercise

**Self Test**

1. Write a declaration for an array flt of 20 elements of type

Try Here

```
flt element[20];
```

Sample answer :

```
float flt[20];
```

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