

## Chapter 7 System Evaluation

### 7.1 Problems Encountered and Solutions

There won't be any system being developed without problems and the same goes for CTutorial4u where it is not without its fair share of problems. Firstly, not sure whether knowledge based system can be developed as standalone system and once it is verified with the supervisor Puan Nazean Jomhari then proceeded to develop the system in Microsoft Visual Basic 6.0 and Microsoft Access 2000 as the database tool. Other than that, there are other minimal problems encountered which had occurred during the coding and testing phase. Table 7.1 describes the problems and solution during coding and testing phase.

**Table 7.1: Problems Encountered and Solutions**

No.	Problems	Solution
1.	Cannot retrieve data from the record source of the database.	Converted MS Access 2000 to its prior version which is the MS Access 97.
2.	Difficulty in designing the Tutorial session in the tab format to reduce number of screen with the same design. Coding is unsure.	Referred with other system developed in VB 6.0 which has the tab functions.
3.	Lecture notes to be in the power point format.	Inserted the reference power point and called the power point format in the code.
4.	Program code in the Tutorial session to be compiled in Visual Studio C compiler and display the output from C.exe	Failed to call the Visual C compiler and if it is to be done then it will slow down the processing and increase the response time to the user. So as a remedial the exact execution file is designed in Visual Basic 6.0 where interface .design looks the same as how it looks in command prompt when C program is executed.
5.	Difficult to get the students to test and evaluate the system.	Installed in one of FCSIT's lab and tutors helped to get the students test the system.

7.2 System Strengths

The functionalities such as user friendliness, password protected reliable system with error handling, interactive, simplicity and consistency and has validation on the user input. There is an evaluation form as depicted in Appendix B distributed to the users which was used to evaluate the system in terms of the functionalities described earlier. Most of the feedback received are very encouraging and favors the system considerably.

The Ctutorial4u was evaluated in terms of its contribution to help them in learning the system in easier way. When asked to rate how much they learned from working with the system, mostly rated 3 where the choices were from 1 to 5 (1 = Little, 5 = Very much). This is shown clearly in Figure 7.1. The majority of the students appreciated the exploratory, hands-on approach, learning their own pace and found that learning with Ctutorial4u is more personal than lectures.

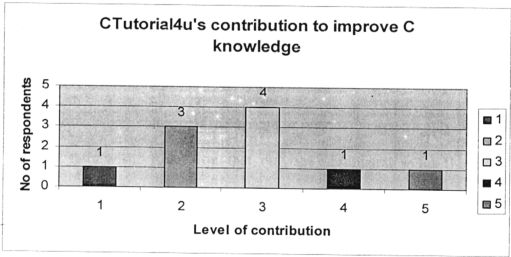


Figure 7.1: CTutorial4u’s contribution to improve C knowledge

7.2.1 User Friendliness

The system is user friendly with minimal of unrecognized format of button. The user can easily know what to do next when they are at one of the page. It has simple and

consistent user interface. The program flow of each sub-module was designed to be as easy as possible to avoid misunderstanding and confusion among the users. The evaluation form distributed, requires users to rate the system in terms of user friendliness. There were rating options of user friendliness from 1 to 5 (1=Not at all, 5=Very). Majority of the respondents rated Ctutorial4u as 4 were it's considered more than average rating. The Figure 7.2 shows the results of user's rating for Ctutorial4u in terms of user friendliness.

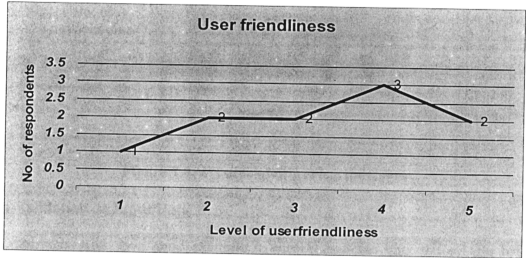


Figure 7.2: User friendliness of Ctutorial4u

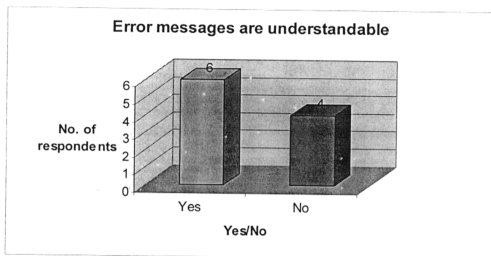
### 7.2.2 Password Protected System – Security Features

Only the authorized user can access the system to restrict the system only be used when the lecturer or tutor wish. Apart from that, only the administration has the rights to do user management (add, delete & edit users) and quiz management (add, delete, & edit question). This function is tested in the testing phase all of the respondents agree that the system only allows authorized users to change and login to the system.

### 7.2.3 Reliable System with Effective Error Handling

All the error messages are effective and reliable where the error message also gives instruction to avoid the problem again. Figure 7.3 depicts the responds of users whether

they understood the system's error messages clearly or not during the testing. The 60% of the respondents said that they understood well but 40% disagrees that the error messages are understandable. In future enhancements phase, the system's error messages need to be given more importance.



**Figure 7.3: CTutorial4u's error messages**

#### **7.2.4 Validation on Input Data**

The tutorial session is a good example to clearly indicate how the system has the validation on input data feature. When the user selects integer in Arithmetic topic, only numbers are allowed and other keys on the keyboard will not be accepted.

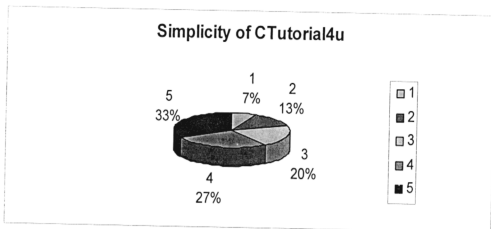
#### **7.2.5 Interactivity**

One of the added values to this system is the interactivity where user data are captured and stored in memory and the code is amended accordingly based on the user's input data. This feature is in the tutorial session.

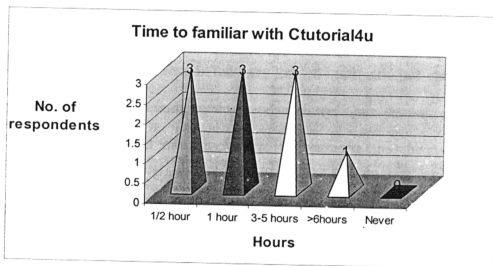
#### **7.2.6 Simplicity & Consistency**

The system is simple to use and the clear instruction made the users to be easy start to use and exit from the system. The system is simple to adopt because screen design is

consistent throughout each session in the system. Figure 7.4 shows the rating among the users regarding simplicity of the system where majority which is 33% rated 1 for the scale (1=Simple, 5 = Very complicated).



**Figure 7.4: Simplicity of CTutorial4u**



**Figure 7.5: Time taken to familiarize with the system**

The Figure 7.5 depicts that there are 3 users take ½ hours time, 3 users 1 hour and 3 users takes 3 to 5 hours time to familiarize with the system. When the system is consistent in terms of screen design and has all the good design features described by Jacob Nielsen then it is easy to understand and used by novice users.

### **7.3 System Limitations**

On contrary to the system strengths, the system has a few limitations which need further works to enhance the system to be zero-defect.

#### **7.3.1 Poor Accessibility Feature**

Since the system is a standalone system and it is limited to be used from where the system is being installed. It is intended to be installed in the laboratory of Faculty of Computer Science and Information Technology (FCSIT) of University Malaya (UM). So, the system cannot be accessed from outside of this laboratory. It is one of a constraint but the requirement was in a way.

#### **7.3.2 Lack of information quality**

The tutorial session and quiz session has very limited information or choices to select. This is because time consuming to do the data entry. Quiz session constrained by providing only ten questions for each chapter. If given more time the system will have more questions for each chapter.

#### **7.3.3 Quiz session only consists of multiple choices questions**

There is only multiple choice questions available in the quiz session. The system did not cater subjective question where the user writes the code and the system verify the code is acceptable or not. This function needs more time where every string and character is searched one by one and if the characters matches with the code provided then the system should indicate it is acceptable.

## **7.4 Future Enhancements**

Despite of the system limitation discussed earlier, the system requires further enhancements.

### **7.4.1 Web- based system**

In the future, the system will be published developed as a web based system and published to World Wide Web using VB.Net to be accessed by everyone. This will be a tool to learn C programming and as online quiz to test user's capability of programming using C.

### **7.4.2 Improve Information Quality**

Data entry of all the possible questions to be asked should be entered to the database of quiz session.

### **7.4.3 Quiz session to be more interactive**

Allow the users to key in their program codes and check whether their codes are acceptable by comparing them with the records in the database.

## **7.5 Comparison between before and after using CTutorial4u**

The Table 7.2 actually describes how CTutorial4u helps the students in the aspects of time, exercise, interactivity, simplicity and passing rates. From that table, it is clear that CTutorial4u actually contributed a lot to the students in improving their knowledge in C.

**Table 7.2: Comparison between before and after using Ctutorial4u**

Aspects	Before	After
Time	<ul style="list-style-type: none"> <li>Learn through books, time consuming to search for quality books.</li> <li>Not timely feedback from the book or manual tutorial.</li> </ul>	<ul style="list-style-type: none"> <li>Saves time where Ctutorial4u act as a reference &amp; installed in laboratories and everyone can use it.</li> <li>Timely feedback for tutorial and quiz session.</li> </ul>
Exercise	<ul style="list-style-type: none"> <li>Students go through quiz or exercise from the book; some exercises no answers.</li> </ul>	<ul style="list-style-type: none"> <li>Students enjoy going through quiz or tutorial session with immediate feedback.</li> </ul>
Interactivity	<ul style="list-style-type: none"> <li>Books and classroom lectures doesn't cater individual needs.</li> <li>Difficult for students to know whether the code they write in paper is correct.</li> </ul>	<ul style="list-style-type: none"> <li>CTutorial4u provide tutorial session as a tool where it gathers user input to manipulate codes stored in database.</li> <li>Validate user input where if variable type is integer then only whole numbers are allowed to be selected for variable value in tutorial session for the topic of arithmetic.</li> </ul>
Simplicity	<ul style="list-style-type: none"> <li>Students find topics such as array and pointers difficult.</li> </ul>	<ul style="list-style-type: none"> <li>Simplified 6 major topics; arithmetic, control structures, functions, array, pointer and file processing in tutorial session using rule-based architecture.</li> </ul>
Passing rates	<ul style="list-style-type: none"> <li>Low passing rates in C programming in local universities.</li> </ul>	<ul style="list-style-type: none"> <li>Tool to increase passing rates in C programming. (Not proven but an added exercise/reference for poor students).</li> </ul>