STUDENT'S MASTERY IN HUMAN-COMPUTER INTERACTION BASED ON COURSE LEARNING OUTCOMES

Mageswary d/o Muniandi[1], Jamaliah Binti Musa[2]

[1](JTMK, Ungku Omar Polytechnic, Malaysia)
[2](JTMK, Ungku Omar Polytechnic, Malaysia)

ABSTRACT *: DFP4023 Human-Computer Interaction is a part of the core module course to enhance the capability of students to design and implementation of the user interface in Human-Computer Interaction (HCI). HCI is a discipline concerned with the design, evaluation and implementation of an interactive computer system for human use and with the study of major phenomena surrounding them. This course offered to the student semester 3 or year 2 for Program Diploma Information Technology (Digital Technology). This paper objective is to identify the mastery level of students in DFP4023 HCI course based on a final examination answer script. The researcher finding shows that the students' mastery of the DFP4023 HCI course is good. The highest percentage of students scored grade A in this course. The finding shows that all students are master every topic successfully with a percentage above average.*

1. INTRODUCTION

Human-Computer Interaction involves the study, planning and design of the interaction between users and computer. The huge arrivals and development of technologies cause a computer system very influential in human life, which is design to make the human being's tasks easier. HCI plays the main role to improve the interaction between users and computers by making the computer move receptive to user needs and use. Interaction between user and computers occurs at the user interface, which includes both software and hardware. The interface acts as an intermediate between human and machines. The success or failure of the product relies largely on its interface.

DFP4023 Human-Computer Interaction is a part of the core module course to enhance the capability of students to design interaction and user-friendly interface. This course is offered to the students of semester 3 or year 2 for program Diploma Information Technology (Digital Technology). There are no prerequisites for this course. This course aim is to provide students with fundamentals knowledge of HCI, including areas such as user and task analysis, human factors, ergonomics, accessibility standards and universal design.

The course focuses on awareness in computer technology and the method usability plays a major part in achieving effective implementation's designs and interactivity. This provides a new dimension that will enrich the lives of people who are information computer adept.

This course syllabus content with four topics. The first topic is about The Introduction to Human-Computer Interaction. The second topic is about The Design Process. The third topic is about The Evaluation Techniques and the Last topic is about The Universal Design.

Course Learning Outcomes (CLO) is the statements that describe significant and essential learning that learners have achieved and able to demonstrate at the end of the course. CLO in DFC4023 HCI course, which are described in observable and measurable terms what a student can do after a completing of course. DFC4023 HCI course has three CLO, CLO1: Identify the concepts of user interface design to elevate technical complexity for usable product that accepted by user, CLO2: Organize a various styles of interfaces interaction of software and hardware product, CLO3: Develop an appropriate interface design and evaluation techniques for an interactive system effectively in real life.

This course assessment is carried out in two sections, coursework and final examination. The coursework contributes 50 percent of marks, which is measured with CLO1, CLO2 and CLO3. While, final examination contributes 50 percent of marks, which is fully measured with CLO1 only.

1.1 Problem Statement

Design in human-computer interaction aims is to create an interactive user interface that is easy and enjoyable to use. However, due to the multidisciplinary nature of HCI and the different value system of an interface user from various backgrounds and experiences, it is highly challenging designers to create applications, which are usable and affordable to such a heterogeneous set of users. This paper's aims to ensure the mastery of students in identifying the concept of user interface design to elevate technical complexity for the usable product accepted by the user.

1.2 Objective

The purpose of this research is to identify student's mastery in the DFP4023 HCI course for student session in December 2018 in Ungku Omar Polytechnic. Identify the percentage of student achievement in CLO1, CLO2 and CLO3 of DFP4023 HCI course. Identify the student's mastery in DFP4023 HCI course by topics. Identify the common mistakes, done by the HCI students in the final examination.

1.3 Literature Review

Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them [1]. They do gain practice on the concepts taught in class, but when focusing on only one-semester project, they may miss concepts and considerations, which is doesn't directly related to their particular project. In the big scheme of core curriculum requirements, the observation can make the students are well prepared to solve problems, but may not necessarily be prepared to design their solutions with the end-users in mind [2].

Human-computer interface design is not a simple art design, which is design not to use beautiful view, bright in colour but more concern towards the importance of peoples' perceptive, and with good human-computer interaction function. It should not only have a good guide for learners but also meet the necessary of interactive hands-on capacity, to achieve good learning results [3]. Teachers of HCI courses are facing at least five challenges. First, track and filter the latest HCI technologies extend. Second, apply the latest HCI technologies with effective and efficient educational manners. Third, aggregate the existing knowledge to the well-designed syllabus. Fourth, how to inspire students' innovation ability during HCI education. Finally, how to collect the curriculum resources and gain the relevant project experience [4]. A well-defined process for teaching an HCI course may help increase the number of such courses being offer [5].

Nowadays, the progress and development in interaction with computing devices has increased as fast that as a human being even we could not remain left with the effect of this and it has become our primary [6]. The incorporation of HCI components into IT courses provide undergraduates with the industrial experience that supports the theory taught at the university level. This allows for more efficient' communication between users and advanced technology. Focus on HCI will result in improvement of users' experience with the technology and enhancement of the usability of the future [7].

Ideally, all software should be easy to use and accessible for a wide range of users. However, reality shows that applications and web sites, from large-scale companies to smaller ones, often fall short of the most basic usability and accessibility goals [8]. We study HCI to determine how we can make this computer technology more usable by people. HCI must be taken seriously by the designers and educators, the requirement for additional complexity in the system is to be matched by increased clarity and usability in the interface [9]. However, HCI plays an important role in computer science, an authoritative survey shows that there are a clear knowledge gap and a reliance on on-the-job learning for topics related to human-computer interaction [10].

Human-computer interaction (HCI) is the study of the interaction between people and computers. Such interaction is implemented at the user interface. One of the major concerns of professional practitioners in the field of HCI is the design of interactive computing systems for human use. As a result, it is a basic goal of HCI designers to make computers more usable and more receptive to the user's needs. To provide the best possible interface within given constraints, the HCI designers are supposed to develop systems that minimize the barrier between the human's cognitive models of what users want to accomplish and the computer's understanding of the users' task [11]. In traditional human-centred HCI approaches, the category 'task' and related methods like task analysis are highly relevant components. To design a user interface-meeting the user's needs the designer must understand for which tasks one will use the system for and how they will be performed [12]

2. METHODOLOGY

The sample study consists of the students' program Diploma Information Technology (Digital Technology) in semester 3, Ungku Omar Polytechnic. Comprising 49 students took the DFP4023 HCI course for the session in December 2018. This study uses the second data, as the main data of this study is the final

examination answer script of the session student in December 2018. The data of this study were analysed using Microsoft Excel Software. This study aims to analyse the students' mastery in responding to the final exam questions in session December 2018.

The statistical analysis method used to identify the percentage of students' responding in the final examination question based on the topic. Statistical analysis was an approach to the selected script. Data obtained is analysed using Microsoft Excel 2013 software. This study involved 49 final examination answer script for course DFP4023 HCI of students in semester 3, Ungku Omar Polytechnic.

3.   RESULT AND ANALYSIS

3.1   Distribution of final exam question based on topics

Final examination paper of course DFP4023 for the session December 2018 divided with 2 section A and B. Section A content with 30 objective questions and section B has 2 structure questions. Structure question 1 has 6 items and question 2 has 10 items. TABLE 1 showed the figure of distribution question based on topics in the syllabus.

TABLE 1: Distribution of final examination based on topics.

Topic	Number of Item in section A	Number of Item in section B	
		Question 1	Question 2
1. Introduction to Human Computer Interaction	1, 2, 3, 4, 5	a, b, c	a
2. The Design Process	6, 7, 8, 9, 10, 11	d, e, f	
3. The Evaluation Techniques	12, 13, 14 , 15, 16, 17, 18, 19		b, c, d
4. The Universal Design	20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30		e, f, g, h, i, j

The findings from the research showed the number of questions for each topic is as in TABLE 2. The results found 36.96 percent question of the final examination is from topic 4 with quantity of 11 objective questions and 6 structure questions. Followed by topic 3, which is covered 23.9 percent question from the final examination consists of 8 objective questions and 3 structure questions from this topic. Finally, topic 1 and topic 2 are 19.57 percent question from the final examination. Topic 1 consists of 5 objective questions and 4 structure question. While topic 2 contributed 6 objective questions and 3 structure questions.

TABLE 2: Question distribution by the volume and percentage.

Topic	Total of question	Percentage
1. Introduction to Human Computer Interaction	9	19.57
2. The Design Process	9	19.57
3. The Evaluation Techniques	11	23.9
4. The Universal Design	17	36.96

3.2   Distribution of respondents' gender

Based on 49 answer scripts obtained, apportionment of respondent's gender showed in TABLE 3.

TABLE 3: Distribution of respondent's gender.

Gender	Number of Respondent		Percentage
Male	31		63.30
Female	18		36.70
Total	49		100

The result from the research obtained the number of the male respondent is 63.30 percentage is greater than the number of the female respondents is just 36.70 percent as shown in TABLE 3.

3.3 Distribution CLO attainment of DFP4023 HCI course

Based on the CLO analysis of DFP4023 HCI course showed, this course had achieved 100 percent for CLO 2 and CLO 3. While CLO 1 had achieved 93.88 percent, which is successfully reached the target of this course's attainment. The result from CLO analysis is shown in TABLE 4.

TABLE 4: Distribution CLO attainment of DFP4023 HCI course

| CLO	Percentage
1	93.88
2	100
3	100

3.4 Identify the percentage of students' achievement for course DFP4023 HCI

Based on an analysis of 49 final examination answer script, apportionment of respondents based on the percentage of students' achievement for DFP4023 HCI course. The output from the analyse is shown in TABLE 5 and GRAPH 1.

TABLE 5: The percentage of students' achievement for course DFP4023 HCI

Grade	Number of Student	Percentage
A	6	12.24
A-	14	28.57
B+	13	26.53
B	11	22.45
B-	2	4.08
C+	3	6.12

GRAPH 1: Percent of student's achievement for the DFP4023 HCI course
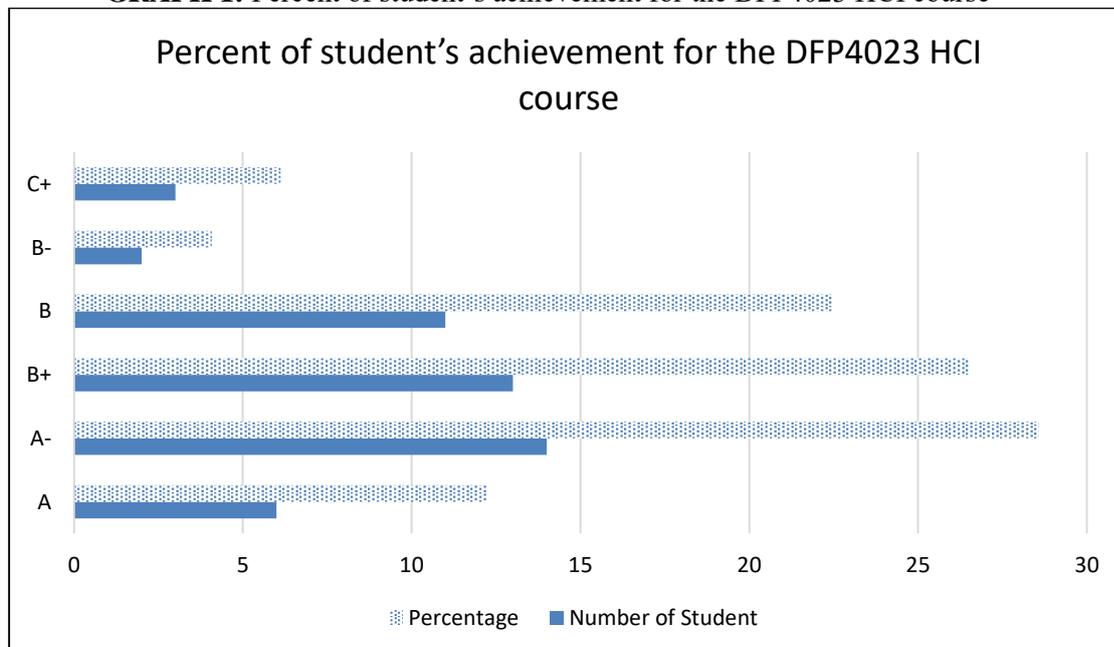

Referring to GRAPH 1 the number of students scored grade A and A- are 20 students and achieved 40.81 percent. However, grade B+ scored by 13 students and achieved 26.53 percent. While grade B scored by

11 students and achieved 22.45 percent. Grade B- scored by 2 students and achieved 4.08 percent. The lowest grade is C+, scored by 3 students 6.12percent.

3.5 Identify the mastery of students for the course DFP HCI by topics

Based on the 49 final examination papers that have been analysed, the respondent apportionment for mastery of students in the course DFP4023 HCI by topics as per the results are shown in the GRAPH 2.

**GRAPH 2:** Percentage for mastery of students in the DFP HCI course by the topics
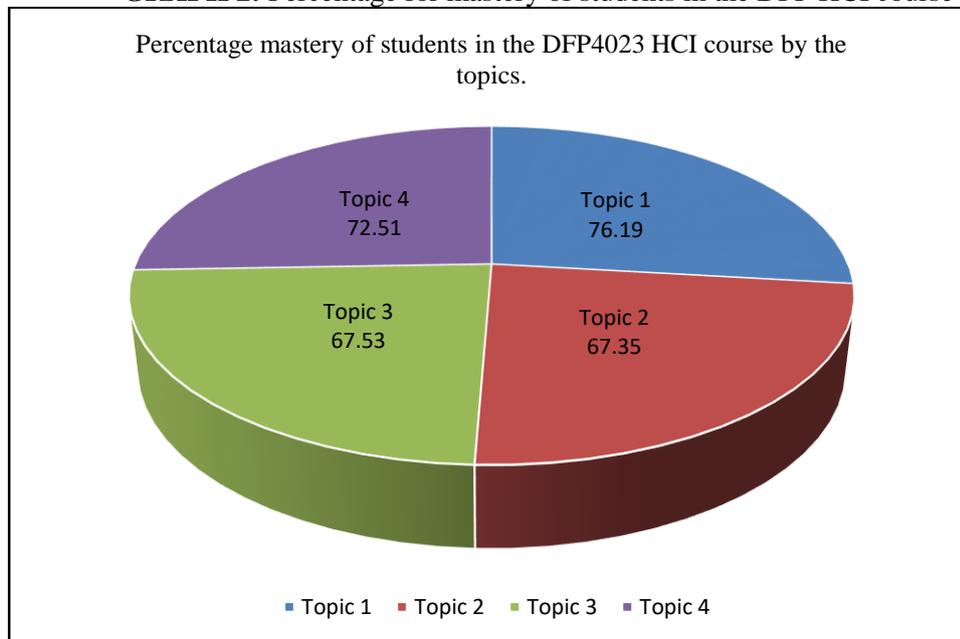
The result of research findings and analysis referring to GRAPH 2 shows the percentage of students' mastery of the DFP4023 HCI course is good and achieve percentage above average. Mastery of students' in topic 1 The Introduction of HCI is 76.19 percent (37 students) it is the higher percentage among the other topics. Mastery of students' in topic 4 The Universal Design is 72.51 percent (35 students) it is a second highest. While topic 3 The Evaluation Techniques and topic 2 The Design Process is 67.53 percent (33 students) and 67.35 percent (33 students).

3.6 Identify the common mistakes made by the student of DFP4023 HCI in the final examination

Based on the 49 final examination papers that have been analysed, the respondent apportionment by the common mistakes made by the student of DFP4023 HCI course in each topic shown in GRAPH 3.

GRAPH 3: Percentage of the common mistakes made by the students in DFP4023 HCI course.
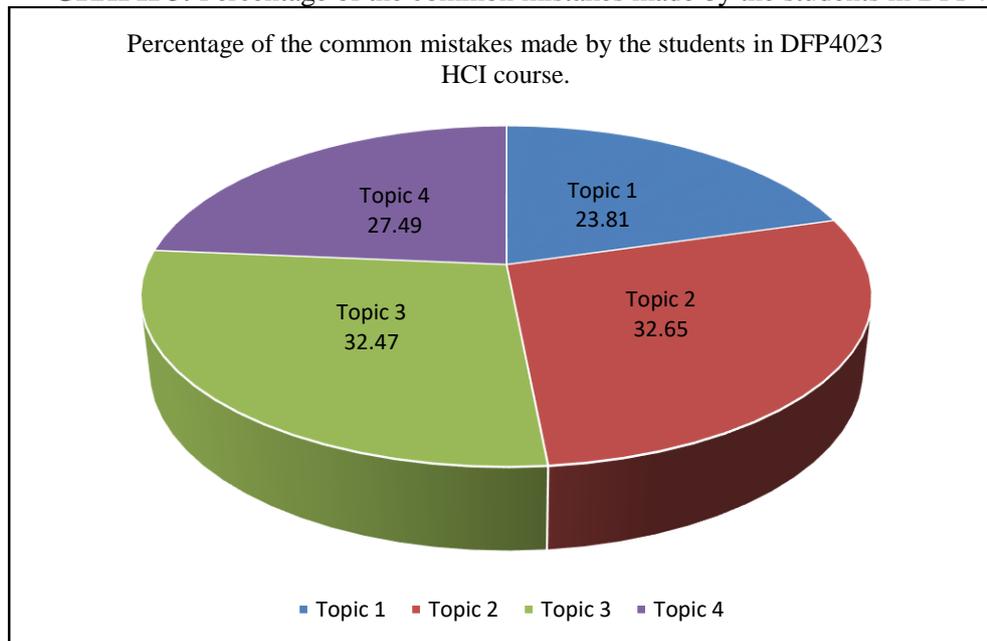
The result of research findings and analysis referring to GRAPH 3 shows the percentage of the common mistakes made by the students of DFP4023 HCI. The highest percent of the common mistakes is on the Topic 2 The design Process and Topic 3 The Evaluation Techniques, 16 students could not answer the question from these both topics (32.65 percent and 32.47 percent). Topic 4 The Universal Design is the second-highest topic, 14 students (27.49 percent) could not answer. Topic 1 Introduction to HCI is 23.81 percent, the lowest common mistakes occur in this topic, 12 students could not answer the question.

4.   DISCUSSION AND SUGGESTIONS

Overall, based on the study-conducted shows that the mastery of the students towards the DFP4023 HCI course is good and satisfying. The majority of students scored grade A in this course and 100 percent students successfully passed this course with minimum grade C+.

Students able to mastery in topic 1 The Introduction HCI and topic 4 The Universal Design the percentage attainment of both are 76.19 percent and 72.51 percent. The weakest topic of mastery by students is on topic 2 The Design Process and topic 3 The Evaluation Techniques (67.35 percent and 67.53 percent). To improve student's performance in all topics, the course lecturer should actively involve the students in their learning process by way of regular use of audio-visual and the students are constantly encouraged to be active participants. At the same time, the course lecturer should approach an attractive and interactive teaching method such as Flip Classroom and Google Class Room. The fun application should be applied in daily classroom activity such as Kahoot, Quizet, and Quizzess.

However, the most important role is the students' attitude in learning and concentration towards lessons. Course lecturer should approach the alternative method to diversify learning and teaching techniques to be more engaging and interactive as well as creating a conducive environment.

5.   CONCLUSION

The mastery of design in HCI is to create an interactive user interface, which is easy and enjoyable to use. The main objective of this research is to identify students' mastery in the DFP4023 HCI course for students' program Diploma Information Technology (Digital Technology) in Ungku Omar Polytechnic. The research findings show that the students' mastery of the DFP4023 HCI course is good and above average. However, the researchers recommend that lectures emphasize on topic 2 and topic 3 so that students can master this course optimally. The researchers hope that a more in-depth study will be carried out regarding the level of students' mastery of the coursework assessment for the DFP4023 HCI course, so that lecturer can evaluate the psychomotor of students in the designing of interaction design. Mastery of the rules in designing interaction user interface will enhance the understanding of producing a more effective and user-friendly user interface.

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