ONLINE INSTRUCTIONAL CONSULTATION (OICON) MODEL FOR HIGHER EDUCATION INSTITUITION

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Abstrak

Tujuan penyelidikan ini adalah untuk menyelesaikan masalah program telementoring yang terdiri daripada: (1) salah faham dalam komunikasi akibat daripada kekurangan kiu bukan lisan, (2) keperluan dan kecekapan dalam komunikasi bertulis dan kemahiran teknikal, dan (3) isu tentang rakaman, mendapat dan memain semula rakaman. Objektif utama kajian ini adalah untuk memperkenalkan model konsultasi (OICon) yang boleh dijadikan sebagai platform untuk melaksanakan konsultasi dalam talian bagi pelajar dan pensyarah di institusi pengajian tinggi. Objektif khusus bagi penyelidikan ini adalah untuk mengenalpasti komponen multimedia yang sesuai untuk diimplementasikan dalam model konsultasi, membangunkan model konsultatsi (OICon) berdasarkan prinsip dan garis panduan e-konsultasi, membangunkan prototaip, menguji dan menilai penerimaan pelajar dan pensyarah terhadap modul konsultasi secara atas talian ini di institusi pengajian tinggi. Model yang dihasilkan adalah berdasarkan fungsi-fungsi penting komponen komunikasi multimedia yang dikemukan oleh penyelidik terdahulu serta cadangan daripada pakar IT dalam bidang teknologi maklumat dan pendidikan. Model ini kemudian diterjemahkan ke dalam bentuk prototaip untuk diuji oleh 40 pelajar and 8 pensyarah dan tutor dari segi penerimaan teknologi dengan menggunakan modul TAM. Sebelas hipotesis diperolehi dari 7 faktor-faktor TAM dengan pemboleh ubah penggunaan sistem sebenar dikecualikan. Hubungan hipotesis di antara 4 faktor (kebergunaan Persepsi (PU), Kemudahan Persepsi Penggunaan (PEOU), Sikap, Niat Tingkah Laku (BI)) disokong kecuali PEOU tidak mempunyai hubungan yang positif dengan sikap seperti yang diramalkan. Kepentingan Persepsi Komponen Komunikasi dan Ciri-ciri mempunyai hubungan positif dengan PEOU. Pengguna bersikap positif ke arah pelaksanaan alat komunikasi multimedia dalam konsultasi di institusi pendidikan tinggi. Pengguna berpendapat bahawa komponen komunikasi adalah penting jika komponen mudah digunakan. Mereka bersetuju bahawa mereka akan menggunakan prototaip OICon pada masa akan datang dari segi PU dan Sikap.

Kata Kunci: Kiu bukan lisan, Kajian tindakan, Modul TAM, Keberkesanan diri

Abstract

The purpose of this research is to solve the problems of the existing telementoring program which are (a) the miscommunication due to lack of nonverbal cues, (b) the need or competency in written communication and technical skills, and (c) the issue regarding recording, retrieving, and playback of consultation recorded document. The main objective of this research is to develop an appropriate online consultation model for higher education institution. The specific objectives of this research are to identify suitable multimedia components to be implemented in the online instructional consultation (OICon) model, to develop a prototype, and to test and evaluate the acceptance of online instructional consultation (OICon) prototype by students and lecturers in higher education institution. OICon model was established based on the identification of multimedia communications components and features that were adapted and adopted from the existing online financial consultation, tele-medicine consultation model as well as major e-consultation components for public policy consultation. In addition, recommendations from the IT and Educationist experts were also taken into consideration. This model was then transformed into a prototype and tested on 40 students and 8 lecturers. Eleven hypotheses are derived from 7 factors of TAM with actual system variable excluded. The hypotheses relationships among these 4 factors (Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Attitude, Behavioural Intention (BI) are supported except that PEOU does not have positive relationship with attitude as predicted. Perceived Importance of Communication Components and Features have positive relationship with PEOU. Users are relatively positive towards the implementation of multimedia communication tools for consultation in higher education institution. Users perceived the communication components as important if the components are easy to use. They agreed that they will use the OICon prototype in the future in term of PU and Attitude.

Keyword: Nonverbal cues, Action research, TAM model, Self-efficacy

Acknowledgement

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List of Abbreviations

ACL	Access Control List
AR	Action Research
AVI	Audio Video Interleave
BI	Behavioral Intention
CMC	Computer-mediated communication
EE	Effort Expectancy
EOU	Ease of Use
FC	Facilitating Conditions
FMS	Flash Media Server
GIF	Graphics Interchange Format
GSS	Group Support System
HCI	Human Computer Interaction
HEIs	Higher Education Institutions
HTTP	Hypertext Transfer Protocol
IBSTPI	International Board of Standards for Training, Performance and Instruction
ICT	Information Communication Technology
ICTs	Instructional Consultation Teams
ID	Identity
ID	Instructional Design
IS	Information System
JPEG	Joint Photographic Experts Group
K-12	Kindergarten through 12th grade in the United States and Canada
MP3	MPEG-1 or MPEG-2 Audio Layer III
OICon	Online Instructional Consultation
PDF	Portable Document Format
PE	Performance Expectancy
PEOU	Perceived Ease of Use
PU	Perceived Usefulness
RSO	Remote Shared Object
RTMP	Real Time Messaging Protocol
SE	Self-efficacy
SME	Subject Matter Experts

SPSS	Statistical Package for Social Science
SWF	Shockwave File
TAM	Technology Acceptance Model
VOD	Video on Demand
WWW	World Wide Web

CHAPTER ONE
INTRODUCTION

Online consultation, one of the advancement of information and communication technology (ICT) in consulting services, is being extensively offered in various contexts such as medical teleconsultation (Costanzo & Monari, 2006), online consultation for medical curriculum (Ortega, Lessard, Burgun, & Beux, 2005), online financial service consultation (onlineconsultation.com) and public policy consultation (Fagan, Newman, Paul, & Murray, 2006). Consulting service is no longer time-bound and place-bound information delivery process. Many organizations have discovered ICT beneficially in solving distance problem and forming virtual team consultation which consists of staff that collaborate at geographically dispersed place (http://www.onpointconsultingllc.com). This consulting service would be offered with much more flexible information delivery ways through a plethora of multimedia technologies. Indeed, according to Newman (2005), conducting online consultation service helps to keep cost to a minimum while offering competitive service based on client's demand as well as enabling staff to work from client's location regardless of the distance.

At the early phase of conducting online consultation service, asynchronous technology such as e-mail and forum discussions are commonly applied as collaboration tools among virtual team staff compared to synchronous technology that enhances the collaboration at real time (Kinney & Panko, 1996). Nowadays, as the advantages of synchronous communication technology is acknowledged, many organizations have started to blend this advanced technology as part of their e-consultation that enables participants to communicate in synchronous and

asynchronous ways (Caulat & Haan, 2006). As a result, computer-mediated communication (CMC) technologies are developed and adopted to fulfill the demand of organizations in terms of providing support and enhanced collaboration on real time and delayed time, and overcoming the time and space constraints that burden face-to-face consultation.

Evolution of communication technologies at present gives impetus to researchers and practitioners by simply putting the CMC tools on their telementoring application without really understanding the potential benefits the technologies bring for telementoring or online consultation. This leads to several issues and challenges that confront existing telementoring program. Although there are many suggestions regarding conducting consultation service online (Sabella & Booker, 2003; Horn & Myrick, 2001), the use of communication technology is not fully implemented as an essential support for instructional consultations in higher education institutions (HEIs) in Malaysia. Indeed, there is a need for investigation, analysis, and proper strategy planning on solving the real problems encountered by students and lecturers during instructional consultations.

Thus, this situation has been the motivation factor to conduct this research by proposing an online instructional consultation (OICon) model that can facilitate consultation processes among students and facilitators in mentoring program in HEIs. Specifically, the OICon model is constructed based on conceptual considerations for building an online consultation prototype. The holistic approach considered in developing OICon model starts from scheduling the consultation time until the termination of the consultation session as well as the management of the

online recorded document. Analyzing the participants' requirement as well as types of consultations and tasks involved are the most important factors that indirectly affect the instructional consultation processes and selection of communication technologies. Besides that, multimedia communication components are implemented as strategic information tools within this well-planned OICon model in order to meet students' and instructors' requirements.

Giving the pervasiveness of implementation of communication technology in the consulting services, more studies are needed to determine accurately the multimedia communication technologies that are suitable for instructional consultation purposes. The interaction among online collaboration participants, and the way information is delivered across the network differs from traditional consultations. Hopefully, OICon model that integrates suitable CMC tools would provide a complete package of features needed to assemble, administer, and facilitate comprehensive e-consultations for HEIs.

1.1 Problem Statement

Telementoring is conceptualized as the online or electronic version of mentoring (Chan, 2000; Single & Muller, 1999). With the introduction of telementoring, many researchers and practitioners investigate the use of communication tools to reduce the time and space constraints that hinder formal mentoring programs or consultations by drawing on mentors separated from the mentees (Hamilton & Scandura, 2003). However, they uncritically integrate communication technology to

facilitate online consultation without examining how communication technology is implemented in building and maintaining mentoring relationships.

Even though telementoring provides connectivity, the effect of distance and time depersonalizing the relationship is still questionable (Talmadge, 2004). Eventually, the problem of socialization becomes more severe as both mentors and mentees are separated at a distance. If communication technologies are uncritically adopted to confront some human needs such as time and distance barriers, this may cause other important social and individual issues go unacknowledged and unresolved. These lead to two issues that confront existing telementoring program. First social issues and challenges that confront existing telementoring program which are (a) miscommunication due to lack of non-verbal cues, and (b) the need or competency in written communication and technical skills (McLoughlin, Brady, Lee, & Russell, 2007; Ensher, Heun, & Blanchard, 2003).

Talmadge (2004) suggests that in order to solve these issues, it is necessary to build and sustain a sense of community or belonging in which participants could feel truthfully connected to each other besides being able to share thoughts, ideas and feelings. Besides technology, mentor and mentees' needs and goals in governing the mentoring or consultation process should also be given considerable attention (Talmadge, 2004; Fagan, 2006).

Secondly are the issues related to the recording, retrieving, and reviewing of the consultation recorded document. Some mentoring programs are long-term relationships. Thus, it should be designed to support ongoing relationships.

Unfortunately, many of the telementoring programs are terminated as soon as the problems of a client are solved. In addition, there is a lack of recorded information management and indexed for future retrieval and references. Even if there is, most of the recorded information is in the form of semi-structured information such as dates, announcements, participants' names, or e-mail contents. The program also rarely makes use of the online meeting recording technology capability, which can track a group progress and serve as a public record of past actions and decisions. For example, the Electronic Emissary K-12 (Sanchez, B & Harris, J), telementoring created with a communication platform allows mentor and protégé to communicate via private e-mail lists, forum, chat, and electronic teleconferencing. However, for continuing consultation activities, the facilitator needs to manually set up the organizational system such as creating personal record and project information. The Electronic Emissary telementoring program only keeps e-mail messages as an archive for future retrieval. No other verbatim records of online mentoring are stored as archive.

Besides that, the consultation process may end up with the clients' problem remained unsolved and delayed. Thus, there should be an alternative way in keeping track and following up the delayed consultation session. Unfortunately, the majority of researchers and practitioners do not investigate the capture of information to be used in future collaborative activities. The failure to record important information, decisions, and actions may affect future individual and collaborative work.

Another example of mentoring program, MentorNet (http://www.mentornet.com) claims that it provides fast and inexpensive mentoring through e-mails. However, consultation through e-mails may lead to inconvenience for protégé who are weak in posting their problem in writing. This corresponds to the second telementoring issue: the need or competency in written communication and technical skills (McLoughlin, Brady, Lee, & Russell, 2007; Ensher, Heun, & Blanchard, 2003).

Likewise, Tutor.com (http://www.tutor.com) provides live help for students in solving their academic problems with the used of shared-whiteboard and instant messaging. However, it would be an added advantage if the telementoring program provides other CMC tools such as video conferencing that enhances online interaction. Lack of non-verbal cues may reduce the richness of information delivered and it is difficult to maintain a train of thoughts or a discussion theme due to the considerable delays that happen between the time the message is sent and the time the message is received.

Although there are a few models that have been developed for consultation such as Financial Service Consultation (Tanaka, Koga & Yajima, 1999) and Virtu@l Consult@tion for telemedicine curriculum (Ortega, Lessard, Burgun & Beuxl, 2003), none of them is appropriate for instructional consultation purposes. This is probably due to differing community contexts, with different interest and roles. Hence, in consultation service, consultation processes have different perspectives in the use of information and communication technology (ICT).

Thus, this study will attempt to solve or reduce challenges and issues of the existing telementoring problems. An OICon model, which integrates multimedia communication components, will be developed with the objective of facilitating online consultation in HEIs in Malaysia. This study will also investigate the real problem encountered by students who are involved in a mentor-mentee system in HEIs in Malaysia; by accessing their perspectives and perceptions on conducting consulting service online. Although technology provides rich resources but it is not the panacea for problems in mentoring or consultation programs. If the telementoring program is not properly planned, it can be as ineffective as one way communication or even worse if it does not offer a wide range of communications tools as an option for meeting the users' need.

1.2 Operational Definition

Previous researchers and practitioners have stated various terms for telementoring such as electronic mentoring, e-mentoring, and teleconsultation. However, for HEIs in Malaysia, telementoring refers to the process of students seeking help from their supervisors through mentor-mentee programs or from other SMEs from other faculties and departments. Online consultation provides assistance in solving students' academic and behavioural problems. In this study, the term "online instructional consultation" or "curriculum-based teleconsultation" would be more appropriate because the term "online consultation" and "telementoring" is too broad. Table 1.1 shows the operational definition of telentoring, e-consultation and online instructional consultation.

Table 1.1: Telementoring, E-consultation and Online Instructional Consultation with Definition

Types	Operational Definition
Telementoring	It is also defined as e-mentoring or online mentoring (Wong & Premkumar, 2007; Perren, 2003). It supports collaborative learning which has been documented to improve academic achievement, improve behaviour, increase self-confidence and motivation (Chance, 2002)
E-consultation	It is also known as online consultation. The term of e-consultation may differ according to the consultation purpose. For example if it is viewed from e-consultation policy perspective, it is defined as the use of information and communication technologies (ICTs) to involve the public (citizens and/or stakeholders) through different forms of interaction with our democratic institutions, with the intention to elicit inputs that contribute to more sustainable or robust decision making. (Joseph & Manon, 2009). From telemedicine perspective, it is known as telemedicine consultation or virtual consultation (Ortega et al., 2003).
Online Instructional Consultation	IC (Rosenfield, 1987, 2002) is a problem-solving approach that is used to support teachers in the classroom. It is a consultee-centered model whereby the focus of the process is to change the way teachers view concerns and to expand teachers' skills in dealing with students about whom they have concerns (Knotek, Rosenfield, Gravois, & Babinski, 2003; Rosenfield, 1987; Rosenfield, 2002).

1.3 Research Questions

The research aims are to investigate the following:

a) What are the processes of instructional consultation in higher education institutions?
b) What are the multimedia components and features that are suitable to be composed in OICon model?
c) What are the multimedia communication components and models that are suitable to be adapted in the online instructional consultation at the higher education institutions?
d) What are the factors influencing user technology acceptance of the online instructional consultations?

1.4 Research Objectives

The main objective of this research is to develop an online instructional consultation model (OICon) for HEIs. The specific objectives of the research are to:

a) identify suitable multimedia components to be implemented in the OICon model.
b) design the proposed OICon model based on user requirements, e-consultation principles and guidelines.
c) develop a prototype following the proposed OICon model.
d) test the acceptance of online consultation prototype by students and lecturers.

1.5 Research Hypothesis

The usage of novel technologies requires people to spend a considerable amount of time learning features that they may never utilize, changing their human–computer interaction behaviour, and, finally, either accepting or rejecting the technologies. It is important to test on the acceptance of OICon model and investigate the factors that

influence the acceptance of OICon. In order to answer the last research question addressed, OICon prototype is developed based on OICon model and tested by students and lecturers by using Reduce TAM model. The actual system uses variables which are excluded since OICon is just a prototype; not the well-developed system to be tested. External variables low level anxiety and self-efficacy are added as antecedents for perceived ease of use (PEOU) and perceived usefulness (PU). Fearful, self-confident, frustration and similar emotional states can influence the interaction itself, productivity, social relationships, and overall well-being. Likewise, relationship between perceived importance of communication components and features with PU and PEOU are investigated. The higher the user perceived the communication components and the importance of features, the higher their perceived usefulness and ease of use of OICon. Thus, the factors of users' perceived importance of communication components and features are included. The details of how the hypothesis is derived from TAM model are discussed in section 2.13.1 whereas the null hypotheses are constructed as shown below:

$H_0 1$ There will be a positive relationship between Self-efficacy and Perceived Usefulness.

$H_0 2$ There will be a positive relationship between Self-efficacy and Perceived Ease of Use.

$H_0 3$ There will be a positive relationship between low level of anxiety and Perceived Usefulness.

$H_0 4$ There will be a positive relationship between low level of anxiety and Perceived Ease of Use.

$H_0 5$ There will be a positive relationship between Perceived importance of features and multimedia communications components with Perceived Usefulness.

H_06	There will be a positive relationship between Perceived importance of features and multimedia communications components with Perceived Ease of Use.
H_07	There will be a positive relationship between Perceived Usefulness and Perceived Ease of Use.
H_08	There will be a positive relationship between Perceived Usefulness and Attitude toward Using.
H_09	There will be a positive relationship between Perceived Ease of Use and Attitude toward Using.
H_010	There will be a positive relationship between Perceived Usefulness and Behavioral Intention.
H_011	There will be a positive relationship between Attitude Toward Using and Behavioral Intention to use the system.

1.6 Research Scope

The scope of the study focuses on the development of a suitable model for students-lecturer online consultation for HEIs in Malaysia. In addition, the study aims to overcome some issues and challenges of the existing telementoring program. There are approximately 25872 students in Universiti Utara Malaysia (UUM) for 2009/2010 session (Hadi & Weay, 2010). Therefore, it is impossible to collect all data from a wide and diverse range of population in UUM. Thus, the respondents' scope focuses on the undergraduate and postgraduate students that undergo the Information Technology and Multimedia programmes at the College of Arts and Sciences (CAS).

A preliminary study is conducted to assess students' perception regarding online consultations. Furthermore, related previous consultation problems that they have encountered are also determined. Among the literatures that have been studied

include face-to-face consultation or mentoring program in HEIs. The researcher also communicates with three lecturers who represent the IT and education experts to seek their opinions on the proposed OICon model. Their recommendations on other important components or features of an online instructional consultation are also taken into consideration.

1.7 Research Design

In order to build the OICon model, the objective-method table is formulated, mapped, and linked to the research questions, objectives, methods, and outcomes. The illustration of these relationships among ideas stated or tasks planned through linking of research problem, research questions and objectives is necessary (Norshuhada & Shahizan, 2009). Objective-method is applied as an early guideline on building the research methodology which starts from identification of the research questions, research outcomes, research objectives, validations of the research, and methods used. Derivation of research questions from the literature review helps the researcher to understand the major issues related to the trend towards technology implementation in consultation activities. The main components of the research methodology are the research variables that govern the designation and development of the OICon model. This is crucial as a preliminary step in a research project. From the research questions, research variables are derived respectively which represent the important components for research methodology.

Table 1.2 shows the relationship of objective-method together with the research variables. The first research question is to determine the instructional consultation

processes in HEIs through literature review and interview. The outcomes are the consultation processes and a selection of communication media. The second question is to determine suitable multimedia components and features for the OICon model. The multimedia communication components are selected precisely to match the consultation process. Besides that, user requirements are also determined through a survey and an interview. The third question is to determine a suitable model to be adapted in developing the OICon model. This is done through literature reviews and comparative analysis on existing models from various contexts based on the outcomes of the first and second questions. The independent variable is the OICon model while the dependent variable is the appropriate model. From reviewing the existing e-consultation models, some multimedia communication components and features are also determined. Once the OICon model is proposed and reviewed by the experts, a prototype is developed based on the Rapid prototyping method to test the model. The last research question is to determine the criteria used for testing user technology acceptance towards this prototype. The independent variable is OICon model while dependent variable is users' acceptance of OICon.

Table 1.2: Adaption of Objective- Method Table with Research Variables

Research Questions	Objectives	Outcomes	Methods	Research Variables
1. What are the processes of instructional Consultation in HEIs?	a) Identify suitable multimedia components to be implemented in the OICon model.	Consultation processes	• Literature Analysis • Lecturers' Interview	
2. What are the multimedia components and features that are suitable to be composed in the online instructional consultation model?	b) Identify suitable multimedia components to be implemented in the OICon model.	Multimedia components	• Identification of features and functions from e-consultation models • Student Survey • Lecturers' interview	Independent Variables: OICon model Dependent Variables: Multimedia components
3. What is the appropriate model to be adapted in the online instructional consultation at HEIs?	c) Design the OICon model. d) Develop a prototype to test the online instructional consultation model.	Multimedia components, model, & Prototype.	• Comparative Analysis • Literature Analysis • Rapid Prototyping	Independent Variable: OICon model Dependent Variables: Appropriate model
4. What are the testing criteria for the user technology acceptance of online instructional consultation?	e) Test the acceptance of the online prototype.	Research Result & Findings	• Students & lecturer survey	Independent Variable: OICon model Dependent Variable: User's acceptance towards OICon.

1.8 Significance of Research

The context of this research within educational ICT is significant for online instructional consultation for HEIs. The significance of this research is to develop an online instructional consultation (OICon) model and shows how the implementations of CMC tools can provide a wide range of forms of representation and therefore help to solve the research problem. Figure 1.1 illustrates the significance of the research through the development of OICon model to govern the intention of solving the research problem addressed.
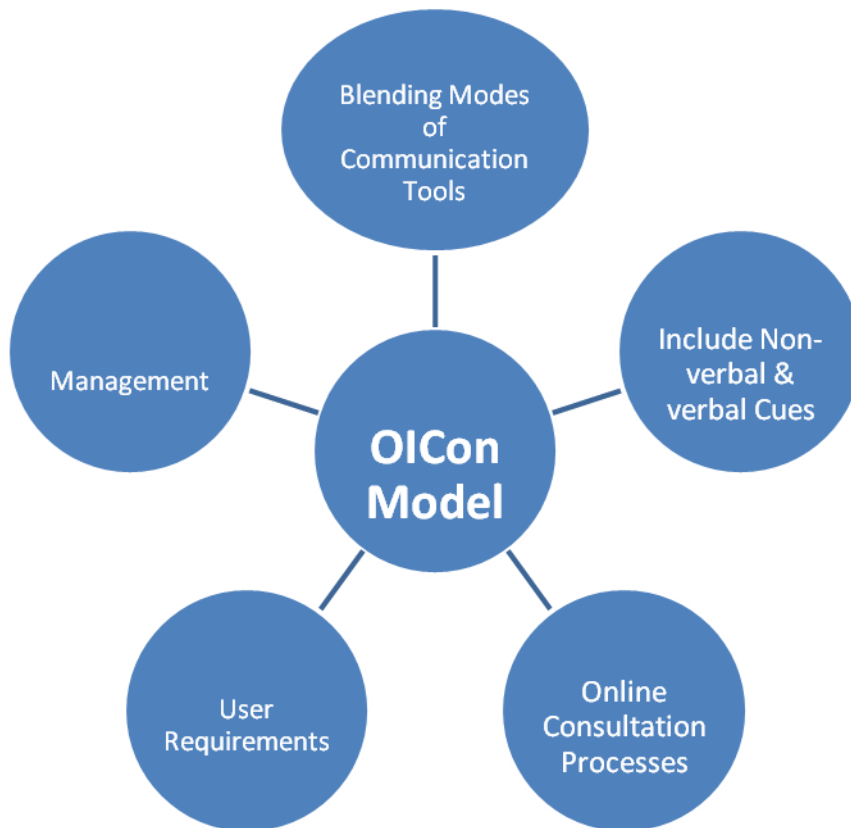
Figure 1.1: Significance of Research with Development of OICon Model

In order to solve the first and second problems which are a) miscommunication due to lack of non-verbal cues, and b) the need or competency to written and technical skills, blending modes of communication tools that include verbal and nonverbal cues are implemented. The selection of media is based on online consultation processes and user requirements. Besides that, the design considerations take into account the issues of recording, retrieving and playback of consultation document. In the digital environment, it is particularly important to include the management of consultation documents which include controlling record creations, retrieval, storage and disposal.

1.9 Contribution of Research

This research provides new insight and appropriate conduit for research findings to easily transfer to the online instructional consultation research and practice communities. For higher education context, this study provides support by improving online consultation environments and to contribute to future online consultation systems developers with the help of a comprehensive Online Instructional Consultation (OICon) model. This research makes four research contributions: (i) OICon model that is designed to benefit online instructional consultation research and online consultation community, (ii) online instructional consultation principles and guidelines that match with online consultation processes, and (iii) a set of criteria for evaluating the acceptance of online instructional consultation for HEIs research. The final outcomes of this study are a series of artifact which are OICon model, prototypes, documentation of online instructional consultation processes, principles and guidelines.

From user perspective, students and lecturers perceive it as an effective way to retain the quality of delivering consultation-content. The study also provides a systematic consultation and records the document as well as maintaining the on-going telementoring relationships with the students even when they are at different locations. It also provides a platform for students to seek help from subject matter experts in solving problem encountered by them.

The right selection of the communication technology and its implementation in an instructional consultation model may bring extensive benefits as described below:

a) An online consultation website can be accessed anywhere and anytime given the suitable equipment and Internet connectivity. Knowledge can be delivered through online sharing and collaborating. In addition, students are able to search for other SMEs in seeking help, in addition to their existing supervisor.

b) Two ways communication of real-time synchronous and asynchronous consultations provide a variety of choice of communication technology used for consultation purposes.

c) Recording of consultation sessions and keeping them as archive for future references and reviews provides great advantages for those who miss the consultation sessions to do follow ups.

d) Online retrieval and playback of recorded consultation sessions. This enables those who are involved in post session discussions to review the recorded documents.

e) Management of consultation recorded document and mentee's management functionality.

1.10 Organization of Thesis

This research is organized into seven chapters as below:

a)   Chapter 1 - Introduction

The first part of this chapter provides the introductory to the research and highlights the existing telementoring program issues and challenges, addressing the research questions, and hence formulating the research objectives. Research questions are stated to provide hints to explore more deeply on the pedagogical gaps for consultation in HEIs. Finally, the objective-method table is formulated to illustrate relationship of research questions, research objectives, the expected outcomes, the research variables, and the validation methods. Then, the importance of research to education communities is discussed with the research scope briefly described. Based on the problem addressed, the emerging of computer-mediated communication tools for the educational purposes are recommended to solve the problem arises from existing telementoring program.

b)   Chapter 2 - Literature Review

The first part of this chapter introduces instructional consultation where concepts of online consultation are discussed. The chapter then explores the current trends and limitations of telementoring program deeply. Likewise, it provides the foundation study on the mentor-mentee system for HEIs in Malaysia. From this study, the consultation processes are determined. This is followed by exploration on principles and guidelines, existing online consultation models, and the selection of consulting technology to discover major e-consultation components. It briefly discusses on the theoretical framework of media choices theory. Facilitators and students' roles in online environment as well as types of communication and interactions are also discussed. At the end of this chapter, the multimedia components and

features for educational online consultation are determined and stated based on exploration of the previous research work and literatures.

c)   Chapter 3 - Research Methodology

This chapter starts with an introduction and description of the research methodology used in this study, which is the Action Research (AR) approach. Each phase consists of research methods in achieving the research objectives. The methods for data collection, analysis technique as well as justification for using those methods and techniques are also discussed. This chapter also briefly discusses the derivation of research variables from the research questions and objective-method table. The phases and their activities, the methods used and research outcomes are illustrated in the research framework.

d)   Chapter 4 - Preliminary Study

The initial findings and main contribution are discussed in Chapter Four. The preliminary results are analyzed and discussed. The initial findings of this research include identification of multimedia communication components and features and online consultation processes. Other features and components suggested by the experts are also presented. This is followed by presenting the crucial needs of an online consultation model and its value for HEI. As a result, Online Instructional Consultation (OICon) model is proposed, described, reviewed, and verified by experts. The online consultation components and features obtained through literature reviews and experts' recommendation are discussed in detail.

e)   Chapter 5 - Online Instructional Consultation (OICon) Model and Prototype Development

In Chapter Five, the design and development of the online consultation prototype are discussed. OICon model with its domain, components and features are described in detail. This is followed by the discussion on the prototype specification, interface, database design, and platform of prototype development. Customization on existing components with a sample of programming integrated code is also briefly discussed.

f)   Chapter 6 - Analysis and Discussion on the Users' Perception and Acceptance towards the Online Instructional Consultation (OICon) Model

The first part of this chapter describes the methodology, the testing environment, structure of questionnaire, surveys results and discussion. The findings and results are shown in a descriptive analysis due to the small sample size in terms of the frequencies and percentages of user's perceptions with respect to each construct in Technology Acceptance Model (TAM) questionnaire. Besides that, regression analysis is conducted to examine the nature of relationships between variables based on the null hypotheses derived from the TAM model.

g)   Chapter 7 - Conclusion

The overall research findings are summarized in this chapter. The limitations and contributions of the study are discussed as well as the suggestions of refinements and recommendation for future research.

CHAPTER TWO
LITERATURE REVIEW

In the so-called "information era", the presence of World Wide Web (WWW) associated with online communication tools has affected the way people work and learn. With the rapid growth of technology advances, the technology that is associated with HEIs has to find ways in adapting to these changes. Hence, in order to obtain a broad research perspective of the online instructional consultations for HEIs, review on the related literatures need to be done. This is required to discover a suitable multimedia communication components and features. The reviews include the identification of the consultation processes of typical consultation and the mentor-mentee system in HEIs. In addition, the review on the existing online consultations for different contexts is needed to determine the ways of carrying the management of online recorded document. Figure 2.1 shows the overview of the literature review.

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Consultation ──────────┐
                       ├──────► Definition & Characteristics of Instructional Consultation
                       │
                       └──────► Mentor-mentee system in higher education


Online
Consultation ──────────────────► The Concept, Online Consultation Principles and Guidelines
       │
       ├──────► Online Consultation for Various Contexts
       │              │
       │              ├──────► Financial Service Consultation
       │              │
       │              ├──────► Telemedicine Education Consultation
       │              │
       │              └──────► Major E-consultation Components of Public Policy Consultation
       │
       ├──────► The Potential of Enhancing the Value of Utilization of Communication Tools on Instructional Consultations in Malaysia
       │
       ├──────► The Role of Facilitators & Students Online
       │
       ├──────► Active & Passive Participants in Affecting Online Consultation Session
       │
       ├──────► Management of Recorded Document ──────► Retrieving, Display and Organization of Audio-visual Recorded Components
       │
       └──────► Acceptability
```

Figure 2.1: Overview of the Literature Review

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2.1 Definition and Characteristics of Instructional Consultation

The definition of online consultation begins with an understanding of traditional consultation. Consultation, as defined by Steele (1975), provides help in the process, content, structure of a task or to someone. Consultation does not include actual responsibility for doing a task. It is the act of helping in two way processes of seeking, giving, and receiving help (Bell & Nadler, 1985). Schein (1999) views consultation processes as relationships among consultants and clients in which consultants play the helping role in guiding clients to discover problems or concerns in their organization. These problems are then resolved by the clients themselves. More specifically, Kampwirth (2005) presents consultation as a kind of collaboration and problem solving activities which may include the following characteristics:

a) A consultant is a trained professional, expert or someone that has experience in a certain field.
b) Good communication skill is needed to obtain the clarification of the problem faced.
c) The consultation process can be initiated by either the consultant or the client.
d) Problem solving is the primary goal for instructional consultation.

On the other hand, the term "instructional consultation" is a kind of problem-solving consultation model systematically designed around schools (Rosenfield & Gravious, 1987; 2008) with the purpose of solving academic and behavioural problems encountered by students. Usually, instructional consultation teams (ICTs) that particularly consists of school-building stakeholders such as teachers, well-trained staff, specialists, and building administrators work shoulder-to-shoulder to cope with the challenges encountered by students in which decisions are determined by collecting the students' specific data (Rosenfield & Gravious, 1996). More specifically, in the education context, these ICTs members may consist of teachers or

school personnel that can communicate proficiently, have the ability to collaborate in problem solving and assessing in either academic or behavioural problems (http://soe.unc.edu/fac_research/projects/ict.php).

Based on the definitions given by previous researchers and authors, the term "instructional consultation" can be concluded as two-way communication that involves inexperienced clients seeking for guidance and service from experienced consultants in solving their problems. A consultant would be someone that is handy in a specific area that the client is willing to seek help. The consultant may not only be the lecturers, but may also be a tutor, supervisor, or other SMEs. The consultant will obtain information on the clients' problems by communicating with them through a discussion before making decisions or proposing any solutions or cues. At the end of the consultation session, clients will gain some knowledge that may help them on choosing appropriate solutions.

Many authors and researchers propose consultation processes by dividing the consultation model into three phases: entry level, analysis-diagnosis, and problem solution (Brokes, 1975; Kurpius & Brubaker, 1976; Davies, 1975; Schein, 1969, 1978; Argyris, 1970; Havelock, 1973; Caplan, 1970). However, according to Rosenfield and Gravious (1987), consultation processes may differ according to consultation purposes, tasks, and persons involved. This indicates that there is no standard consultation guideline for consultation processes. Particularly, the processes of instructional consultation in HEIs may differ from those conducted in secondary schools since the actors, tasks, and students' academic levels and communication abilities are not the same.

The changing and development of organization indirectly affects consultation processes, and thus modification is necessary to meet the organizational goals (Schein, 1999). Hence, the questions addressed: (a) What are the standard consultation processes involved for instructional consultation in HEIs? (b) What are the tasks to be performed by the person? To answer these questions, it is necessary to understand the concepts of online consultation and the processes of the mentor-mentee system in HEIs.

2.2 The Concepts of Online Consultation and Selection of Consulting Technology

Online consultation essentially serves the same purpose as face-to-face consultation. However, the main different is that online consultation utilizes communication technology for facilitating consulting relationships. The concept of utilizing the electronic computing and communication technologies in consultation processes is complementary to the existing practices (Fagan et al., 2006). There are two meanings of online consultation concept, first is the delivery of a special service that provides information and helpful instructions on how to use the web service such as eBusiness, ePay, and eMarket. The second is to provide career information and guidance on specific area such as policy-making e-consultation (Fagan et al., 2006).

More specifically, as defined by Steven (2002), online consultation is a structured asynchronous event that offers time-limitation with utilization of online tools to inform public policy processes and encourages civic participation. The time limitation indicates that each online event has its beginning and end. In addition, Steven (2002) perceives online consultation as not only focusing on the choice of

using communication technology to improve connectivity among government and citizens but also on building online efforts among citizens in order to raise voices in their communities.

This means that e-consultation is not only limited to one-to-one interaction but also to the distribution of knowledge and information among a broad range of citizens. Besides the mentioned differences, the only similarity found was the use of information and communication technology as intermediary devices. Since the term "online consultation" is too general, it may be perceived differently in various contexts depending on the types of consultation processes and the tasks involved. Indeed, it should be viewed as a blending mode of communication which includes asynchronous and synchronous communications. Hence, one might legitimately ask : What are the other factors that influence the selection of information and communication technologies for online consultation?

Many researchers have their own point of views regarding the selection of communication technology for a virtual community. Some of them propose that the selection of media should be based on the consultation process (Carlson & Davis, 1998) and more specifically the task involved (Morison & Newman, 2001; Fulk & Steinfeld, 1990; Fagan et al., 2006). Specifically, Morison & Newman's (2001) approach considers the task to be performed by participants at each stage. Nevertheless, Fagan et al. (2006) mention that the selection of media based on the consultation process is not a standard approach since there are various consultation processes with different purposes. They also suggest that the consultation process can be designed based on task specification in order to meet the consultation topic,

organization, and user requirements. They also group the communication technologies into three categories:

a) Real-time synchronous chat such as video conferencing, instant messaging, and audio conferencing.
b) Asynchronous discussion such as e-mail and forum discussion.
c) Group Support System (GSS) and idea-mapping software.

Apart from the consultation processes and tasks, Fagan et al. (2006) mentioned that it is necessary to understand the selection of information and communication technology (ICT) for e-consultation based on the actors' goals and needs in consultations. Fagan et al. (2006) have listed the following guidelines that would be useful in selecting the appropriate technology that matches e-consultation:

a) Identify the consultation objectives.
b) Determine participant's requirement especially the communication needs.
c) Determine the knowledge to be obtained.
d) Identify communication processes.
e) Select technology that supports these stages of communication processes.
f) Combine technology and communication processes as plan for e-consultation.

These guidelines are appropriate to be applied in this research due to several reasons; (i) The exploration on reality of e-consultation for citizens' participations; (ii) Online consulting is not only a theoretic structure, but a working platform with practical dimensions (http://www.careercenteronline.org/manuals/econsulting.pdf); (iii) The selection of media is based on various aspects including user requirement, goals, and communication processes; (iv) The selection of communication technology is based

on each stage. Consultation processes are acknowledged by many researchers as a crucial factor that influences the selection of technology and it may differ according to consultation purpose and contexts. Thus, it is necessary to investigate on the limitations of existing telementoring programs in details and this will provide a bird's eye view on consultation processes, the tasks and communication components involved.

2.3 Current Trends and Limitations of Existing Telementoring Programmes

The current telecommunication and information technology provides indispensable capability for mentoring without the presence of participants to be at the same place. In general, telementoring and e-consultation come in three forms: ask an expert for one time regarding discipline-based questions (Joyce, 2011), pair mentoring which involves a mentor and a student for a long term relationship, and group mentoring which involves matching an expert or experts with a group or a class of learners (Margaret, 1999). Group mentoring is a form of open mentoring in which the mentors' roles are not only limited to teacher or expert but also as learners and students who are willing to share their knowledge (Margaret, 1999). As mentioned in the problem statement section, there are several issues and challenges that confront existing telementoring system. These telementoring programmes are Electronic Emissary Telementoring, MentorNet, and Tutor.com.

The Electronic Emissary Project at The University of Texas, Austin (Sanchez & Harris, 1996) is an example of a group mentoring among adult subject matter experts (SME), volunteers and elementary, middle-level, K-12 students, secondary students,

and their teachers. It is a long term mentoring program that typically ranges from six weeks to a full academic year. Protégé is offered with mentoring service by enabling them to connect with the registered SMEs who are willing to share their knowledge through e-mails (Harris & Jones, 1999). Unfortunately, the Emissary project only support the elementary, middle-level, and secondary students. The project also solely explores on the asynchronous electronic mail interaction among students and adults. Telementoring through private e-mails may lead to the limitation in transferring of knowledge and dissemination of consultation results and contents. In a telementoring project that requires real-time communication, participants need to use other computer-mediated communication tools such as third party software which are chat, web forum, and videoconferencing client namely CU-SeeMe to present diagrams and picture on real-time.

For the Emissary telementoring program, there are three options of maintaining the recorded document. This is done by using a tracking system, setting an e-mail program to organize e-mail messages or setting a definite schedule projects tasks. Meanwhile, the facilitator or consultant is required to use proprietary software such as Microsoft Access or the AppleWorks database to store personal records and project information, set up an e-mail program for organizing messages, and set a time schedule for managing weekly or monthly project tasks. Obviously, organizing a telementoring program involves manual and labor-intensive processes. Some efforts should be made by mentors and experts by setting a well-planned online mentoring program in maintaining the mentoring relationship such as interactive

access to database repository, mentoring report management, and students' assessment when using the Electronic Emissary mentoring program.

Another example is the MentorNet that matches college women to women professionals in the fields of science and engineering. Similar to the Emissary Mentoring Project, MentorNet has successfully matched thousands of students, postdoctoral and early career researchers in engineering and science on hundreds of campuses to mentors in the professions for one-on-one guided relationships. The mentor and protégé communicate through e-mails and web forums. The e-mail provides written record of communication besides providing easy and inexpensive way for mentoring activities. However, a sense of community, immediacy feedback could be more suitable to facilitate online consultation. Indeed, a lack of nonverbal cues in the e-mail may lead to miscommunication in telementoring and indirectly slows the development of online relationships. In addition, it may end up to misunderstanding or incorrect diagnoses of the client's problem that may lead to a consultation frustration (Oravec, 2000). Consequently, the use of e-mails as the most common medium for telementoring is perceived as a cold medium as it hinders the process of building and retaining the mentoring relationships. Therefore, e-mentoring program should not be limited to communication through asynchronous communication tools, but should be opened to other communication tools that provide verbal and nonverbal cues. The communication and coordination activities of the team members are facilitated by technologies that can be categorized according to time, space and level of group support (Alavi & Keen, 1989; Desanctis & Gallupe, 1987; Johansen, 1988).

Another example of one-to-one mentoring program is Tutor.com that provides guidance and tutoring for K-12 and college students in solving well-structured problems. It is a short term web-based mentoring program in which the consultation session is terminated as the student's problem is solved. This mentoring program offers live help for students; 24-hours, seven-days-a-week availability of consultation service in solving their homework by using shared-whiteboard, instant messaging as well as file sharing functionality without making any appointments. This two-way interactive whiteboard function enables the students to draw charts, graphs, and to share files such as worksheets, maps, and essays. Different from the other asynchronous telementoring programs, this spontaneous nature of online telementoring provides a mean for students to seek help whenever needed. However, misinterpretation of problem by protégé to consultant may occur if they fail to figure out the exact problem confronted them through instant messaging and shared-whiteboard. The need for competency in written communication skills and technical skills is one of the challenges of the current telementoring program (McLoughlin, Brady, Lee, & Russell, 2007; Ensher & Blanchard, 2003). People that are weak in written communication will find that online consultation using text chat is less effective. Therefore, it is likely to suggest that these issues and challenges can be mitigated with the implementation of multiple online communication tools that provide non-verbal cues capabilities such as body language and sound of voice.

Obviously, the blending of multiple modes of telementoring programs, which leverage all types of communication media and opportunities, will be more effective in formalizing mentoring programs. User intention to continuously involve in online

communication is highly influenced by the media capabilities in transferring knowledge. Indeed, there should be an alternative way to maintain the mentoring sustainability by keeping the archive of consultation contents, control in retrieval and disseminating of consultation contents and results. The Electronic Emissary and MentorNet provide a matching service between mentor or SME with protégé. However, this matching service is not included as one of the components in this online consultation model. Students at the university level are not supposed to be spoon-fed in obtaining knowledge. In fact, they need to be resourceful in searching for help. Thus, it would be an added advantage if the online instructional consultation can provide a search engine function in which protégé can search for experts' information details and their area of expertise from online databases.

As a conclusion, mentoring in open may serve as a powerful component strategy for building equitable and sustainable online learning communities. It should allow the collaboration between peers and other SMEs while a knowledge-based of consultation documentations and recorded sessions are developed and stored for future use. Knowledge transfer through this online mentoring system requires encouragement to inculcate knowledge-sharing culture among students in online consultations for HEIs. Thus, a review in the mentor-mentee system in HEIs is necessary to determine the consultation processes.

2.4 Mentor-mentee System in Higher Education Institution: An Overview on Consultation Processes Involved

The instructional consultation processes can be determined by examining the mentor-mentee system in HEIs. In most universities in Malaysia, the mentor-mentee system is implemented by assigning a lecturer to a number of students (mentees) for the purpose of providing guidance and consultation relating to academic and behavioural matters. For example, at the Faculty of Engineering at Universiti Kebangsaan Malaysia (UKM), the mentor-mentee system is conducted with the purpose of identifying problems faced by students who are not performing academically (Ramizi, Aini, Salina, Hilmi, Azah & Marzuki, 2004). These students are then given motivation on curriculum skills. The system also tries to enhance good relationships and interaction among students and lecturers (Karim et al., 2005). In Universiti Malaysia Sarawak (http://www.fmhs.unimas.my/index.php), the mentor-mentee system is conducted in Faculty of Medicine and Health Science (in which the role of a lecturer is to assist students in their curriculum and solve academic problems. However, in Kolej Profesional Mara Beranang (http://www2.kpm.edu.my/beranang/), the mentor-mentee system acts as a platform for solving personal matters instead of academic-related matters.

Generally, the function of a mentor-mentee system is more on solving students' behavioural problems, molding students' attitudes, behaviours, interests, and careers as well as collecting students' data and reports. The mentor-mentee system in the Malaysian HEIs focuses on the overall students' personal development that include career, academic, and behavioural matters as well as relationships among mentor,

mentee, and faculty. But, this research highlights the need of ongoing support for students' curriculum and academic matters rather than their careers and behaviours.

In general, mentoring practices can either be formal or informal (Chao, Walz & Gardner, 1992; Ragins, 1999; Azman, Rizal, Rusli & Adanan, 2006). Formal mentoring is time-bounded and always conducted by following certain mentoring procedures that has been planned. Informal mentoring is not bounded to lecturers' working hours. It is frequently conducted at anytime especially when students have emergency matters. The frequency of students to meet up their mentors for formal mentoring has been set to at least three times per semester (Azman, et.al, 2006). However, communication between students and lecturers usually is inactive even though informal mentoring is conducted frequently.

For consultation purpose, students can meet their supervisor for consultation in many ways, either through phone (http://www.slideshare.net/fahmic99le/rasional-pementoran-di-jabatanr), e-mail or through sending an appointment form (http://www.redlands.edu/academics/school-of-business/1335.aspx), and signing up the paper sheets outside the supervisor's office (Haslina & Khadijah, 2007). Nevertheless, most of the time, mentor and mentee may arrange for a suitable time and place for their meetings. During their meetings, one of most important activities is to produce a report that will be recorded in the students' faculty files.

A lecturer from College of Arts and Science (CAS), Universiti Utara Malaysia (UUM) notifies that there are two conditions in which consultations are initiated (Hadi, personal communication, October, 2009):

a) Student requests for an appointment with lecturer based on the consultation time provided.

b) Student requests for an appointment with lecturer at any time if there is urgency without adhering to the consultation time table.

The consultation process in UUM begins when a lecturer sets up consultation time and students request for an appointment. During the consultation session, students reveal their problems to the lecturer. During the decision making process, both participants try to achieve a consensus on selecting the best solution. If the decision cannot be made at that particular time, the consultation may be terminated and delayed to another session. However, in some circumstances whereby the problem needs to be solved immediately, students can just call up and make an appointment with their lecturers. These online instructional consultation processes is illustrated in Figure 2.2.

Posting the problem → Discussion → Decision Making
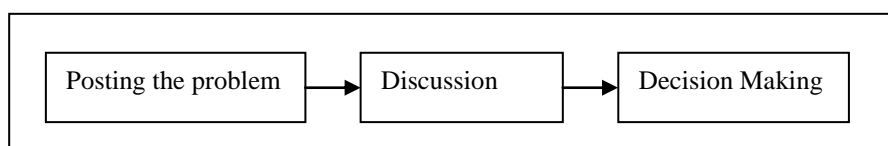
Figure 2.2: Online Instructional Consultation Processes

Among the limitations raised include geographical distance, time and unavailability of facilitator. These problems can be solved by applying a communication technology that allows discussion or consultation to be carried out even in an emergency situation. Apart from that, mentors' and mentees' roles, and responsibilities for online collaboration are crucial to be highlighted in order to identify social interaction among the participants.

2.5 The Roles of Facilitators and Students in Online Consultation

Understanding the role of the participants is one of the success criteria of an online consultation because it may affect the interaction activities. In general, facilitator plays the main role of motivating the students, initiating online collaboration, stimulating the social behaviours as well as having greater access to online collaboration compared to the students. The facilitators need to be active since they are dealing with less-knowledgeable participants. This shows that the role of facilitators in an online consultation do not only involve discussion with mentees but also monitoring the consultation activities. Bonk, Wisher, and Lee (2004) state that online instructors should not only support interaction but also need to know when to recruit individuals and groups further and when to offer help to participants in constructing new knowledge. With the instructional role in online settings become increasingly important, there is a need to study the role of a facilitator (Berge, 1995).

On the other hand, a student's role is not only limited to seeking help but also to discuss with the facilitator by presenting their point of view. The balanced between advocacy and inquiry communication would foster two-way communication. This allows students to expose their understanding and opinion while inquiring other participants and facilitators' suggestions. Facilitator-student consultation is a dynamic process and two-way communication that involve presentation of the problem by the student, discussion between the student and the facilitator, and decision making process. It is the responsibility of the student to implement the suggested solution.

2.6 Online Consultation Principles and Guidelines

A more comprehensive and richer understanding of several principles that may affect online consultation participants need to be studied in order to have a proper guideline in designing and developing an online instructional consultation. To help in designing and developing the online instructional consultation model, Steven (2002) has proposed the following top ten tips:

a)   Political Support Required

b)   State Consultation Purpose and Context

c)   Build the Audience

d)   Choose the Model and Elements Carefully

e)   Creating the Online Event Structure with Beginning and an End

f)   Provide Facilitation and Guidelines

g)   Access to Decision-Makers and Staff Required

h)   Disseminate Content and Results

i)   Promote Civic Education

j)   Not About Technology

The first guideline is associated with the second, which include the required political support, the consultation purpose statement, and contexts (Steven, 2002). If viewed from an instructional consultation perspective, there must be an academic desire for input and a willingness to consider that input in the decision-making process. This academic support is the core domain in governing the other guidelines as proposed by Steven (2002). It is necessary to give participants some information regarding the consultation issues before starting the online consultation session either through downloadable discussion document or web sites (Fagan et al., 2006). Assuming that the students and lecturers may feel doubtful on the purpose of online events, it must

be stated clearly so that both participants are aware of the shared-context and readable information.

The third guideline is about building the audience and informing others. Recruitment of people before starting the online consultation session is crucial as most of the people are not aware of the online published announcement. Steven (2002) posits that the participants need to be encouraged to join an announcement list so that they can join in whenever possible. Obviously, the first three guidelines focuses on the pre-consultation processes, that begins with lecturer making an online announcement, scheduling consultation hours, and sending upcoming consultation events and details through e-mails. To have more participants, the lecturers will send invitations to other students.

The fourth guideline concerns with choosing the right model and elements. Steven (2002) has suggested asynchronous mode online elements. For the instructional consultation in HEIs, the communication mode chosen should match the consultation purpose. It must also take into consideration the time factor since mentoring programs have differences in duration. Some of the mentoring programs are long-term relationships while some are short-term. Thus, an effective telementoring or online consultation program should be implemented with repository that can keep consultation contacts and contents as archive. For those who need consultation during an emergency, synchronous communication tools would be the preferred choice.

Meanwhile, Steven (2002) emphasizes on creating an online event structure that has a beginning and an end as stated in the fifth guideline. Although this consultation is asynchronous event, the time required for participation is still a key factor. Besides offering 24-hours, and seven-days-a-week availability of consultation service to students, this model should make use of real time communication benefits that provide a sense of community and immediacy for user. Steven (2002) adds that an effective consultation should be emphasized on the time and themes in which the amount of online consultation participants should not be too many. It should consider creating an effective small group breakout discussion session, a question and answer session with a decision-maker.

In the sixth guideline, Steven (2002) suggests that online consultation events should have an online facilitator that helps to keep the event flowing and on task. This corresponds to the seventh guideline which is access to the decision-makers and staff required to ask the question. Likewise, Gagne (1992) in his nine events of instructional consultation also states that the instructor should provide learner guidance to help them stay on track. This means that they are given authority to remind organizational decision-makers of their commitment to participate, and deal with problems behind the scenes as required. The facilitator's role is to regulate the flow of conversation and control the consultation activities as well as proposing solutions.

The eighth guideline refers to the dissemination of consultation contents. This corresponds to the ninth guideline, which is to promote civic education. People should be aware of the contents of the online events so that their opinions and

comments can be shared. Through the online announcements, people can obtain knowledge and issues of the consultation. However, instead of sharing decision-making and consultation results, there should also be an online discussion platform that supports discussions between people who are not physically present in the same room, or at the same time. This online discussion helps participants by contributing ideas and reflecting on consultation issues.

For the tenth guideline, Steven (2002) states that e-consultation is not about technology. Successful online consultation is about selecting the right consultation medium and reaching the right people. The technology that is selected should match the consultation purpose and simplify the daunting tasks. It should not make the user get "trapped" into complex technology. A poor design and implementation of technical infrastructure may destroy even the best plan of an online consultation system. In fact, many researchers in the e-consultation field agree that e-consultation that is designed around appropriate media selection would provide greater benefits for a desired e-consultation system (Joseph & Manon, 2009; Stephens et al, 2006). Therefore, it should take into consideration the information technology features that may affect the participants during online communication. This guideline "not about technology" is excluded from application in this research study since it is not important. For this study, seven principles and guidelines out of the ten guidelines proposed are illustrated in Figure 2.3.
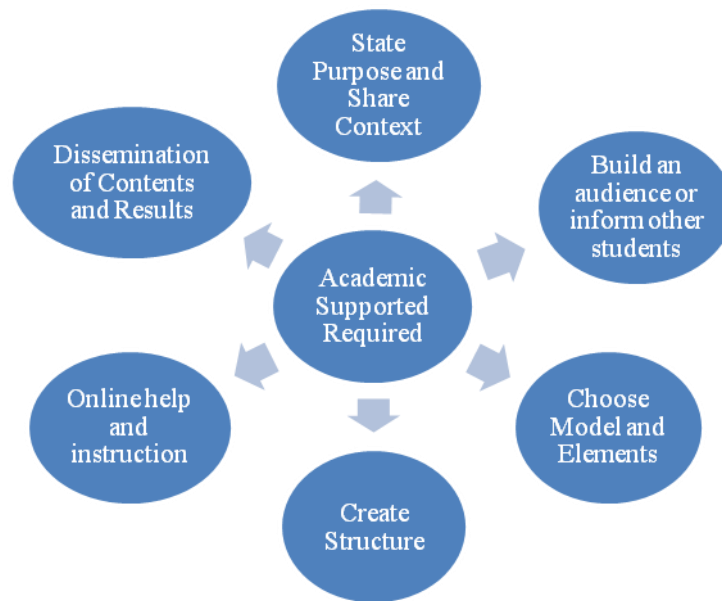
Figure 2.3: Online Consultation Principles and Guidelines adapted from Steven (2002)

As mentioned in section 2.4, three consultation processes for HEIs are determined. These consultation processes are then adapted to e-consultation principles and guidelines to form the comprehensive online instructional consultation processes as shown in Figure 2.4. To initiate the online consultation session, it is necessary to recruit students or lecturer, send them the consultation details and consultation purpose as well as share the consultation contexts during pre-consultation phase. During online consultation session, two principles are adapted which are "choose the suitable CMC tools" and "online help and instruction". Since some consultation decisions cannot be made in a short time and may be delayed to the next consultation, hence, the term "decision making" is used instead of the term "problem solving". The consultation details such as the document uploaded, the online participants' name and others will be stored in a database and retrieved during post-consultation session. During post-consultation session, the consultation contents and

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results are disseminated. Students and lecturer can retrieve them and conduct a post-session discussion.

Pre-consultation Phase	Online Consultation Phase	Post-consultation Phase
• State the Consultation Purpose & Share Contexts • Recruitment of Other Students	Problem Posting → Discussion → Decision Making • Choose suitable CMC Tools • Online help and instruction	• Dissemination of Content & Results • Post-session Discussion
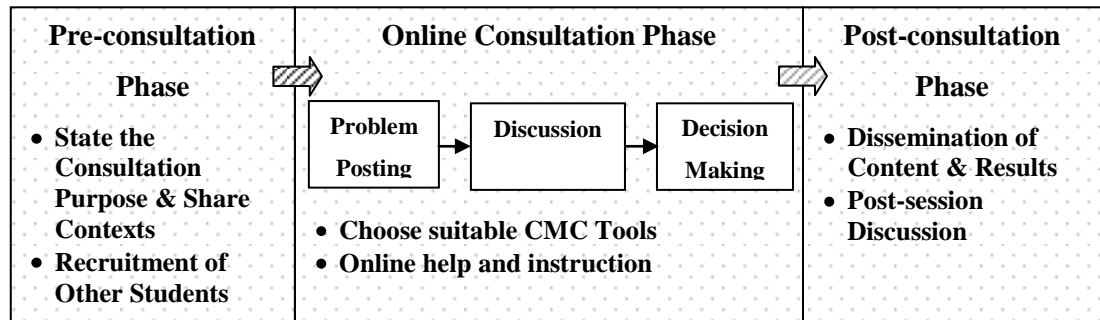
Figure 2.4: Adaption of E-consultation Principles and Guidelines with Consultation Processes

2.7 Active and Passive Participants in Affecting the Patterns of Communication

Generally, in an instructional consultation session, there are two categories of actors involved: active participants and passive participants (Bovee, Thill & Mescon, 2007). The active participants refer to the consultant and students that contribute actively during the session while the passive participants usually remain quiet. The passive participants will only speak up if they are asked to give opinion. However, if the participants talk too much, it may lead to a chaotic situation especially when they speak at the same time. Being either too talkative or passive may cause lack of interaction and poor communication among the participants. This kind of interference does exist in face-to-face consultation session. This disorder may become worse during an online session especially when the lecturer is inhibited by the interference.

The instructor must have the competence to motivate participants (Benfield, 2000) by promoting relevant learning and engaging the learners in activities and

communication. In addition, this interaction undesirably increases the instructor's barrier of putting effort on learners and encouraging them to take part actively in the learning process. If the instructor failed to motivate the students to present their own point of views, the session may prolong since some of them may rely on the instructor to make the first move. The students lack autonomy if the instructor is inhibited during an online session. Therefore, it is necessary to find ways to let go of these advocacy pattern to an inquiry pattern. Nonetheless, some learners may not participate in the conservation or discussion if their knowledge or skills differ or conflict with the others. Kemshal-Bell (2001) emphasizes that a healthy online group should have participant-to-participant collaboration and appropriate questioning, listening, and feedback skills.

Thus, in order to retain participant-to-participant types of interaction and communication patterns, features such as "raise-hand" function that allows only one speaker to talk at a time should be practiced in order to avoid interruption and overlapping (Michelle, 2007). In addition, other suitable features such as "passing the ball" function (http://www.webex.com/) that changes a user role to a presenter or host, and "kick the user" function that rejects troublemaking participants should be integrated. These features should be implemented in the online consultation prototype so that consultants are given the autonomy to control the speakers during a discussion session. Table 2.1 shows the features implemented in retaining the pattern of interaction and communications.

Table 2.1: Features Implemented to Retain the Pattern of Interaction and Communications

Features Implemented	Description
a) "Raised hand" Function b) "Pass the ball" Function c) "Kick the user" Function	a) Only one speaker talks at a time to avoid interruption and overlapping. b) Changes the user role to presenter or host. c) Rejects troublemaking participant.

2.8 Theoretical Framework of Media Choices Theory

Consultation is a social process. Therefore, it is extremely important to examine the online community interaction with the presence of computer-mediated communication tools (CMC). A strong sense of community not only makes participants feel that they are strongly connected, but also enhances the sharing of their point of views and feelings (Talmadge, 2004). Without a feeling of community, people will feel anxious, defensive, and unwilling to take the risks involved in learning (Wegerif, 1998). The significance of study on these media choices theory is to determine the appropriate medium to match online consultation processes.

One of the important factors related to active social interaction and a sense of community of online learning community members is "social presence" (Rovai, 2002). Social presence originally defines by Short, Williams and Christie (1976) as "the degree of salience between two communicators using a communication medium" (p.1). Garrison et al. (2000) defined social presence as the ability of students "to present themselves socially and emotionally, as 'real' people" (p.4).

Putting it simply, it is a kind of media choices theory that is concerned with active social interaction and a sense of community. The level of social presence depends on the social context, online communication, and interactivity (Tu & McIsaac, 2002). Video conference is an example of a communication tool that possesses a high degree of social presence as compared to e-mail or other text-based communication widely implemented in a virtual community. Para-verbal and non-verbal cues that are included in the video conference are important in which the movement of facial gesture, hand gesture, and eye movement may influence the flow of conversation. It is believed that this interactive element is the key to success when combined with well-planned, student-centered instruction (Greenberg, 2004; Omateyes, 1996).

Many researchers have found a relationship between social presence and student's satisfaction in online learning environment (Gunawardena, 1995; Gunawardena & Zittle, 1997; Hostetter & Busch, 2006; Richardson & Swan, 2003). The formation of community requires a sense of social presence among participants (Rourke, Anderson & Garrison, 2001), besides being an important factor that enhances instructional effectiveness (Gunawardena & Zittle, 1997). Social presence is not only limited to existing of nonverbal cues such as facial gesture or eye movement but also to other online community behaviour. Hence, Shen and Khalifa (2008) propose a multidimensional conceptualization of social presence which is found to be a better understanding of the online community behaviour. It consists of three dimensions which are awareness, affective social presence, and cognitive social presence. "Awareness" is the appearance of other social actors to react to the users as defined

by Heeter (1992). "Affective social presence" refers to a user's emotional connection with others (Nan, Wang & Xu, 2010). This dimension can be perceived by observing non-verbal cues, such as facial expression, eye contact, body language, gestures, and touch in an interpersonal communication (Depaulo, 1994); whereas "Cognitive Social Presence" refers to the belief about the users' relationship with others and the social context (Shen & Khalifa, 2007). Instead of proposing the three dimensional conceptualization of social presence, Shen and Khalif (2007) adopt the categorization of online community artifacts from Ma and Agarwal (2007) which are self-presentation, deep profiling and virtual co-presence as the antecedents of social presence. This is illustrated in Figure 2.5.
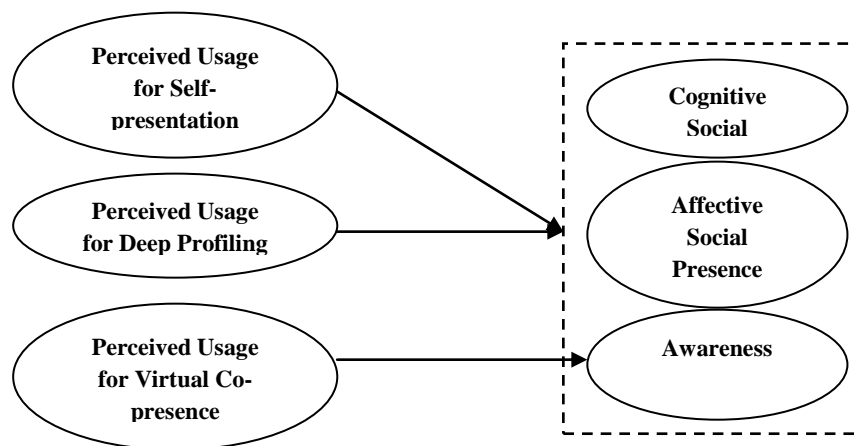
Figure 2.5: Theoretical Model of Multidimensional of Conceptualization Social Presence (Shen & Khalifa, 2008)

"Self-presentation" is defined as a process by which a focal person communicates his or her identity and is aware of the existence of each other (Ma & Agarwal, 2007). The samples of "Self-presentation" features include profile images, avatars, username, user profile, personal page, and interactive tools. The implementation of these features would help online participants to be aware of the existence of each

other that would decrease a sense of loneliness. Shen and Khalifa (2008) study on the relationships of perceived usage of online community features that support self-presentation towards three dimensional social presence theory: cognitive social presence, affective social presence, and awareness. Their results show that these online community features that support self-presentation has significant effects on these three dimensions.

"Deep Profiling" is defined by Ma and Agarwal (2007) as "the digital organization of social information with which community members can identify the focal person". The features that support "Deep Profiling" are member directories, community archive, search engine, and feedback. Shen and Khalifa (2008) perceive that the features that support deep profiling are positively related to sense of awareness, affective social presence, and cognitive social presence.

"Virtual Co-presence" is defined as the artifact that promotes the subjects that are being together in an online environment (Ma & Agarwal, 2007). As viewed from the online communication technology perspective, the features such as "user status" which show whether a participant is online or off line, can enhance the sense of awareness since the participants are aware about the status of each other. Another feature, the online informing caption, indicates the one who is leaving the consultation session, who is online, and who is speaking. The list of participants is applied for the purpose of participants' acknowledgement. Virtual co-presence is found to have significance relationship only with a sense of awareness. Table 2.2 summarizes these three dimensional of social presence conceptualization.

Table 2.2: Theoretical Model of Multidimensional of Conceptualization Social Presence (Ma & Agarwal, 2007)

Item	Self-Presentation	Deep Profiling	Virtual Co-presence
Definition	Process by which a focal person communicates his or her identity and is aware of each other's existence (Ma & Agarwal, 2007)	The digital organization of social information in which community members can identify the focal person (Ma & Agarwal, 2007)	The artifacts that promote the subjects that are being together in an online environment (Ma & Agarwal, 2007)
Example of Community Artifacts or Features	Profile images, avatars, username, user profile, personal page, and interactive tools.	Member directories, community archive, search engine and feedback	Online Informing Captions such as "who is leaving", "who is online", and interactive tools (real time posting, cooperative whiteboard)
Significance Relationship	Cognitive social presence, affective social presence, and awareness	Cognitive social presence, affective social presence, and awareness	Awareness

Another theory is the media richness theory which is defined as the ability to carry information, feedback, channel, source, and language to help reduce the ambiguity of media selection especially for computer-mediated communication (Daft & Lengel, 1984; 1986). Figure 2.6 shows the media richness theory with the complexity of the communication in relation to the richness of the medium (Daft & Lengel, 1984; 1986). According to Daft and Lengel (1984; 1986), the complexity of media starts from rich medium to lean medium from (1) face-to-face communication, (2) video conferencing, (3) telephone conference, (4) voice mail, (5) computer conference, (6) telefax, (7) e-mail, and (8) letter. This theory indicates that the more ambiguous a task, the richer medium format is needed to reduce uncertainty whereas lean media would be used to reduce the equivocal. For example, in an online consultation, lean medium such as e-mail is effective for users in scheduling meeting date and time as it is able to provide detailed information to reduce uncertainty. On the other hand, chatting system or instant messaging is poor at managing interruption and conveying comprehension. This makes chatting system a poor decision-making tool and knowledge storage, which indirectly reduces its potential value for meetings and presentations of detailed ideas. Lean media are less appropriate for performing such tasks because they can only transmit fewer social cues and limited feedback (Rice, 1984; Steinfield, 1986; Walther, 1992). However, lean medium offers certain advantages for group exchanging and sharing of information and allow group members to concentrate on contents (Hightower, Sayedd, Warkentin & McHaney, 1997). For example, e-mail consultation allows an individual or groups to take time to reflect the message they received and carefully provide appropriate feedback. On the other hand, rich media are more suitable for ambiguous tasks in which information contains multiple interpretations.
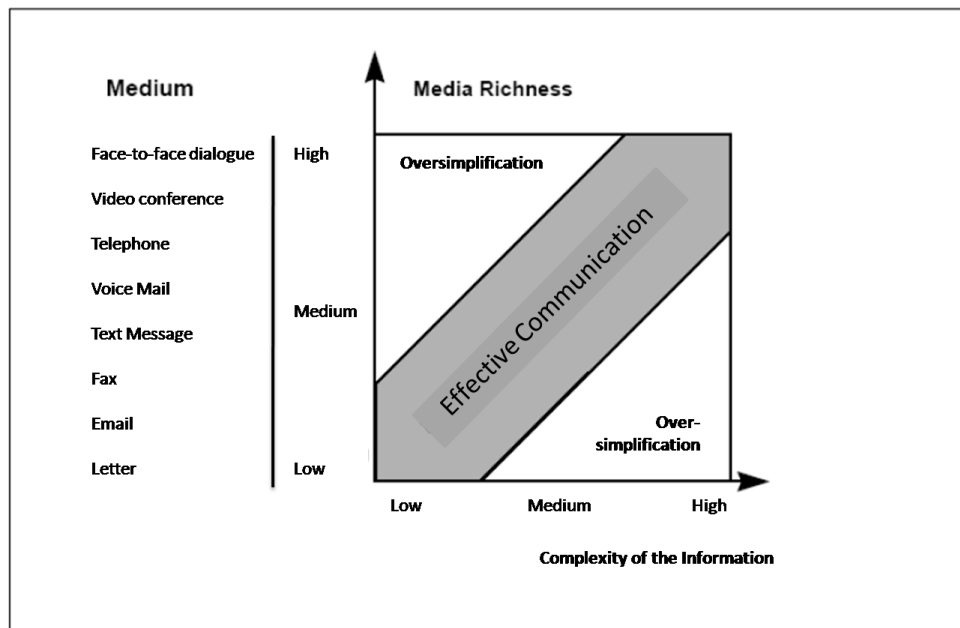
Figure 2.6: Media richness theory with the complexity of the communication in relation to the richness of the medium (Daft & Lengel, 1984; 1986)

In view of media richness theory, obviously communication effectiveness is highly influenced by matching the media capabilities to the needs of the consultation processes or tasks involved. Typically for face-to-face consultation, a human being relies on multiple communication modes such as para-verbal (voice, tone, pitch) and non-verbal (emotion expression of facial, eye movement or other body language) cues to convey information and provide feedback. However, such communication modes may be interrupted in an online consultation due to the failure of getting the right media capability. Consequently, this may not lead to the improvement of mentoring relationships. Thus, online instructional consultation should be well-equipped with supportive tools that match the consultation processes and tasks, so that it can work efficiently and understand the impacts of these tools on online consultation environment. Table 2.3 summarizes the categorization and matching of some CMC tools based on consultation processes as discussed on section 2.6.

Besides that, multidimensional conceptualization of social presence of online community as proposed by Shen and Khalifah (2008) on several online community artifacts or features are suitable to be implemented to induce a sense of community and social presence. These features include user profile detail, online status informing captions, interactive tools such as shared-whiteboard, username and image.

Table 2.3: Matching of CMC tools in Online Consultation Processes

Online Consultation Processes	CMC tools
Pre-consultation	a) Email as a lean medium; effective in delivering information details such as consultation date and time
During online consultation	b) Instant messaging is effective for providing immediate feedback
	c) Video conference provides non-verbal and para-verbal cues and is suitable for resolving equivocal situation
	d) Shared whiteboard, online status informing captions and username provide a sense of community and social presence

2.9 Major E-consultation Components of Public Policy Consultation

The identification of appropriate ICT tools for each task in a consultation process is important for identifying stages and activities. The consultation processes consist of a number of tasks to be accomplished in solving a client's problem. In order to determine suitable multimedia communication tools that match the online

consultation for education context, it is necessary to discover major e-consultation functional components.

In general, online consultation possesses a set of components and communication tools. Among the components recommended by Steven (2002) include question and answer (Q&A), document comments or leave comment feature, online conference, live chat events, online polling or surveys, online focus group, and e-mail list. These communication components can be categorized into synchronous and asynchronous communication tools.

Question and answer (Q&A) web page contains questions asked by users frequently through e-mails with response signed by decision-makers in an organization (Steven, 2002). Many media sites have integrated this feature by posing questions with short responses from users. For example, Kids Questions to Florida Governor (http://www.flheritage.com/facts/faqs.cfm), Multimedia Super Corridor MSC Malaysia Portal (http://www.mscmalaysia.my). This feature is suitable to be implemented in online consultation, especially in multi-participants consultation session in which the responsibility of answering questions is not only limited to the consultant but also to those who can provide solutions.

The ability of sharing opinions, comments, or questions on published articles or documents provides great advantages for readers to communicate with authors. Therefore, Steven (2002) has recommended that document comments should be considered as a consultation feature. Such feature allows people to express their views on the published consultation document.

Online consultation should include live chat events so that it can be used to form online real time discussion group. The use of live chat events or more commonly known as instant messaging with younger audiences in an educational setting may have a special appeal since they are familiar with this communication tool. A session would be pre-configured with several virtual rooms. In addition, the online consultation should also include other useful communication components that possess pedagogical features.

Other interactive consultation component suggested by Steven (2002) is online polling, which allows the consultant to craft poll questions, to be completed by citizens and useful links that present various consultation topics. These components are especially useful in a multi-participant consultation because the opinions and data collected from the people can be transformed and illustrated in the form of graph, bar chart, or percentage for better understanding. This online polling or survey component can be included in real time online instructional platform, due to the need in decision-making among instructor and students for academic purpose. According to Clive (2000), real-time polling helps to gauge opinions of all participants in a meeting or to gather answers of test questions.

Sharing of personal details of each participant is necessary for the development of online learning collaboration (Palloff & Pratt, 2003). Openness to the participants' personal details such as their name, age, and educational experiences would promote a sense of community and virtual presence. It also helps to create a sense of awareness and cognitive social presence (Ma & Agarwal 2007). Fagan et al. (2006) provide a holistic view of online consultation that focuses not only on the

communication activity but also on the management of consultation contacts and feedbacks. Consultation contacts, both the consultants and clients, should be kept informed and given feedback on the online consultation they have been engaged in. This activity can be supported by ICT tools in which contacts' details would be stored in a database, while the consultation details would be sent through e-mail newsletter. This will enable the contacts to be aware of the weekly or monthly updates of public meetings, focus group, and consultation events.

Based on the above descriptions, the major components that are found to be suitable to be included are:

a)   Communication tools
- Question and answer (Q&A)
- E-mail
- Leave comments
- Online conference
- Live chat event or Instant Messaging
- Online polling

b)   Consultation Contact Management and Feedback

2.10 Review on Existing E-consultation Models

A different e-consultation application possesses its own objectives and consultation processes. However, the basic components and functions are easy to define. Firstly, from the operational perspective, the strength of online instructional consultation depends on its capability to provide web-based access to information and other sophisticated communication tools. Secondly, from the functional perspective, online

consultation should provide accessibility at anytime and from anywhere. Utilization of Internet means that physical location does not matter, thus people can access wide range of data resources whenever they need them. They can also access the online consulting service before critical situation arises. Thirdly, from the user perspective, the familiarity of online communication tools indirectly influences the success or failure of the online consultation.

The common model of online consultation consists of basic components, collaborative tools, functionality, capability, and consultation processes. The matching of alternative technology to the consultation processes or the task involved is necessary (Fagan et al., 2006). Since there is no specific online instructional consultation model for HEIs, reviews on the instructional consultation processes and other types of online consultations are conducted. It is expected that the features and communication components identified in those online consultation systems would be applied in the OICon model. Two literatures of the existing online consultation model are reviewed:

a)   Financial Service Consultation (Tanaka, Koga & Yajima, 1999)
b)   Telemedicine Consultation Education (Ortega, Lessard, Burgun & Beuxl, 2003)

2.10.1 Financial Service Consultation

The financial service consultation provides assistance for customers in completing tele-consultation through touch screen interface at the client's side. It is designed as a help desk or a kiosk-like standalone system that serves one client at a particular time. The design of this consultation takes into consideration remote conversation,

different participant's skills, roles and asymmetrical communication among customer and staff. This asymmetrical communication refers to the different levels of participants' knowledge. For example, customers have the knowledge about their problems but do not have the skill in solving their problem (see Figure 2.7). Thus, they seek a consultant that has the knowledge on how to solve their problem.

Thus, to support this kind of asymmetrical communication, two additional functions are included: tele-monitoring and tele-operating (see Figure 2.6). Tele-monitoring permits the staff to monitor the customer terminal. Tele operating enables the staff to guide the customer in completing the consultation procedure by remotely operating the customer's terminal. The customer's terminal activities are captured and observed by the tele-monitoring at the staff terminal. Both staff and customer's terminals provide windows for tele-operating but with different functions. The Tele-operating window at the staff terminal is equipped with functional buttons that control various activities such as maps or figure displays at the customer terminal.

The customer may either obtain financial information directly from the terminal or seek help remotely from staff at real time. With the advancement of videophone or video conference and share-window function, a consultant can provide instruction on the customer's terminal. The consultant can take over the control of customer's operation in order to provide support if the customer does not know how to use the remote consultation system. It is necessary to include this privileged grant feature in a two-way communication as illustrated in Figure 2.7 and Figure 2.8:

a)   Stage I: Client reveals his or her problem to consultant.

b)   Stage II: Consultant discusses with customer and finds solution.

c)   Stage III: Consultant explains the solution to customer.
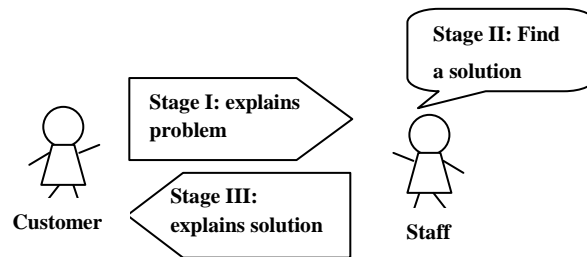
Figure 2.7: Online Consultation Processes (Tanaka, Koga & Yajima, 1999)
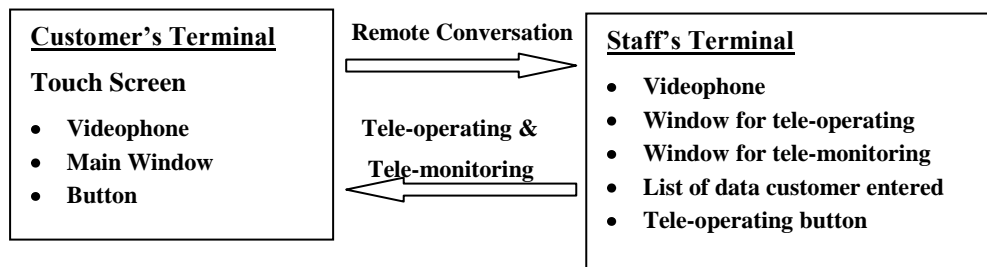
Figure 2.8: Components of Customer's and Staff's Terminal (Tanaka, Koga & Yajima, 1999)

2.10.2 Virtual Consultation for Telemedicine Consultation

Virtu@l Consult@tion (see Figure 2.9) is a Medical Simulation-based Training model developed by Ortega et al. (2003). Its purpose is to provide support for students to simulate a medical consultation from different locations, using current pedagogical methods based on clinical cases and integrating electronic resources. Most of the available computer support systems do not support multi-users and asynchronous environment (Ortega et al., 2003). The system focuses on synchronous consultation by adding some functionality in their model to compensate for the insufficient functions in other models as illustrated in Table 2.4.
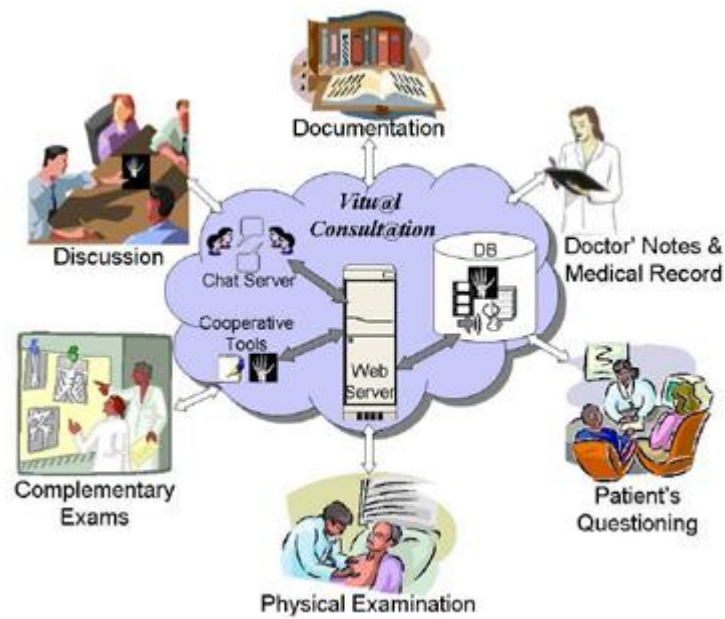
Figure 2.9: Virtu@l Consult@tion Model with Main Functionality (Ortega et.al, 2003)

Table 2.4: Components Implemented in Virtu@l Consult@tion

Functionality	Components
• Discussion	• Chat Server
• Patient's Questioning	• Cooperative electronic
• Complimentary Exams	whiteboard
• Medical Record	• Graphic Database Interface
• Physical Examination	• Multi-user Shared Interface
• Physician's Notes	• Sound Player
• Secretary's Summary	• Cooperative Electronic Notepad
• Document Access	• Cooperative Electronic
	Whiteboard
	• Web Browser

The advantage of Virtu@l Consult@tion is the multimedia data exchange that makes simulation medicine consultation more realistic than face-to-face simulation, besides enabling sharing of information among users. The main function of this model is the ability to question patients as they are the people who encountered one or more symptoms. The physicians will try to guide them in presenting their problems by asking questions.

Ortega, et al. (2003) emphasize that Virtu@l Consult@tion model provides an integrated medical education consultation which include the following functionalities:

a) Virtu@l Consult@tion provides a medium for multi-users which include tutor, patient, secretary, and physicians, to collaborate and accelerate the access and delivery of information.

b) Through a friendly chat application interface, an individual is informed by other users' roles through representative medical icons. Different colour per role is used during discussion and patient questioning.

c) Multimedia data, medical imagery or photographs are used to complete the examinations and medical records can be retrieved from graphical database and shared on corporate electronic whiteboard. This electronic whiteboard component is implemented with modification tools that allow multi-users to zoom in, zoom out, write, and draw annotation on the images.

d) The sharing and comparing of physician's notes that enables tutors to evaluate their reasoning and send feedback immediately after reviewing the summary of the patients' problems.

e)   Human body images and sound player is implemented to simulate a patient's problem area. The multimedia information and learning material delivery during consultation session are stored in a database.

f)   Accessing to external resources such as e-books, comments or interactive clinical cases, and medical images can facilitate the learning process by providing extra knowledge. Simple website navigator is constructed to provide optional support for user to access these resources, besides using their own web browser.

Table 2.5 shows the comparison of these two e-consultation models. Both of these e-consultation models with their different purposes and methods of consultation are adapted with CMC tools that match these contexts and purposes. The aim, user requirements, type of interaction, collaboration components used are all having important influence on the consultation.

As can be seen, selection of media for financial service consultation is based on client's and staff's skills, roles and knowledge; while for virtual consultation telemedicine education is based on interaction of active and passive participants as well as types of communication. If viewed from online instructional consultation perspective, the selection of CMC tools should be based on user requirements by assuming that there are two types of participants: active and passive. Financial service consultation stresses on one-to-one interaction while virtual consultation telemedicine education stresses on one-to-one and one–to-many interaction. Likewise, the display-change of the financial service consultation and shared-window whiteboard of the medical tele-consultation system can be applied in this online instructional consultation model as document or application presentation

function. Besides, textual chatting should be applied as an optional support communication tools.

For maximum effectiveness, a system should have the capabilities to conduct various activities during remote consultations without any interruption. The capabilities are video conferencing, instant messaging, application and document sharing. By having these functions, time can be saved because only little effort is required whereby one consultant can serve many clients with a similar problem simultaneously.

As a result of comparative analysis, other features and components which are shared-window function, video conference, multimedia database, electronic notepad, list of participants, and shared-whiteboard are found to be appropriate for the OICon model of HEIs.

Table 2.5: Comparison of Financial Service and Virtual Telemedicine Education Consultation Model

Dimension	Financial Service Consultation	Virtual Consultation Telemedicine Education
a) Purpose	a) Assists customer in completing a tele-consultation procedures.	a) Provide support for students to simulate a medical consultation form based on clinical cases and integrating electronic resources.
b) Processes Involved	b) Consultation processes • Customer explains problem to staff. • Staff find solutions • Staff explain solution to customer	b) Not Stated
c) Selection of ICT	c) Based on client's and staff's skills, roles and knowledge.	c) Based on interaction of active and passive participants as well as types of communication
d) Collaboration Components Used	d) Videophone, Shared-Window Function, List of Customer Data, Tele-Operating , and Tele-Monitoring	d) Instant Messaging, List of Participants, Multimedia Database, Sound Player, Shared Images Whiteboard, Electronic Notepad and Board, and Physical Examination Tool.
e) Methods of Consultation	e) Through shared-window and remote display-change function.	e) Through Physical Examination Tool
f) Types of interaction	f) One to one interaction	f) One-to-many interaction, and one-to-one interaction

To this end, there are totally 12 multimedia communication components determined. Table 2.6 summarized the communication components and features of Public Policy Consultation at section 2.9 and comparative analysis.

Table 2.6: Summarization of Communication Components and Features

Major E-consultation Components of Public Policy Consultation	Financial Service Consultation	Telemedicine Virtu@l Consultation
Steven (2002) • Q & A • Document Comments • Live Chat • Online Polling • Email List Fagan (2006) • Consultation Contact Management	• Shared-window Function • Video Conference	• Multimedia Database • Electronic Notepad • List of Participants • Shared-whiteboard

2.11 Enhancing the Value of Online Consultation Utilization for Higher Education Institution in Malaysia

Typically, the interaction of consultation relationships among lecturers and students starts with phone, and e-mail-based consultation. The interaction becomes improved by new technologies such as instant messaging, audio and video conferencing as well as online forum discussion board. The blending mode of synchronous and asynchronous communication tools has made consultations easier by providing users with various options to suit their online communication patterns and consultation environment.

Based on the literature review on the existing e-consultation model of various contexts, the consultation model for instructional technology should apply the following characteristics and concepts of the existing e-consultation model:

a) facilitates one to many consultation

b) provides participants with various options of communication tools

c) requests data stored in database

d) requests help from peers, other SMEs besides the supervisor

e) increases problem solving skills with the help of shared-window components

f) obtains multi-participants through online polling for decision making stages

The major values of online instructional consultation model for education contexts are discussed in the next section.

2.11.1 Shifting from Asynchronous Consultation to Blending Mode Consultation

A closer examination of the asynchronous and synchronous modes of e-consultation brings to the identification of valuable and essential characteristics or features to be applied in educational context of online consultation. There are two types of consultations: real time tele-consultation as well as store and forward tele-consultation (Deshpande, Khoja, McKibbon, & Jahad, 2008).

Real time consultation is conducted by using advanced information communication technology such as audio or video conference, and instant messaging to enable live communication. Video conference combines video and audio transmission of information at real time that mimics face-to-face interaction. This real-time communication usually needs equipment such as webcam, built-in sound system, and software installed in the client's computer. Auditory and visual cues that are included in a video conference are important in which the movement of facial gestures influence the delivery of information.

Asynchronous e-consultation refers to the online consultation that occurs independently of geographical location and time in which participants' communications do not happen simultaneously. It is the same as asynchronous e-learning in which information are commonly delivered through portals, forum discussions, e-mails, or well-developed learning management systems such as virtual classroom. The advantage of asynchronous e-consultation is the ability to provide a way in which a user can have access to delayed materials, permanent record or archives for future reviews. Early e-consultation was often entirely asynchronous. For example, e-mail had been employed as an important communication tool due to its benefits in contemplating and answering for a period of time. However, the level of immediacy of asynchronous communication is not as high as synchronous communication. Participants who are curious to get feedback cannot get the answer immediately. Thus, the use of synchronous communication tools is necessary for those who need immediate response.

In practice, e-consultation communication tools have been increasingly shifted from purely asynchronous to the hybrid mode of asynchronous and synchronous communication technology. This asynchronous consultation always involves the exchange of consultation documents, for example, exchange of clinical information, static images, and radiographs over the networks. Online recording or multimedia, online recorded document, and threaded discussion forum are the examples of asynchronous collaborations. However, the lack of immediate social interaction on asynchronous communication may cause online participants to feel isolated and lonely (Kurtz & Friedman, 1999). Therefore, the right combination of multimedia

elements used in an online consultation prototype is efficient in demonstrating users'
thoughts and feelings. These multimedia elements include text, graphic, animation,
audio, and video that should be integrated and linked to a computer resource. In
addition, the users need to have an understanding of these communication
components. Hence, the implementation of mode-blending consultation would help
to reduce this limitation. This hybrid communication mode, if properly planned,
would make online consulting service more effective and sophisticated.

2.11.2 Shifting to Online Consultation Environment

The two limitation factors of a typical consultation are distance and time; which are
needed to schedule consultation session. Fortunately with the existence of the
Internet, numerous advantages have been identified especially to the consultation
participant in an academic environment. For instance, a host of sophisticated
Internet-based applications makes online consultation possible through video or
audio conferencing, e-mail or online forum. Such innovation has successfully
helped in saving time and money spent on travelling. Most importantly, the use of
Internet technology and asynchronous computer-mediated communication mode
allows consultation sessions to be conducted anytime and anywhere that are
convenient to both parties. This kind of arrangement is most suitable for those who
do not expect immediate response. Synchronous mode of computer-mediated
communication is applied when real time interaction is required.

2.11.3 The Need of Personalization for Online Instructional Consultation

The objective of personalization is to deliver pertinent contents to an individual or group of users according to their roles and preferences (Aneja, et al., 2000; Strauss, 2000). Basically, a student will be assigned to an experienced lecturer who has the relevant expertise and knowledge. Each user usually has different level of access authorization and preferences to webpage contents. Users are given the authority to subscribe to a particular consultation newsletter, and keep in touch with groups of people with a common interest. Therefore, users will be kept informed by the updates of consultation events or particular topics currently under discussion. According to Steven (2002), the ability to recruit participants to online events as well as dissemination of consultation contents to participants after each consultation session are crucial for the success of an online consultation. Personalization refers to the process of providing relevant content based on each person's profile. These profiles are created by users through signing up of the online forms. Having the user's profile, students can view the consultation contents that they have subscribed to and the latest consultation posted by their mentors, send mail or make online appointment, create consultation room as well as involved in post-session discussion and leave comments on recorded consultation document. With the personalization function, facilitators will be able to manage their mentees' information, send appointment feedback and send invitation mail. Furthermore, this helps the members of the group to keep in touch with each other. If an online consultation system can get students to sign up as mentees under a certain supervisor, they can receive updates of previous consultation sessions, or invitation mail from other mentees under the same mentor or consultant.

2.11.4 The Need of Recorded Consultation Document Management

Participants of an online consultation should be kept informed regarding the consultation contents such as consultation decision, result of survey and recorded consultation document. Likewise, a consultation session may be terminated before the problem being solved. Thus, there is a necessity to store consultation information of a particular session such as participants' information, and recorded consultation document. These particulars will be sent as feedback at the end of a consultation session. Students who subscribed as mentees under a supervisor but do not take part in any online consultation session may feel curious about the consultation session. However, having access to online recorded consultation document, it is easier for them to follow up with the missing session.

Researchers need to consider a proper way of storing, retrieving and organizing the consultation information because currently a large portion of information available over the network is stored in an unstructured form, and the information retrieval tools are poor in finding heterogeneous information (Tanaka et al., 1999).

2.12 Management of Consultation Recorded Document

There are two kinds of meeting records: public and personal meeting record (Jaimes et al, 2004; Whittaker, Tucker, Swampillai, & Laban, 2006). Public meeting record includes minutes, agenda, documents distributed at the meeting, audio-visual recording of meeting sessions, pre-recorded documents, diagrams, and notes taken from digital whiteboard. Personal meeting document refers to the note taken during and after a meeting that consists of participants' own perceptions. According to

Jaimes et al. (2004), written notes are mostly used by people in reviewing meeting contents since they are easily obtained. However, this does not mean that the audio-visual recorded documents are unnecessary for capturing information delivered during the online collaboration. The audio-visual recording decreases the probability of information loss as compared to the written note recording since a verbatim record is produced (Whittaker et al, 2006).

It is clear that it may appear as an attractive proposition to record and save consultation sessions in multiple forms of media, such as video recordings, written notes taken, and slide presentation recordings. It would be a great advantage for people who prefer to retrieve multimedia documents for various purposes such as to understand any unclear meeting segment, identify the cases that differ with the written document, keep accurate record, and recall the information that are not stored in public and personal documents. These are among the associated issues that need to be considered when proposing a way of retrieving multimedia recorded document and playing back the recorded document through the web browser. In an online consultation session, there is a need to save the public record document such as agenda and minutes, participants involved, audio-visual recording as well as documentation presented.

2.12.1 Retrieving Video Method

Once the recording of the consultation session is complete, there are some efforts needed to organize the media asset in order in the web browser, so that it can be accessed easily by users. Most of the video sharing websites employed search engine features to reduce human effort on retrieving the video asset from various databases such as Youtube.com (http://www.youtube.com), Dailymotion.com (http://www.dailymotion.com/), and Vimeo.com (http://vimeo.com/). The method of retrieving media asset can be simplified by implementing a search engine and dynamic thumbnail view of video segments. Users can search any video they wish through categories such as date and topic of consultation.

2.12.2 Recording and Playback of Online Audio-Visual Asset

A systematic way of manage the recording and playback of the video and audio components on the web browser is required because the storage of these assets is increasing. Previous study by Bruno, Augusto, Manoel, Evandro, Henrique, Leandro, & Marcello (2007) proposed a component-based toolkit to support e-learning multimedia environment known as ArCoLIVE. In order to stream different types of audio video asset from different sources, ArCoLIVEPlayer and ArCoLIVENetworkPlayer are developed. Both of these media players stream audio-video from different locations. ArCoLIVEPlayer streams real-time audio-video from web browsers, webcams, and microphones that are plugged-in to computers. ArCoLIVENetworkPlayer plays the progressive downloaded and pre-recorded audio-video from the media server. The disadvantages of progressive download method to embed a media player to a web page is that the digital file needs to be

downloaded to the hard drive of end user's device. This video delivery method is not suitable to prevent raiding of a video content in the device memory. The differences of these two media players: live streaming and recorded media players, are shown in Table 2.7.

Table 2.7: Functionality Differences of Real-time and Recorded Media Player

Live Streaming Media Player	Recorded Media Player
a) Streams real-time audio and video from microphone plug-in to computer, webcam or video conference.	a) Streams pre-recorded audio video from media server.
b) User can record, stop, and playback the media.	b) User can playback, fast forward, drag the timeline to particular media segment or stop the media stream.
c) Media player as a part of web conference system which interacts with other communication components.	c) Media player as an independent component interacts with media server.

2.13 Acceptability

At present, technology acceptance by users has been paid considerable attention for evaluating an information technology product. Current research offers insight into determining reliable factors that influence user acceptance towards information technology (Malhotra & Galletta, 1999; Bertrand & Bouchard, 2008; Nelson, Wixom & Todd 2005; Sun & Zhang, 2006). Some even extend the derivation of reliable predictions of user acceptance's factors by unifying these reliable factors with systems design models to formulate a formal theory of user acceptance of information technology (Lee, Cho, Gay, Davidson & Ingraffea, 2003). It is a

technique for accessing intended user's behaviour in performing the intended tasks by measuring several factors. Many researchers who studied information technology mentioned that the success of a system is highly affected by user attitudes (Amoako-Gyampah & Salam, 2003; Keat & Mohan, 2004; Lee at al., 2004; Liu et al., 2005). According to Succi and Walter (1999), the more the users accept the information system, the more they are willing to make changes in their practices and spend time and effort in using the system.

2.13.1 Technology Acceptance (TAM) Model

In general, Technology Acceptance Model (TAM) has been extensively used to understand technology adoption (Taylor & Todd, 1995; Gefen & Straub, 2000; Doll & Xiandong, 1998). The early proposed TAM model is based on perceived usefulness, ease of use and attitude towards using the technology (Davis, 1985). The latest investigation on the effectiveness of TAM model was conducted and it was found that behavioral intention (BI) as the new variable in affecting the respondents' acceptance on technology used (Davis, Bagozzi & Warshaw, 1989). Figure 2.10 shows the TAM model by Davis (1989). It measures the communication components adoption with relation to perceived usefulness, perceived ease of use, behavioural intention, and attitude towards using information system. Davis (1989) hypothesized that attitude is the determinant for behavioural intention to use a system. Perceived usefulness and perceived ease of use, in turn, are the determinants for users' attitude. Perceived ease of use is the key factor that increases the acceptance of IT and utilization of a technology (Venkatesh, 2000; Ramayah & Ignatius, 2005). More specifically, TAM theorizes that an individual's behavioural intention to use a

technology is directly influenced by perceived usefulness (PU) and attitude of users toward using information systems. It is extremely importance to determine individual thoughts, attitudes and feelings as a consequence of interactions with other individuals or groups.
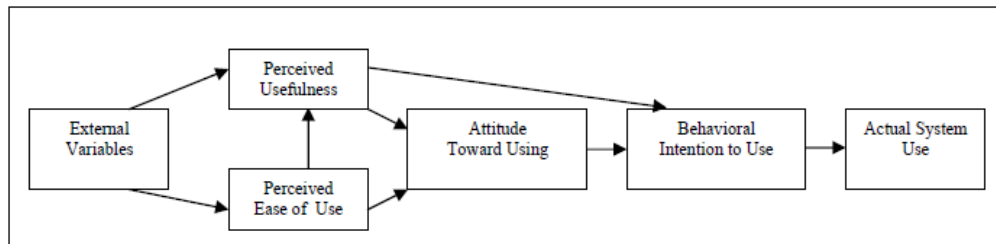
Figure 2.10: TAM Model (Davis, 1989)

TAM does not analyze the qualities of interaction or products interface with the same precision as many usability questionnaires. It is extremely important to know user acceptance towards a novel technology tools or system that has not been implemented or applied in a context. Many researchers found that the acceptance of technology is usually measured on the behavioural intention to use rather than the actual use of the system (Mark, Barbara, Pearl, Stuart & David, 2010). Thus, in this research, the variables of the actual usage of information system are excluded since the OICon prototype does not fully-implement the mentoring program in HEIs as shown in Figure 2.11.

In online instructional consultation context, a user's likelihood of using OICon is jointly determined by their attitude towards using the OICon and perceived usefulness (PEOU). This indicates that the more they found the OICon useful, the more they are willing to use OICon in the future. OICon prototype is designed to facilitate online instructional consultation with the implementation of CMC tools.

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User perceives ease of use of OICon in this research refers to "the degree of which multimedia communication components helps accomplish a tasks with minimal difficulty". It accounts on CMC functional interaction rather than human computer interface interaction.

There is a lack of theoretical frameworks in past studies that deal with the effectiveness of e-consultation system. This leads to the fact that the factors to determine the effectiveness of online consultation system are still questionable. Thus, in this research, it is important to determine to what extent is the TAM model in predicting the perceived usefulness and perceived ease of use which are shown in Figure 2.11 as external variables. TAM emphasizes external variables have direct effects on PEOU and PU. Several studies have shown that self-efficacy and computer anxiety are the predictors of PEOU and PU (Gefen, Karahanna, & Straub, 2003; Gefen & Straub, 1997; Pedersen & Nysveen, 2003). Furthermore, studies on information system also found that anxiety as the determinants to the PEOU and PU (Igbaria, 1993; Venkatesh & Davis, 2000). Self-efficacy is referred as "self confidence in his or her ability to perform tasks across multiple computer application domains"(Monsuwe, Perea, Dellaert, & Ruyter, 2004). Humans tend to avoid challenging tasks and give up quickly when they face difficulties (Bandura, 1994). Thus, in this research, it is necessary to examine users' self-confidence in performing tasks by using CMC tools as it directly influences the PEOU and PU.

Another factor, anxiety, is referred as "the degree of an individual's apprehension, or even fear, when he or she is faced with the possibility of using computers". In this research, low level of anxiety is predicted to have positive relationship with PU and

PEOU. This indicates that the lower their feelings of fear and fright when using OICon prototype, the more they belief that OICon prototype is useful and easy to use. In this research, self-efficacy and low level anxiety are included as external variables. Instead of these independent variables, factors of user perceived important components and features to be examined as determinants PU and PEOU. The way users perceive the importance of consultation components and communication features is critical and indirectly influences the user's acceptance of online consultation. Thus, perceived importance of communication components and features is predicted to have positive relationship with PU and PEOU.

The relationship of these independent variables, dependent variables and external variables with hypotheses for users' acceptance towards OICon model are illustrated in Figure 2.11. Independent variables of PU and PEOU are the determinants for attitude towards using the information system. Perceived Usefulness and Attitude are predicted as the determinants for behavioral intention to use. In this research, reduced TAM model is applied in which the variable of the actual system use is excluded while other external variables are added which are self-efficacy, low level of anxiety, and perceived importance of the features and multimedia communications components. These variables are briefly explained:

a) Perceived Usefulness (PU) is about "the degree to which a person believes that using a particular system will make his or her life easier" (Davis et al., 1989). It is predicted as the determinant of attitude and behavioural intention.

b) Perceived Ease of Use (PEOU) is about "the degree to which a person believes that using a particular system would be free of effort". It is perceived as determinant of perceived usefulness and attitude.

c) Behavioural Intention (BI) is defined as "the degree to which a person has formulated conscious plans to perform or not perform some specified future behaviour."

d) Computer Self-efficacy (SE) is defined as "self confidence in his or her ability to perform task across multiple computer application domains (Monsuwe´, Perea, Dellaert, & Ruyter, 2004). It is predicted as determinant for perceived usefulness and perceived ease of use.

e) Low level of anxiety is defined as "The degree of an individual's apprehension, or even fear, when she or he is faced with the possibility of using computers." It is predicted as the determinant for PU and PEOU.

f) Attitude is defined as "the individual user's positive or negative feelings (evaluative affect) about performing the target behaviour." It is predicted as a determinant for behavioural intention to use OICon.

g) Users' perceive the importance of Communication components and features that had impacts on OICon prototype. It is predicted as the determinants for PU and PEOU.

2.14 Conclusion

In the first part of the literature review, the introduction to the concepts and definition of instructional consultation is discussed. This is followed by an exploration on current trends and limitations on existing telementoring programs. Then, the characteristics of consultation including the typical consultation processes, the actors involved, patterns of communication, and interaction was discussed. Comparison of remote financial service consultation and medical curriculum tele-consultation are reviewed to define the communication components involved. Besides that, an overview of a typical consultation of a mentor-mentee system for HEIs in Malaysia is reviewed to define the consultation processes and the types of communication and interaction involved. Based on the functionality of these communication components and features processes, online instructional consultation processes are defined. Furthermore, methods of managing recorded document including the organization, retrieval and playback of media are also reviewed. As a result of reviews on the literature regarding TAM model, 3 external variables are derived which are low level of anxiety, perceived importance of features and communication components and attitude. All of these three external variables are predicted to have positive relationships with PU and PEOU. PU and attitude are predicted to have positive relationship with behaviour intention to use. Besides that, PU is predicted to have positive relationship with PEOU. Both PU and PEOU are predicted to have positive relationship with Attitude. Furthermore, 12 multimedia components have been identified to facilitate this online consultation model.

CHAPTER THREE
RESEARCH METHODOLOGY

As discussed in Chapter 2, the selection of CMC technology is based on users' requirement and consultation processes. This is important to identify appropriate CMC tools to facilitate each stage in the consultation process. Hence, in this research, a step-by-step and cyclical methodology as entailed in action research (AR) is applied as the research approach. The methods of gathering data, research instruments, respondents involved as well as methods in evaluating the output will be discussed in the remainder of this chapter.

3.1 Action Research (AR) Overview

Action Research (AR) has been advocated by many writers and researchers to improve the quality of organization and institution (e.g. Schratz, 1993; Zuber-Skerritt, 1996; Walker, 2001; Elton, 2001; Kember, 2002). It is a spiral process that allows the implementation of knowledge by taking action at the same time. A more brief definition by Gilmore, Krantz, and Ramirez (1986) is:

"Action research...aims to contribute both to the practical concerns of people in an immediate problematic situation and to further the goals of social science simultaneously. Thus, there is a dual commitment in action research to study a system and concurrently to collaborate with members of the system in changing it in what is together regarded as a desirable direction (p.160)."

There were clouded origins of action research being established in the literature (Masters, 2000). It is believed that it started to be applied as a research method in social and medical sciences since the mid-twentieth century (Richard, 1999). The

origin of AR has also been said to be applied as a research method in the education context in the 1950s by Corey (1953), a researcher at the Teachers' College at Columbia University in the field of education and it began its popularity in 1970 as the practitioners and researchers in the education field had used it in solving educational issues (Ferrance, 2000). It then gained considerable attention for scholarly investigations of information systems at the end of 1990s.

3.2 Action Research as a Pedagogy Approach for Information System (IS) Research

Action research (AR) is a type of research that shares common knowledge of facts found at the researchers' workplace or organization (Norshuhada & Shahizan, 2009). More specifically, it is always conducted by researchers doing studies related to academic purposes for HEIs, individuals or organizations in forming and developing policies related to education (Ng, 2001). Nevertheless, it focuses on solving problems by investigating facts or human problems in a real context (Ann, 2005). Practitioners investigate deeply the cause of problems closest to them or to the environment being studied, propose intention and apply intervention to conquer barriers encountered by them. These processes are repeatedly undertaken until the problems are solved.

Basically, it consists of iterative and cyclic approach with 4 phases: planning, action taking, observing, and reflecting (Altrichter, 1990). It varies in form and responds to particular problem domains (Richard, 1999). A more prevalent AR approach has been developed by Susman and Evered (1978). They view the AR approach as a cyclical process that comprises of five stages:

a) Diagnosing

b) Action Planning

c) Action Taking

d) Evaluating

e) Specifying Learning

At present, AR has gain popularity as research approach in many information system (IS) research projects such as Coping with Systems Risk (Straub & Welke, 1998), and Asynchronous Groupware Support (Kock & McQueen, 1998). Its multiple approaches on education settings include collaborative action research, critical action research, classroom action research, and participatory action research. This increases its importance in education field particularly in curriculum development, professional development, and applying learning in social context (Rory, 1998). Likewise, AR is also commonly employed as a research method for school settings, usually for improving the quality of learning with the implementation of information technology.

3.3 Selection of Research Method

The characteristics of action research, iterative and collaborative process, make it appropriate to be used as a guideline in the establishment of research in the field of information system (IS) and education. AR emphasizes on taking quick action in solving problems or improving the quality in an organization rather than dealing with theoretical aspect of proving the theory. In other words, AR is defined as "a mean or model for enacting local, action-oriented approaches of investigating and applying small-scale theorizing to specific problems in particular situations" (Berg, 2004). Action Research is usually undertaken in a practitioner's environment in

order to address real problems that are closest to their environment. Its problem-centered, client-centered, action oriented, and iterative nature (Damme, 1998), which are specifically designed to deal with real world situation, makes it particularly suitable for this study.

The appropriateness of applying AR as the research methodology is basically due to its nature that emphasizes on reflective process within stages starting from diagnosing, action-planning, action-taking, and evaluating until specifying learning. Practitioners generally address problems encountered by them in an organization. They are responsible in continuing to plan and make decisions within the operation of the education field once problems have been diagnosed. The processes in AR act as guidance to assist educators in assessing the needs, documenting the steps of inquiry, analyzing data as well as making informed decision that leads to desirable outcomes (Ferrance, 2000). The nature of AR makes it particularly suitable for this research since the scope and objectives are related to HEIs environment. Thus, AR is applied in this research by following a cyclical structure as outlined by Susman and Evered (1978) that will be discussed in the next section.

3.4 Action Research Cycle

Susman and Evered (1978) elaborate AR as a cyclical process which consists of five stages as shown in Figure 3.1.
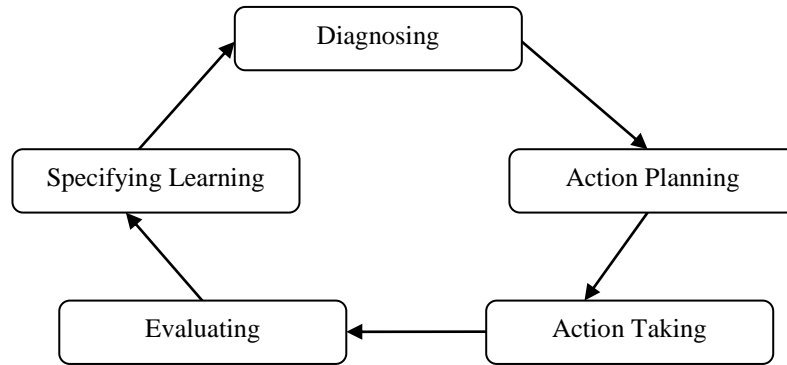
Figure 3.1: Action Research (AR) approaches developed by Susman and Evered (1978)

The diagnosing phase corresponds to the bird's eye view in the identification of problems or issues in an organization. A preliminary study is conducted in this study to provide evidence and more detailed diagnosis that support the existing problem. This step is then followed by considering an alternative course of action and determining possible solutions. These are the activities conducted in the action planning phase. The next stage, the action-taking phase, involves performing the tasks or action planned at the previous stage. Evaluating phase involves gathering and analyzing the data as well as interpreting the findings and results. The last phase, specifying the learning phase, involves examining the research evidence and contribution of knowledge. The overview of the AR cycle for this research is shown in Figure 3.2, while the details are discussed in the following section.

Phases	Activities	Outcomes

Phase 1- Diagnosing

Literature Review

- Mentor-mentee system in higher education
- Instructional Consultation Concepts
- Typical Consultation process & Online Consultation Process
- Existing Telementoring Program

Consultation problems in higher education & challenges of existing telementoring program

Research Question & research variables

Research Objectives

Phase 2- Action Planning

- Financial Consultation
- Medical Consultation

Comparative Analysis

Multimedia components & Features

OICon Model

Achieve Objective 1 &2

Major e-consultation components of Public Policy Consultation

Phase 3- Action Taking

Pre-test Questionnaire- Student Analysis

Communication with Experts

Pilot Testing

Factor Analysis & Reliability analysis

Quantitative Data Analysis

Figure 3.2: Overview of Action Research (AR) Approaches

3.4.1 Diagnosing Phase

During the diagnosing phase, related literatures are reviewed by initially exploring on the mentor-mentee system in HEIs, the existence of various e-consultation contexts, instructional consultation concepts, existing telementoring program as well as Technology Acceptance Model (TAM).

Research problems are addressed from reviewing literature of existing telementoring program in HEIs. Research questions are also formulated in this phase. Then, research variables are derived from the research questions. These are discussed in more detail as shown in Table 1.2 at section 1.7: objective-method table. Other research variables are also found after reviewing the literatures on TAM model and null hypothesis are derived. The research objectives are also identified to govern the intention of solving the problem addressed. The findings of the literature review provide a better understanding of the research area.

3.4.2 Action Planning

To really make use of the opportunities offered by the technologies, careful attention should be given on the pedagogical consultation including its entire planning, design, and development processes. For example, besides focusing on the media and online collaboration modes, attention should also be paid in determining these factors: (i) users' actions, (ii) support for online collaboration, (iii) ways of providing feedback and, (iv) users' perception towards incorporating ICT for consultation in HEIs. Hence, in this action planning phase, a series of actions to be undertaken at the proceeding steps in solving the identified problem are prescribed and decided. The

planning has taken into consideration the findings from the quantitative analysis and literature review. The following are the series of actions carried out:

a) Exploring existing e-consultation models for various contexts which are financial service consultation, virtual consultation for medical curriculum, the processes involved, the CMC tools used and its challenges. The literature of major e-consultation components for public policy consultation was reviewed since there is no comprehensive model found for Public policy e-consultation contexts.

b) Conducting quantitative study on students and interview lecturers to access their point of views of conducting consultation online.

c) Identifying appropriate multimedia components to be adapted in the Online Instructional Consultation model (OICon).

d) Identifying the multimedia components and features to be modified to suit the user requirement.

e) Proposing a new online consultation model for instructional purpose in HEIs.

f) Constructing a prototype.

As mentioned before in the diagnosing phase, a brief review on the existing types of e-consultations is insufficient for understanding. Therefore, the existing telementoring programs are critically analyzed to determine the right multimedia communication components and features. Besides that, the existing e-consultation models are also explored and compared to identify their strengths and weaknesses. The pedagogical value, social presence, and media richness are also considered. Then, the instructional consultation processes with the multimedia communication components are combined to form the OICon model.

3.4.3 Action Taking

The action taking phase involves design, development, and implementation of OICon prototype based on the series of actions planned in the previous phase. Below are the descriptions of action planned to be undertaken in this phase.

3.4.3.1 Exploring of the Existing E-consultation Models of Various Contexts

Initially, a brief review of various e-consultation models was conducted. However, there is no specific e-consultation model for instructional purpose in HEIs. Hence, the exploration was done on a financial consultation system and virtual consultation for telemedicine education. Reviews on the literatures for e-consultation model were also conducted to identify the role of the consultants and clients, the types of interaction, and the communication patterns and tasks. Generally, the reviewing of the e-consultation model was based on these aspects:

    a) E-consultation processes
    b) Online participants' roles
    c) Interaction and types of communication
    d) Communication components and features involved for each stage

3.4.3.2 Conduct Quantitative Study and Interview

User requirement is found to be the main factor in developing a system. In fact, 73 % projects are cancelled or failed to meet expectations and cancelled due to its poor requirements definition and analysis as stated in The Standish Group Chaos Report (http://www.projectsmart.co.uk/docs/chaos-report.pdf). Indeed, it is extremely important to investigate deeply the real problem encountered by students and instructors in HEIs. Thus quantitative study is conducted to access students'

perspectives on conducting consulting service online. Interviews with lecturers and experts help to identify the real problem encountered in consultation in HEIs.

3.4.3.3 Identifying multimedia components that are appropriate to be adapted in Online Instructional Consultation (OICon) Model

After exploring the existing e-consultation models, comparative analysis was conducted between the two e-consultation models, which were Financial Service Consultation (Tanaka et al., 1999) and Virtual Consultation for Telemedicine Curriculum (Ortega, Lessard, Burgun & Beuxl, 2003). The dynamic video playback application was explored to identify the organization of video playlist and video delivery methods. The functions of the multimedia communication components of these applications were compared and analyzed. Modifications of some of the multimedia communication components were conducted to suit the instructional consultation purpose.

3.4.3.4 Proposing the new online consultation model for instructional purpose in higher education

A brief Online Instructional Consultation (OICon) model is proposed through a literature review on previous researchers' e-consultation model. Data were gathered from the lecturers of UUM College of Arts and Science who have experience in teaching human computer interaction (HCI) and multimedia course. These lecturers' recommendations and opinions are important for this study. At the end of the action taking phase, objective two is achieved.

3.4.3.5 Constructing the prototype

Rapid prototyping (see Figure 3.3) method was used for developing the OICon prototype to test on the OICon model in order to achieve objective 3. The phases in the Rapid Prototyping include need assessment, content analysis, setting objectives, prototype construction and utilization, system installation and maintenance. This method was chosen due to its time and cost effectiveness in determining errors before renationalizing it into a working system. It is also effective in minimizing and sustaining the engineering modification of a prototype. According to Kruse (2002), rapid prototyping is an iterative process that provides feedback on technical issues, creative treatment and effectiveness of instructions. The advantage of a prototype is that it helps to determine bug and response promptly based on the feedback in refining the prototype. It is especially useful in conducting periodic testing for handling usability issues.

In this research, a small-scale prototype using multimedia communication components is constructed, tested and revised by a small number of users (4-8 users) before constructing it into a finalized prototype. According to Kruse (2002), the revise and review processes differ from the evaluation process in which only four to eight selected students are required to test on the prototype based on ease of use on the navigation button, the screen design and layout, appropriateness of metaphor, and the technical performance. An OICon prototype is developed by following OICon model to test on the user acceptance towards the OICon prototype.
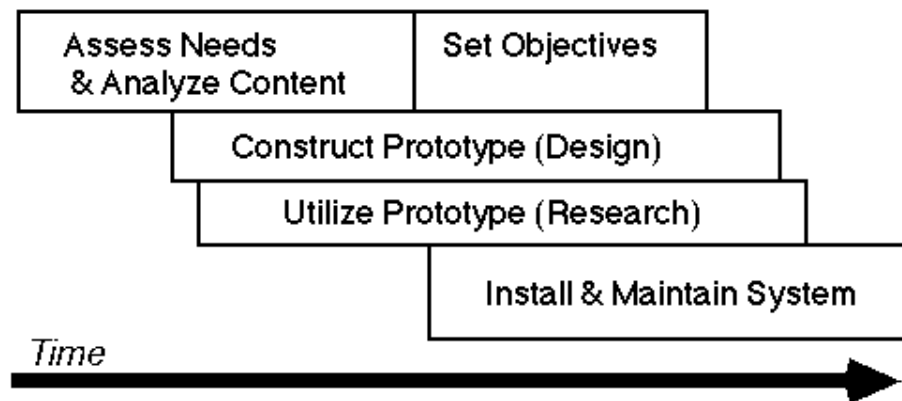
Figure 3.3: Rapid Prototyping Design Model of Tripp and Bichelmeyer (1990)

The following are the steps taken in the OICon prototype development:

a)   Designing of Prototype Interface

In the design phase, the web interface and prototype system architecture were designed without implementing the functions required.

b)   Development of Prototype

The development of a prototype included the construction of a database, writing of codes, establishment of client-server architecture, and compilation of modules into a complete working prototype. The modules include multimedia communication components that were constructed, tested and revised separately. After testing and revising the prototype, it was found that the modules managed to function as expected. This contributes to the achievement of the main objectives stated earlier. The following tasks, which are part of the action taking processes, have been accomplished:

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a) **Interaction Design**- Modules which consisted of multimedia communication components that were developed is repeatedly tested with the prototype and Flash media server 3.5 to prevent prototype failure.

b) **Functional Design**- This task was done to ensure that each feature or component does only what it claims to do.

c) **Development** - This phase involved prototyping and operational prototype development.

d) **Utilizing Prototype**-   After the development of the prototype, it is necessary to test on the revised prototype to prevent error.

e) **Install & Maintain System** - This phase involved the assembling of modules to develop a functional prototype. The interaction and functional of the prototype were repeatedly revised and tested to ensure the prototype is free of bug.

3.4.4 Evaluation

In order to easily pinpoint source of error, clarification on the areas of confusion, elimination of users' frustration, and evaluation methods should be well-planned. In this phase, the developed model and prototype system were evaluated through user testing method. The objective of this phase was to validate the prototype and user acceptance towards the use of communication technology in the OICon prototype. Users were required to perform a series of tasks and filled questionnaire.

3.4.5 Specifying Learning

This phase includes discussion on the results and findings obtained from the evaluation process. Contribution of knowledge to the research area was emphasized as well as the suggestion of the model refinements and recommendations for future research and development.

3.5 Preliminary Study: Quantitative Survey

In this research, in order to access users' requirement, their perspective towards conducting consultation service online, two methods of data collection were conducted during preliminary study through:

a) Quantitative survey among students using questionnaire
b) Communication and Interview with lecturer

3.5.1 Questionnaire Instrument for Preliminary Quantitative Survey

The questionnaire of the preliminary study consisted of five parts (refer to Appendix B). The first part of the questionnaire is about the demographic profile of the respondents such as age, gender, and mode of study. The second part is concerned with the respondents' computer literacy level and pattern of computer usage. The third part focuses on the students' experience on the online communication and the communication tools used. The fourth part requires respondents to indicate their perceptions on consultation experience. The fifth is about the respondents' perspectives regarding the website interface. The participants are assumed to have consultation experience because they are involved in the mentor-mentee system that has been conducted in the university. Each student has been assigned to a lecturer that will provide additional guidance and advice.

These questionnaires are constructed with the objectives of identifying students' attitudes and behaviour towards face-to-face consultation in HEIs in order to determine important aspects of interactivity that could be applied to an online instructional consultation. In addition, it is also used to determine the respondents'

perceptions on the importance of the multimedia communication functions and features to be included in the online instructional consultation. Furthermore, problems related to the face-to-face instructional consultation are also identified. The data collected was analyzed using the Window Version 12.0 Statistical Package for Social Science (SPSS). The Likert scale between 1 to 5 was used in the third, fourth and fifth part of the questionnaire in order to measure the value of criteria (refer to Appendix B). Appendix C lists the part of the questionnaire and its source.

3.5.1.1 Sample Characteristics

The total population of 1846 UUM students (undergraduate and postgraduate) that registered under Information Technology (IT) and Multimedia programs for the 2009/2010 session as shown in Table 3.1.

Table 3.1: Students Population according to Programs

Programs	Number of Students
Doctor of Philosophy (Information Technology)	111
Master of Science (Information Technology)	239
Master of Science by research (Information Technology)	24
Bachelor of Information Technology	943
Bachelor of Multimedia	529

Data Source: 13 October 2010 from Jabatan Hal Ehwal Pelajar (HEP Department UUM)

Since it is impossible to collect data from the whole population, accurate sample size needs to be determined in order to obtain meaningful result (High, 2000). Thus, Yamane's (1967) formula was applied to draw samples from the large population.

Figure 4.1 reveals the formula in determining the sample size (N=1846) with 90% confidence level or 10% acceptable sampling error.

n= sample size

N= Population

e=level of precision/ acceptable sampling error

Substitution:

N= 1846

e = 90% confidence level or 10% acceptable sampling error

n= $1846/(1+1846(0.1^2))$

$= 94.861$

≈ 95

Figure 4.1: Yamane's Formula (1967)

Once the formula was applied, the results indicated that the sample size for this study is 95 respondents. However, to compensate the non-response or non-returned questionnaires (Glenn, 1992), the sample sizes were increased to 30% in which 124 students were selected. 124 questionnaires were distributed randomly to the students with the response rate of 82% when 102 questionnaires were returned. As a result, 30 students were selected randomly from CAS, UUM for pilot testing while 124 sample sizes of students were selected for preliminary study testing. Besides the students survey, communication and interview with lecturers and experts were also conducted to provide precise understanding on the mentor-mentee system in HEIs as discussed in section below.

3.5.2 Communication and Interview with Lecturers and Experts

Three lecturers from College of Arts and Science (CAS) UUM and one lecturer from Politeknik Tunku Syed Sirajuddin (PTSS) were interviewed. Below are the questions asked:

a) What is the consultation processes for Higher Education Institution?
b) Discuss your consultation experiences such as difficulties you face to meet your mentees.
c) What are your suggestions and recommendations on consultation components and features if the consultation among students and lecturer is conducted online?

3.6 Experts' Review

An expert is defined for this study as a person that has wide and deep understanding of skills in the knowledge of an area of expertise, in which they participate with specific experience in that filed. In this research, three experts are selected to review OICon model based on their experience and interest in the IT and education field. Appendix D shows a brief overview of participating experts. Below are the questions asked during the interview:

a) Please verify on OICon model each of the CMC tools and consultation components.
b) Please suggest some key features or components that are crucial for OICon model.

3.7 Prototype Evaluation with Adaption of TAM Model

3.7.1 Sample Size Determination

As mentioned in section 2.13.1, eleven hypotheses that are derived will be tested by using multiple regression analysis. Thus, in order to determine accurate sample size of this study, a table of sample size for multiple regressions was referred to as shown in Appendix E. It is a flexible method for calculating sample size as it is influenced by these following four parameters (http://www.stattools.net/SSizmreg_Tab.php):

- Probability or significance level known as alpha value (α). The most commonly used and significantly accepted value is 0.05 (Hopkins, 2002).
- Power ($1 - \beta$). This value should be greater or equal to 0.8 which denotes the strong regression among variables (Alan, 2008).
- The number of independent variables in the model (u)
- R = multiple correlation coefficient

This research consists of 6 independents variables which is Self-efficacy (SE), low level of anxiety, importance of features and components, PU, PEOU, and Attitudes (u=6). Due to Alan (2008), correlation coefficient beta value 0.2 and 0.5 are considered having moderate effect while value greater than 0.5 are considered to have strong effect. Thus, a moderate effective size of multiple correlation coefficient R=0.5 is applied in order to obtain useful and precise results. Using α=0.05, power=0.8, and number of independent variables u=6, the sample size of 48 respondents are determined as shown in Appendix E.

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3.7.2 User Testing

As mentioned in the previous section, 48 respondents are involved in evaluation testing. Forty students from the UUM College of Arts and Sciences (CAS) are involved in the evaluation of the online instructional consultation (OICon) prototype. Students from the information technology and multimedia programs are assumed to have computer competency and experience in performing simple ICT related tasks. This is due to the fact that they have been exposed to the basic usage of IT software, Internet, Web and communication applications such as e-mail, online portal or online chatting either for entertainment or educational purposes.

Eight lecturers and tutors are involved in the evaluation of prototype. Out of eight lecturers and tutors involved, two of them are tutors from other colleges who are taking a part-time course at CAS, while the other is from Kolej Universiti Insaniah (KUIN) and the rest of the lecturers are from College of Arts and science (CAS), UUM. The lecturers and tutors sample size are selected randomly by assuming that students do not merely seek for consultation from lecturers at CAS but also instructors from other areas.

In order to assess respondents' views on the OICon prototype, they were given a set of questionnaire immediately after they had tested the prototype. They could still continue with their assessment while filling up the questionnaire. Respondents were required to write down their comments at the back of the questionnaire. A short discussion with the respondents was also conducted after they were done with the evaluation in order to obtain clear feedbacks.

3.7.3 Research Instrumentation

The research instruments used in the evaluation phase include online instructional consultation (OICon) prototype, desktop PC, webcam, microphone, and a headset or speakers and a set of TAM questionnaire.

3.7.3.1 Online Instructional Consultation Prototype

The Online Instructional Consultation (OICon) prototype was set up using Flash Media Server 3.5, Apache HTTP server that contained MySQL, and PHP that could be accessed via web through internet.

3.7.3.2 Questionnaires for Testing (TAM model)

There were seven constructs that composed of seven parts of questions (refer to Appendix F & G). Appendix F shows the questionnaire for Lecturer or Tutor while Appendix G shows the questionnaire for students. For the dimension of "Importance of OICon Communication Components and Features", the features, which are consultation contact management and consultation document management, are not included in Appendix G since students are not given privileges to access these features. The parts of Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Behavioral Intention (BI) are adapted from the questionnaire of Technology Acceptance Model and E-learning (Maslin Masrom, 2007). Whereas, the parts of Attitude (A), Self-Efficacy (SE), Low Level Anxiety, and Features and components of OICon prototype are adapted from the questionnaire of Blackboard® application (Marchewka, Liu, & Kostiwa, 2007). This questionnaire is chosen due to a number of reasons:

- Both of the OICon prototype and Blackboard® application have the same evaluation which is to determine a student's perception on the application developed for educational context.
- Both of the OICon prototype and Blackboard® application comprise of distinct components and features based on each own pedagogical value. For instance, the OICon components is for consultation and communication purposes while Blackboard® is for learning and delivery of information.

The questionnaire is composed of nominal scale data that allows the respondents to rate the questions item using scale 1 (Strongly Disagree) to 5 (Strongly Agree) for part Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Attitude (A), Self-Efficacy (SE), Low Level Anxiety, and Behavioral Intention (BI). Scale of 1 (Least Important) to 5 (Very Important) is for the parts features and components of OICon prototype. This questionnaire consists of seven parts with a total number of 40 questions (see Appendix F & G). The options for part one to six include strongly disagree (SD), disagree (DA), neutral (N), agree (A), and strongly agree (SA) (see Table 3.2). For the last part, respondents are required to answer the multimedia communication components in the OICon prototype based on the importance of the features and components (see Table 3.3). The data obtained was analyzed using Statistical Package for Social Science (SPSS) Version 10.0 for Windows. In general, descriptive analysis and correlation analysis were applied in this evaluation study.

Table 3.2: Positive and Negative Item Score

Response	Positive Item Score	Negative Item Score
Strongly Disagree	1	5
Disagree	2	4
Neutral	3	3
Agree	4	2
Strongly Agree	5	1

Table 3.3: Positive and Negative Item Score of Importance of Features and Components

Response	Positive Item Score	Negative Item Score
Least Important	1	5
Less Important	2	4
Not Important	3	3
Somewhat Important	4	2
Very Important	5	1

3.8 Conclusion

In this chapter, the action research (AR) which is applied as the research methodology, the activities involved in each phase as well as achievement of objective have been discussed. A well-planned research approach is essential to understand the procedures of determining of suitable communication tools and features that match the online consultation processes, and meet the user's requirements. Besides that, the method of prototype evaluation is briefly discussed.

CHAPTER FOUR
PRELIMINARY STUDY

This chapter discusses the research findings and main contribution of the students-lecturer consultation in HEIs. A preliminary study has been conducted and the results and findings are discussed. The functionalities, features and communications components that are determined from literature review and from experts' recommendations are also discussed.

4.1 The Features and Multimedia Components for the Online Instructional Consultation (OICon) Model Proposed from Literature Review

From the preliminary study as discussed in section 2.10, several components of online communication tools that contain pedagogical values are determined based on the existing e-consultation model and literatures as listed in Table 4.1. Out of the 12 features suggested by Fagan et al. (2006) and Steven (2002), five features are found to be implemented in the Electronic Emissary Telementoring Program; only one feature is implemented in MentorNet and four features are implemented in Tutor.com. Even though these Electronic Emissary and MentorNet only explore e-mails as communication tools, both programs have strong capability matching service that have successfully match many pairs of mentor and mentee for long-term telementoring. The Electronic Emissary only uses videoconferencing software to facilitate real-time communication rather than synchronous communication tool. Meanwhile, Tutor.com is supplemented with cooperative components such as shared-whiteboard, synchronous communication tool such as instant messaging and

a list of participants, and multimedia database that provides real-time consultation for students.

Table 4.1: Existing Telementoring Program Components and Features

Communication Components & Features	Electronic Emissary Project	MentorNet	Tutor.com
Video Conferencing	Yes	No	No
Shared-screen Feature	No	No	No
Shared whiteboard	No	No	Yes
Instant Messaging	Yes	No	Yes
List of Participants	No	No	Yes
Multimedia Database	Yes	No	Yes
Q&A with FAQ feature	No	No	No
E-mail	Yes	Yes	No
Electronic Notepad	No	No	No
Online Polling	No	No	No
Leave Comments	No	No	No
Consultation Contact Management & Feedback	Yes	No	No
Summary of Features	5/12	1/12	4/12

Besides that, as a result of the literature review on passive and active user interaction and communication, several online features are determined to be applied to this model in order to retain the interactivity as that of the face-to-face consultation. This is shown in Table 4.2.

Table 4.2: Features for Enhancing Online Collaboration Interactivity

Features	Description
"Raised hand" Function	Only one speaker talks at a time to avoid interruption and overlapping.
"Pass the ball" Function	Changes the user role to presenter or host
"Kick the user" Function	Rejects troublemaking participant
User online informing caption	To show the online activities of participants such as who is online or offline and who is talking

The importance of online communication tools cannot be perceived by its prevalence in existing online consultation tools. Indeed, each feature possesses its own pedagogical value and functionality offered to the facilitators and students in a consultation session. Thus, a preliminary study is conducted to determine the consultation problem encountered by students. A number of questions were then asked in the preliminary study regarding the face-to-face instructional consultation in HEIs; "What are the problems encountered during an instructional consultation session as perceived by students?" and "What are the features that need to be included in an online instructional consultation model in order to retain the patterns of the face-to-face communication and interactivity?" The limitations of a typical instructional consultation as elicited from the literature review were included in this research in order to investigate precisely a student's response pertaining to the instructional consulting services in HEIs. The details are discussed further in the next section.

4.2 Preliminary Study: Quantitative Data Analysis

4.2.1 Methodology

A preliminary study had been conducted among the undergraduate students from Universiti Utara Malaysia (UUM) who enrolled on the Information Technology (IT) and Multimedia program as well as postgraduate students. This preliminary study attempts to focus on several aspects of instructional consultation service and to identify suitable ICT tools for collaboration.

4.2.1.1 Reliability Analysis

Since this questionnaire has been adapted from other sources, a reliability analysis (Cronbach's Alpha) was tested for each dimension in instrument. In line with Sekaran (2000), 30 respondents and above are enough for pilot testing. Table 4.3 indicates acceptable results with the value of alpha higher than 0.7 (George & Mallery, 2003).

Table 4.3: Cronbach's Alpha for Dimensions

Dimension	Cronbach's Alpha
Importance Features for CMC Tools	0.836
Student's Behaviours Towards Face-to-face Consultation	0.784
Student's Problem on Consultation	0.865
Student's Perceived frequency used CMC tools	0.799

4.2.1.2 Validity Analysis

The validity of each dimension was measured by using factor analysis. Table 4.4 presents the Kaiser-Meyer-Olkin (KMO) value for all dimensions which are greater than 0.5. This means that the values are acceptable and proves that the factor analysis is suitable for these data (Kaiser, 1974).

Table 4.4: Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy

Dimension	KMO Value
Importance of Features for CMC Tools	0.827
Student's Behaviours Towards Face-to-face Consultation	0.770
Student's Problem on Consultation	0.785
Student's Perceived on Frequently Used CMC Tools	0.666

4.2.1.3 Student Profile

Table 4.5 summarizes the information regarding the student's background involved in this study. The majority of the 102 respondents (71 %) are female. Most of them are undergraduate students (63.7%) while the rest (36.3%) are postgraduate students. These students are mainly full-time students (73%), only 3 (1%) are working full time and 32% (33) part time.

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Table 4.5: Students' Profile

Students Profile	Frequency	Percentage (%)
Gender		
Male	30	29
Female	72	71
Age		
20-30	95	93
31-40	7	7
41-50	0	0
51-60	0	0
Academic Level		
Bachelor	65	63.7
Master	34	33.3
PHD	3	3
Programs:		
PHD (IT)	3	2.94
Master of Science (IT)	30	29.4
Master of Science (IT) – Research	2	1.96
Bachelor of IT		
Bachelor of Multimedia	25	24.5
Bachelor of IT	14	13.7
	28	27.5

4.2.2 Analysis and Findings

Figure 4.2 portrays the numbers of respondents who admitted that they had difficulties during the consultation session. Out of the 102 respondents, 53.7% (55 students) encountered problems during their face-to-face consultation.
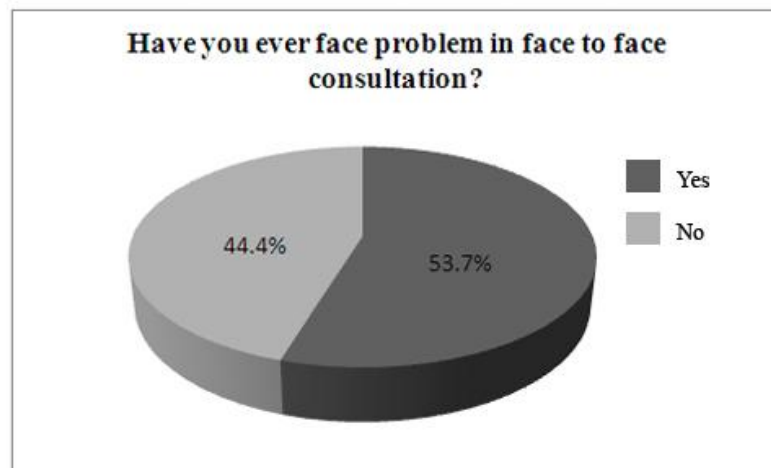
Figure 4.1: Respondents by Problem in Face-to-face Consultation

From Figure 4.3, it is evident that almost all the students had made the effort to see their lecturers for consultation. Most of the students (40%) seldom meet the lecturer for consultation, while only one (1.8%) never had the chance to meet their lecturer for consultation.
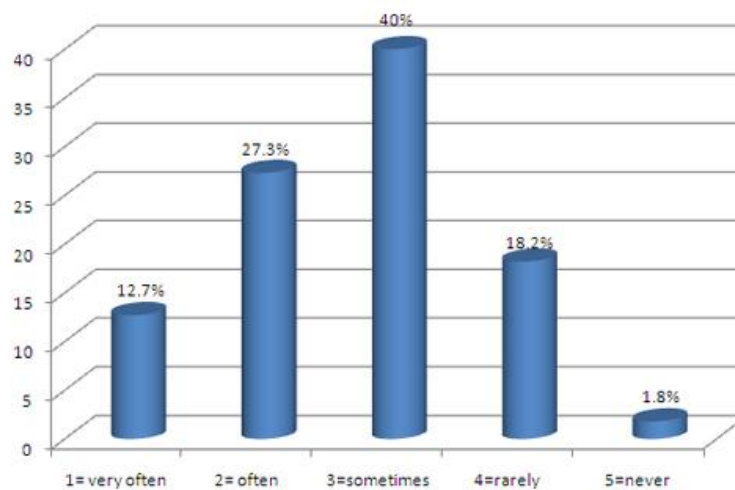
Figure 4.2: Percentages of Frequency of Students Meeting Lecturers for Consultation

4.2.2.1 Problem faced during Face-to-face Consultation

Table 4.6 presents the results on the problems related to the face-to-face consultation in HEIs environment as perceived by the students.

Table 4.6: Student's Problem in Instructional Consultation

Problems	NI					
	1	2	3	4	5	N= 58
Ineffective Time Management (%)	20	10.9	40	21.8	7.3	Mean = 2.85
Constraint by Distance (%)	21.8	14.5	47.3	14.5	1.8	Mean =2.60
Record Consultation Session (%)	27.3	16.4	32.7	20	3.6	Mean =2.56
Emergency Consultation (%)	32.7	5.5	36.4	12.7	12.7	Mean =2.67

From the mean analysis, it is clear that the score is between 2.56 and 2.85. The mean value that falls near to the scale of 3 shows students may sometimes encounter these four problems. 47.3% students encounter the problem in meeting their lecturers when both of them are at a distance while 40% of them are having insufficient time or ineffective time management. This is probably due to the fact that they may have family or job commitments that constraint them from meeting their supervisors. It is significant to note that students concede that they very often conduct emergency consultation with lecturers. There is a relatively high percentage (32.7%) of students (with the scale "very often") meeting their lecturers for emergency consultation as compared to other four dimensions with the same scale.

4.2.2.2 Importance Features of Online Instructional Consultation

In order to solve the issues pertaining to the instructional consultation as encountered by the students, a number of features and functions identified from the literature review are listed. Students are required to indicate the degree of importance of these features and multimedia components that should be included in an online instructional consultation model. The criteria are measured in terms of means and standard deviation by using scale 1 (Not Important) to 5 (Extremely Important). The results are shown in Table 4.7.

Table 4.7: Student's Perceived Important Features of Multimedia Communication Components

No	Variables	No. of Respondents				
		Valid	Missing	Mean	Median	Std. Dev
Q1	Ability to deliver information clearly in audio-visual form	102	0	4.09	5	1.252
Q2	Ability to deliver information in real-time	101	1	4.06	5	1.370
Q3	Ability to store and retrieve consultation document and agenda record	99	3	3.65	4	1.224
Q4	Ability to record consultation session	101	1	4.05	5	1.285
Q5	Ability to customize profile online	102	0	3.32	3	1.091
Q6	Ability to make appointment online	102	0	3.99	4	1.182
Q7	Ability to upload and share document online	102	0	3.63	4	1.258
Q8	Ability to playback video online in video player	102	0	3.58	4	1.238
Q9	Ability to view document online in slideshow	101	1	3.50	4	1.376
Q10	Ability to get consultation announcement online	99	3	4.22	4	0.815
Q11	Ability to take note online and upload note for sharing	101	1	3.94	4	0.904
Q12	Ability to leave message online	101	1	3.57	4	1.126

From Table 4.7, it can be seen that the scores are between 3.32 and 4.22. The score above 3.00 indicates that the students perceived the proposed functions and features as important. The high score mean (4.22) for the variable; "ability to get consultation announcement online", indicates that students are willing to get informed about the consultation events through the web sites. The other variable; "ability to deliver information clearly in audio-visual form", scores the mean 4.09 whereas "ability to deliver information in real-time" scores the mean 4.06. These indicate that the students viewed the dynamic two-way communication with immediate feedback, as well as deliver information in visual and verbal cues are crucial. Furthermore, "ability to record consultation session" has a high mean score of 4.05.

On the other hand, the lowest mean of 3.32 for the variable "ability to customize profile online" denotes that the students felt that the variable is neither important nor not important. The second lowest mean score of 3.50 is the variable; "ability to view document online in slideshow".

4.2.2.3 Student's Attitudes and Behaviour toward Face-to-Face Consultation in Higher Education

Table 4.8 reflects the student's behaviour and attitude towards face-to-face consultation in HEIs. Students were required to indicate their level of agreement or disagreement with the five listed statements regarding the consultation in HEIS. This is evident by the mean score 3.42 where most of the students mentioned that they recorded their consultation activities into log books. However, when asked whether or not they can present their problems clearly to lecturers, they neither agree nor disagree (mean-3.13).

Table 4.8: Student's Behaviours and Attitudes towards Face-to-face Consultation in HEIs

No	Variables	No. of Respondents		Mean	Median	Std. Dev
		Valid	Missing			
Q1	I know my problem very well and can present my problem clearly to lecturer face-to-face.	102	0	3.13	4	1.447
Q2	I am involved actively by giving opinions during consultation session.	102	0	2.62	3	1.516
Q3	The consultation decision can be made without delay in the next consultation session	102	0	2.88	3	1.345
Q4	It is always prompt for me to take notes while lecturers deliver the information.	102	0	2.78	3	1.552
Q5	I always record my consultation activities into the log book.	102	0	3.42	4	1.619

Note: 0-Not Applicable; 1- Strongly Disagree; 5-Strongly Agree

4.2.2.4 Student's Perceptions on the Online Communication Tools Most Frequently Used among Students

Table 4.9 shows the Frequency of Online Communication Tools Usage Consultation in HEIs. The criteria are measured in terms of means and standard deviation by using the scale of 1 (Never) to 5 (Very Often). In general, most students had often used all

the proposed online communication tools except for the audio conferencing (mean score 2.26) and video conferencing (mean score 2.92). A high mean value of 4.03 indicates that most respondents usually use e-mail more frequent than the other online communication tools. This is followed by the use of instant messaging with the mean score of 3.99. The results denote the responses are neutral towards the use of video conference (mean score 2.92). E-mail had been chosen as the most frequently used by the intended participants. This is due to the fact that these students do not expect an immediate response, for documents retrieval and submission as well as placing comments for later viewing. Similarly, a medium mean value of 2.92 reveals that the students are relatively neutral towards the use of video conferencing. In contrast, audio conference scored the lowest mean of 2.26.

Table 4.9: The Frequency of Online Communication Tools Usage

No	Variables	No of Respondents		Mean	Median	Std. Dev
		Valid	Missing	Mean	Median	Std. Dev
Q1	Instant Messaging	102	0	3.99	5	1.375
Q2	Video Conferencing	102	0	2.92	3	1.773
Q3	Audio Conferencing	102	0	2.26	1	1.469
Q4	Forum Discussion	102	0	3.62	5	1.629
Q5	E-mail	102	0	4.03	5	1.375

Note: 0-Not Applicable; 1-Never; 5-Very Often

4.2.3 Discussion

The research findings reveal that students were generally positive about the potential usefulness of the multimedia communication tools to complement traditional consultation system in HEIs. The high mean value scored by both instant messaging

(mean-3.99) and e-mail (mean-4.03) indicates that the combination of these communication tools may facilitate online consultation effectively. Presumably, students perceived instant messaging and e-mail more satisfying and easy to use as they had experience using them. Nevertheless, students may sometimes use video conference to communicate although it is a new tool in the real time communication context.

The students' high perceptions towards real time audio-visual communication tools with mean score value of 4.13 for the "ability to deliver information at real time" and 4.01 for the "ability to deliver information clearly in visual and audio form" show that video conference is needed to be integrated as online consultation CMC tool. This rich media (synchronous) conveys information at a high rate resolving ambiguities while e-mail is predicted to better process uncertain information. Presumably, the combination of these synchronous and asynchronous tools may facilitate consulting service effectively. Likewise, students have high perceptions towards the ability of the online consultation prototype to record consultation session.

The high mean value of the variables "the ability to make appointment online" with mean score 3.99 and "ability to get consultation announcement online" with mean score 4.22 denote that the students are willing to receive news and announcement online. Interestingly, the students viewed the "ability to view document online in slideshow" as not important as the other features to be included in the OICon model. This is probably because they prefer to download the document and view them offline.

The effectiveness of the online communication technology not only depends on the potential usefulness of the ICT tools but also to the student's attitudes and behaviours towards instructional consultation in HEIs. Their interactivity indirectly affects the successfulness of online learning (Bude, 2005). For these reasons, student's attitudes and behaviours were examined. The results show that the mean score value for the four variables did not achieve at least 4.00 which denotes the degree of agreement. The low mean values of 2.62 for the variable, "I am involved actively by giving many opinions during consultation session" indicates that most students disagree with the statement.

As a result of preliminary quantitative study, user requirements on some functionality of e-consultation model are found, in which it should be able to:

a) allow students to make appointment online
b) deliver information in real-time
c) leave message online
d) deliver information clearly in audio-visual form
e) store and retrieve consultation document and agenda record
f) playback video online in video player
g) get consultation announcement online

4.3 Identification of Consultation Processes, Components and Features of Online Instructional Consultation (OICon) Model

4.3.1 Online Instructional Consultation Processes

Communication with the experts in the online instructional consultation for HEIs can be characterized into three main phases:

a) Pre-consultation phase, which includes introductory of upcoming consultation session, appointment and announcement making, time and date scheduling and mail invitation. In this phase, students are the initiators who voluntarily seek help from their supervisor. They will send an online appointment form to request for an online consultation session. Having checked the e-mail, the supervisor will then send the confirmation on either rejecting or accepting the appointment. Once the supervisor accepts the appointment, he or she needs to create an online consultation room. Meanwhile, a notification mail that contains the minutes and meeting agenda are sent to the student's mail box. Due to this respect, the e-mail is integrated to reduce the ambiguity of communication. Besides that, supervisors can also be the initiator of a consultation session in which they can make announcements online to recruit their students to join online consultation.

b) Consultation session refers to the time in which participants engage in various consultation events such as online consultation, form submission, on-going consultation monitoring as well as providing guide to the participants on how to take part. During the consultation session, the lecturer has the autonomy to control the participant's activity. Students will start explaining their problems to their lecturer. Before giving proper advice, the lecturer may need clarification on the student's problem. Usually, in handling this kind of tasks, multiple cues and immediate response are required. Unfortunately, text-based CMC tools cannot communicate such non-verbal information and communicate cue gestures compared to the video conference component. Hence, to cater this kind of communication, the combination of rich and lean medium is necessary. There are several communication components that support the online consultation

environment by providing various communication tools that enable them to share idea and obtain immediate feedback. Most importantly, it provides a sense of community whereby they do not feel disconnected with each other in the online environment.

c) Post-consultation phase includes post session discussion and delayed consultation session follow-up. During a decision making session, lecturer may recommend several solutions. This session usually ends once consensus has been achieved or solutions are being left to the consultant to be decided. Sometimes, a consultation conclusion may be delayed to the next consultation session because not all the decisions can be made in a short time. Thus, a consultant may need to retrieve the previous session recorded document, agenda and list of participants by sending another invitation mail. Therefore, for this purpose, a combination of communication technologies with consultation document management feature can create a spectrum of media richness. This will increase the effectiveness of information delivery, leading to a higher performance of satisfaction.

4.3.2 Adoption of Communication Components and Features of OICon from Previous Researchers

From the literature review, a set of essential multimedia communication components and features are identified as shown in section 2.10.2, Table 2.6. Based on a thorough analysis on these components, it is strongly recommended that the following features are to be adopted and adapted in the OICon model:

a) Audio and Video Conferencing: These tools are required to enhance interactivity, which allow participants to see each other and hear their voice. In addition, the verbal and non-verbal cues can create a sense of social presence; indirectly build relationships and warm feeling in a remote consultation. Participants are also able to start or stop audio or video conference function. Facilitator is given the privilege to control participant's

audio-video conference functions such as to stop or interrupt a talkative participant. The ability to initiate and stop streaming the audio transmission is crucial to prevent chaotic situation when more than one participant talk simultaneously.

b) List of Participants: This component shows the real-time physical presence of attendees at a given time through the indication of their logged-in name or icon. The attendee list will display all participants who are present during the online collaboration session, according to their names, roles (presenter, host, attendee), and status (busy, stepped out). These features as defined by Ma and Agarwal (2007) as "Virtual Co-presence" that promote a sense of community as being with each other in online community. It is an important feature to be integrated with instant messaging so that participants will have a sense of virtual presence for ubiquitous communication. These will prevent them from the feeling of isolation.

c) Shared-Whiteboard: The feature is required to present documentation slides in the form of PowerPoint slide, Microsoft or open office document, and image or video file. The shared-whiteboard usage is usually associated with web converter that converts these documents format to viewable format such as Shockwave (SWF). Once the document is converted and appeared at the whiteboard viewport, participants are free to draw, edit and annotate the document. Presentation aids such as navigation tools and pointers followed by the username that represent an attendee virtually, make every movement more noticeable to each other. These "Self-presentation" features enable the focal person communicates his or her identity and is aware of the existence of others during an online communication (Ma & Agarwal, 2007).

d) Shared-screen Function: An instructional consultation prototype should enable both students and lecturers to share their screen activities, especially when they want to present information and collaborate on a running program or document while remotely connected. Having this shared-screen function, a user can see the presenter's screen and share activities in real-time. The key advantage of presenting information through screen sharing is the ability to view information together at the same time. This function is implemented as

the main component in the Financial Service Consultation (Tanaka et al., 1999) where both client's and consultant's terminal have their own shared-screen viewport. The consultant is given the opportunity to control client's monitor while the client remains passive but needs to follow instructions from the consultant. However, for online instructional consultation, students and lecturers have the privileges of initiating the shared-screen window function.

e) Instant Messaging or Live Chat Event: This text chatting component or commonly known as instant messaging provides the ability for participants to chat at real time. The utilization of instant text chatting by students offers pedagogical benefit. This component helps in catching the attention of participants especially when they start to wander away from consultation. It also functions as an introductory tool at the beginning of a consultation session. According to Bower (2006), it helps to invoke simultaneous response to a question from all participants and facilitate "dual coding" whereby a user can emphasize on a point by typing it on the text chat window while speaking through the audio conference component.

f) Survey/ Polling: Online survey and polls are decision-making tools that are commonly embedded in the existing web conferencing. It is an optional component that provides indication of users' agreement or disagreement using the icon status each time the survey questions are displayed on instant messaging. However, the lecturer sometimes requires students to answer a closed-ended survey or a survey using a compilation response option. The facilitator may create the survey before or during the decision making session to obtain students' opinions and survey results on real-time.

g) E-mail: This is one of the asynchronous lean medium CMC tools that have become an integral component for an organizational communication. E-mail enables the easier, reliable, rapid, and inexpensive information transmission to a large number of people simultaneously. Besides delivering "rich" information contents, e-mail has other potential usefulness such as sending consultation agenda and detailed information to recruit other people to join

the next oncoming online event if necessary. Moreover, users can carefully think and respond to the e-mail contents instantly.

h) Electronic Notepad: Having this capability, dissemination of consultation contents and results can be made available online (Steven, 2002). The contents and information exchanged can also be stored, categorized, and reused in another session of a remote consultation. Electronic notepad greatly enhances the process of information sharing and spreading acquired by online community.

i) Question and Answer (Q&A): Online consultation should be facilitated with question and answer (Q & A) component in which a simple webpage or a panel that consists of questions posted by students and responses given by facilitators or students is included.

j) Multimedia Database: An online consultation must support various multimedia data types in order to provide online facilities such as multimedia data storing, retrieving and accessing as well as conveying multimedia stream through appropriate media player and display of text in web page. Multimedia data such as text, audio, video and images are stored in the web server and can be indexed in a database. Only students and facilitators of a particular online consultation session have the authorization to access the material using the resource index.

k) Consultation Contact Management and Feedback: Online consultation that involved a large number of people needs to be managed by participants by giving them the access to consultation details, recruiting them into online events, keeping them informed, and engaging them in a consultation process as well as sending them the feedbacks after the consultation session.

4.3.3 IT and Education Experts Recommendation

Besides focusing on the features and multimedia components determined through the literature review and preliminary study, this study also takes into consideration experts' recommendation and opinions in developing the OICon model. The recommendations are further discussed in the next section.

4.3.3.1 Frequently Asked Questions / Question & Answer

Puan Azlida binti Ahmad [(personal communication, August 17, 2010), a lecturer from Politeknik Tunku Syed Sirajuddin (PTSS), Perlis] suggests that the online instructional consultation model can implement a function that organizes and shares Q&A known as frequently asked question (FAQ). To handle the overloaded Q&A, due to similar queries posted by different participants, Puan Azlida suggests that FAQ component needs to be added in a meeting room. Therefore, any questions that had been asked and answered can be displayed in a list or panel to prevent redundancies.

FAQ was developed in 1983 by Eugene Miya of NASA for the SPACE mailing list (Hersch, 1998). Generally, the FAQ features that are included in a web site are text forms which enable the site administrator to create, edit and delete the elements from FAQs list (example: BBC FAQ site22, Create Common sites 23). More significantly, searching of keywords can be done based on the FAQ list. In this study, FAQ feature is integrated with the Q&A functions. This will give the opportunity for both facilitator and students to create, search, and edit the posted questions. However, only the facilitator is given the privilege to delete Q&A of FAQ list.

4.3.3.2 Document Conversion and Sharing

Mr. Abdul Hadi Bin Abdul Razak, a lecturer from UUM College of Arts and Science (CAS), recommends that the OICon model should include document conversion and sharing components to enable user upload, convert the document format to viewable format and present the material in a manner in which both the facilitator and students are familiar. This feature is added by developers for online conferencing application (DimDim (http://www.dimdim.com/), GotoMeeting (http://www.gotomeeting.com), and WebEx (http://www.webex.com/)).

Mr. Abdul Hadi adds that this document sharing and conversion component is different from the other document uploading and sharing components in which only uploaded document to a database can be retrieved and saved by other users. Instead of only uploading and retrieving, this document conversion and sharing component also allows users to convert their material format to a viewable format by implementing web conversion function to prototype function. To meet the requirements of IT students and multimedia students, online instructional consultation prototype would have to support different types of document format such as PDF (.pdf) and PowerPoint (.ppt), graphics formats such as JPEG (.jpg) and GIF (.gif) and short media formats such as Audio Video Interleaved (.avi). To be more effective, the presentation slides need to be clear and visible to all participants with the navigation and annotation tools implemented. Mr. Hadi also states that this document conversion and sharing component can be integrated with whiteboard components, which allow participants to edit and draw on the presentation slide material, print the drawing area, besides allowing the content to be annotated.

Although this component is useful for instructional consultation purposes, it is not compulsory to be included since users can utilize existing Document Conversion Tool to convert document.

4.3.3.3 Logbook/ Attendance List

A lecturer from UUM College of Arts and Science (CAS), suggests that the logbook is crucial for participants to record attendance, agenda and minutes, generate memo after a consultation session (Fakhrul, personal communication, November 13, 2010). At the end of a semester, lecturers can refer to the logbook to check students' attendance. Students can also view or print their logbook online. This feature is added in Microsoft SharePoint Foundation 2010 (http://sharepoint.microsoft.com), Blackboard (http://sharepoint.microsoft.com) to track people who were invited and attendee of a particular online conference session.

Before terminating a consultation process, the participants may decide on the solution during the decision-making process and the lecturer may conclude the meeting. However, when a conclusion cannot be made, the consultation session will be postponed to a next session. Even though consultation sessions are informal meetings, there is a need to record the consultation session, agenda and minutes. This is important for future references and for follow-ups on the delayed-consultation sessions. A systematic document management simplifies human effort in retrieving certain documents from a database. There are certain approaches that can be used to search and retrieve documents effectively (Fagan et al., 2006). This proves that a systematic online multimedia-recorded document management is

necessary for retrieving and playback purposes. Without effective management, the consultation session may end up with frustration.

4.3.3.4 Consultation Time Scheduling and Announcement Board

At the pre-consultation phase, minutes and agenda of a consultation session should be made noticeable for students by the creator (Personal Communication, Abdul Hadi Abdul Razak). Usually, the developer adds time schedule function in appointment-making form to obtain the exact consultation time and date (eg: Library Service E-consultation for Florida Gulf Coast University http://library.fgcu.edu/ADMIN/Forms/my_librarian.htm; http://www.denver doctor.com). Participants may need some preparations before taking part in the consultation session. Some private conferences restrict unauthorized people to take part. In response to a meeting invitation, a user can choose either to deny or to accept. The students can also conduct their own conference outside the meetings or personal appointment since they are provided with sophisticated control over their task schedule. However, they are not allowed to modify others' time schedule or consultation meeting that is not created by them. Below are the accessibility options of users:

a) Students Accessibility Options:
   i.   Create or request online consultation
   ii. Find and view existing consultation
b) Lecturers Accessibility Options:
   i.   Manage Reservation
   ii. Delete Reservation
   iii. Manage Schedule

4.3.3.5 Recording, Retrieving and Playback of an Online Consultation Session

Mr. Abdul Hadi Abdul Razak recommends that online instructional consultation session should include additional functions such as recorded consultation session, multimedia database storage, online retrieval playback and search engine. These capabilities provide opportunity for students who have attended or missed a consultation session to review what had been discussed or presented. This recommendation is supported by the Director of Research, Dr. Michael Morgan (personal communication, November 24, 2010) from Monash University in Australia, who suggested that an OICon model could include the ability to track a series of consultations. He also stresses that it may be handy to be able to review previous sessions involving the same person and perhaps a summary of agreed outcomes. This feature is compulsory to be included in OICon as it provides verbatim record that may help to reduce lost of information delivery. To compensate for lack of non-verbal cues as they are absent in most CMC tools at present, video conference session should be recorded.

According to Mr. Hadi Abdul Razak (personal interview, October 21, 2009), the importance of recorded session playback are as follows:

a) To provide a backup capability and collaboration platform for a student who is absent from the consultation session to get involved in post session discussion with other peers.

b) To assist students who participate in online consultation to recall the session or information delivery by facilitator.

Playback that is not only limited for a post-session, can also be a playback on a facilitator's terminal to review the early recorded material during live session (Hadi, personal interview, October 21, 2009). With the advancement of Flash media player, the consultation session could either be broadcasted to a number of people concurrently in real time or streamed via the stored media server whenever a user retrieves the session from database. Other communication components such as guestbook components and instant messaging should be included in assisting the post-session collaboration.

4.4 Crucial Need for Online Instructional Consultation (OICon) Model

With the emergence of information communication technologies (ICT), e-consultation has been penetrating into sectors such as financial, telemedicine and government agency due to the benefits it brings to conquer barriers of time and distance. Thus, there is a strong belief that CMC tools will provide necessary fundamentals for sophisticated distance consultation environment for HEIs as other contexts do.

User requirements and consultation processes have been widely emphasized by many researchers while planning the e-consultation system (Fagan et al., 2006; Oliver, 2006). Thus, when one plans the idea of implementing ICT tools for consultation in HEIs, the first thing which should map into one's mind is the recruitment of participants and adoption of technology based on correct consultation processes in HEIs.

As mentioned in chapter 2 on the e-consultation principles and guidelines, online consultation model should be an educational support for consultation in HEIs. Given the mentor-mentee system in HEIs as the focalization setting, followed by investigation on the types of interaction and communication mode as well as consultation processes involved, literature on mentor-mentee system in HEIs is reviewed and a preliminary study among students was conducted. The output of the preliminary quantitative study helps in determine students' real problem in a typical consultation as well as the functionality and features to be included in the OICon model.

Apart from that, En.Hadi and En.Fakhrul, also suggest the following issues that have to be taken into consideration when implementing OICon solution. These issues are:

4.4.1 Personalization

Adapting instructions to the requirement of an individual has long been emphasized by many researchers especially on the learning aspects (Wang & Lindvall, 1984). Personalization is broader in scope, more systematic in organization and more authentic in its goals and strategies (James, 2000). Personalization in education setting in which only specific contents are accessible by people based on their preferences, authorised access as well as security level is highly recommended. In fact, an individual should be able to subscribe to relevant consultation session contents, and should be kept informed regarding the update of consultation information that he or she subscribes to.

4.4.2 Privilege Separation

Facilitator and students usually have different levels of privilege for online consultation in which a facilitator is granted greater access level to online instructional consultation functionality compared to the students. This means that the facilitator has the authority to help keeping the online events tasks as preventing or minimizing chaotic situation by controlling the online consultation session. The facilitator as the moderator can give other participants the facilitator-level privilege when needs arise. Besides that, this privilege can be granted by participants who have been promoted by the facilitator. In some web conferencing application (eg: Dimdim & WebEx), the consultant terminal is provided with extra functionality to differentiate it from the consultee's terminal.

4.4.3 Instructions and guidelines

A list of resources that contains help and documentation related to the online consultation application helps to prevent participants from being "trapped" into a problem or losing their ways during the navigation (Steven, 2002). This may occur due to technical difficulties or difficult-to-use communication components that might demotivate the users especially novice users' enthusiasm in working on it. Assuming that all participants including the facilitators and students are novice users, the instructions and guidelines would be useful to them in carrying out various events.

The factors and issues identified are crucial in designing an online consultation prototype. The system must be able to deliver information seamlessly with the use of rich multimedia, and at the same time must be able to maintain the stability of the

system, and to make information accessible to all participants. However, there should be a control mechanism to monitor unauthorized access to specific consultation content. In addition, the system should be able to facilitate consultation sessions with suitable CMC tools. Most importantly, an online consultation system for HEIs setting need to have pedagogical values that can guide students and lecturers, in a small online consultation groups, to have a more sophisticated remote consultation environment.

4.5 Conclusion

The findings and the main contribution of this research have been discussed throughout this chapter. There are twelve features and components identified. However, only five features are found to be implemented in the Electronic Emissary Telementoring Program which are: video conferencing, instant messaging, e-mail, consultation contact management and feedback. Only one feature is implemented in MentorNet which is the e-mail; and four features are implemented in Tutor.com i.e. shared-whiteboard, instant messaging, list of participants and multimedia database.

In order to investigate deeply on the real problem that confronts students in face-to-face consultation, a preliminary study is conducted. The result shows that students are sometimes having difficulties to meet their lecturers due to time and distance constraints. They may sometimes conduct urgent consultation with their lecturer. The findings also show that the majority of them are generally positive about the potential usefulness of the multimedia communication tools to complement traditional consultation system in HEIs.

Three experts consulted for this research recommend eight features and components that are crucial for this online consultation development, which are: FAQ, Document conversion and sharing function, logbook management, time schedule and announcements board, consultation recording, retrieval and playback function, consultation document management, dynamic video playback and search engine. Thus, there are all together nineteen features and components which have been identified that are crucial for this online consultation model. Then, all of these features and components are transformed into OICon model, which is the main contribution to this research.

CHAPTER FIVE

ONLINE INSTRUCTIONAL CONSULTATION MODEL DESIGN AND DEVELOPMENT

This chapter discusses the detail of OICon model including the features, components, processes and tasks involved. Information regarding the students and facilitator terminal are also described. Finally, the OICon prototype client-server architecture is discussed.

5.1 Proposed Online Instructional Consultation (OICon) Model

Online instructional consultation (OICon) model (see Figure 5.1) comprises of multimedia components and features that are adapted from the existing e-consultation models such as Financial Service Consultation and Virtu@l Consult@tion models, major e-consultation components as suggested by Steven (2002) and Fagan et al (2006) as well as experts' recommendations. Besides that, the model is designed based on seven principles and guidelines as proposed by Steven (2002). The guidelines are:

- Academic Support Required
- State Purpose and Share Context
- Build audience and Inform Other Students
- Choose Model and Elements
- Create Structure from Beginning to an End
- Online Help and Instruction
- Dissemination of Content and Result and Post-session Discussion

In order to determine students' real problem related to consultation in HEIs as well as their perspectives on conducting online consultation service online, a preliminary quantitative study has been conducted. The user requirements on the OICon communication components and features functionality are stated as the following in Table 5.1:

Table 5.1: OICon Communication Components and Features with Functionality

OICon Components and Features	Functionality
Email	Allows students to make appointments online
Instant Messaging & Videoconference	Delivers information in real time
Video Conference	Delivers information in audio-visual form
Instant Messaging	Leaves message online
Multimedia database	Stores and retrieves consultation document and agenda record
Video Player	Playback video online in video player
Online announcement	Gets consultation announcement online
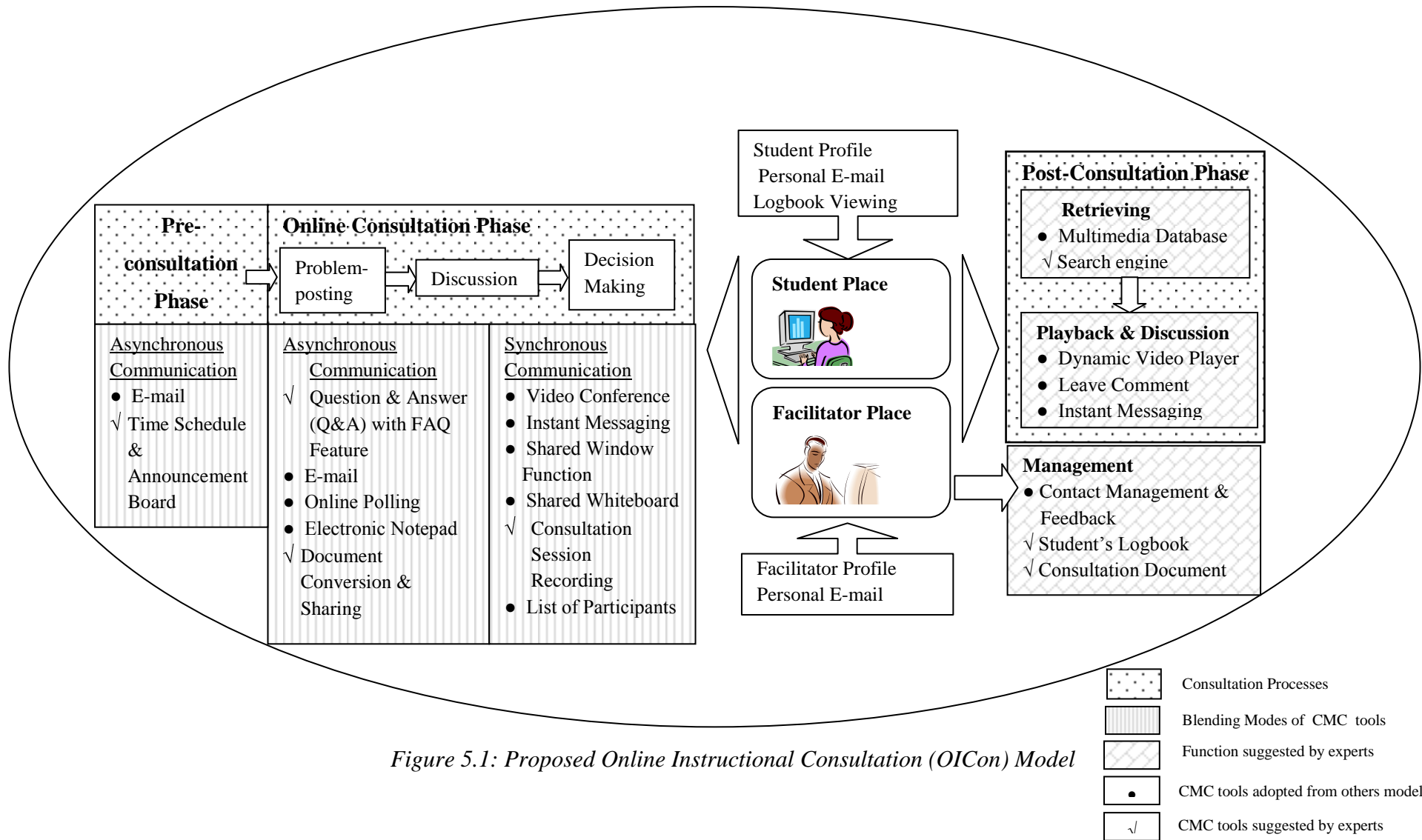
Figure 5.1: Proposed Online Instructional Consultation (OICon) Model

Pre-consultation Phase

Online Consultation Phase

Problem-posting → Discussion → Decision Making

Asynchronous Communication
- E-mail
- √ Time Schedule & Announcement Board

Asynchronous Communication
- √ Question & Answer (Q&A) with FAQ Feature
- E-mail
- Online Polling
- Electronic Notepad
- √ Document Conversion & Sharing

Synchronous Communication
- Video Conference
- Instant Messaging
- Shared Window Function
- Shared Whiteboard
- √ Consultation Session Recording
- List of Participants

Student Profile
Personal E-mail
Logbook Viewing

Student Place

Facilitator Place

Facilitator Profile
Personal E-mail

Post-Consultation Phase

Retrieving
- Multimedia Database
- √ Search engine

Playback & Discussion
- Dynamic Video Player
- Leave Comment
- Instant Messaging

Management
- Contact Management & Feedback
- √ Student's Logbook
- √ Consultation Document

Consultation Processes

Blending Modes of CMC tools

Function suggested by experts

• CMC tools adopted from others model

√ CMC tools suggested by experts

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Table 5.2: Overview of OICon Model Domain

Personalization	Phases and Tasks Involved	Features and Components	Consultation Content	Management
Facilitator	**Pre-consultation** • Reject/Accept Meeting Request • Create Conference Lobby • Create Meeting Room • Schedule Consultation Time • Send Invitation Mail • Control Online Collaboration activities • Make Decision • Terminate/ End Session	• Consultation Time Scheduling and Announcement Board • E-mail	• Consultation Recorded Session • Consultation Presentation material • Agenda/Meeting Record	• Student's Logbook Management • Student Management • Consultation Document Management
	During Consultation • Control Collaboration • Shared Screen • Shared whiteboard • Shared Document • Add note • Record Session	• Audio or Video Conference • List of Participants • Electronic Notepad • Shared window Whiteboard • Shared-screen Function • Instant Messaging • Survey/ Polling • E-mail		

Personalization	Phases and Tasks Involved	Features and Components	Consultation Content	Management
		• Multimedia Database • Document Conversion and Sharing Question & Answer (Q&A) with FAQ feature	• Consultation Recorded Session • Consultation Presentation material	
	Post Consultation • Leave Comment • Share Document • Logbook management	• Consultation Session Recording, Retrieving and Playback Online • Consultation Contact Management and Feedback • Multimedia Database • Dynamic Video Player • Leave Comment • Instant Messaging • Search Engine		• Student's Logbook Management
Students	**Pre-consultation** • Make Appointment • Join Meeting	• Consultation Time Scheduling and Announcement Board • E-mail		

Personalization	Phases and Tasks Involved	Features and Components	Consultation Content	Management
	During Consultation • Problem-posting • Shared Screen • Upload Document • Shared Whiteboard • Create Survey/ Poll	• Audio or Video Conferencing • List of Participants • Electronic Notepad • Shared window Whiteboard • Shared-screen Function • Instant Messaging • Survey/ Polling • E-mail • Document Conversion and Sharing • Question & Answer (Q&A) with FAQ feature		
	Post-consultation • Leave Comment • Share Document • Logbook management	• Multimedia Database • Dynamic Video Player • Leave Comment • Instant Messaging • Search Engine		

5.1.1 Description of OICon model

The selection of media to be implemented in the OICon model is based on the online consultation processes, tasks involved and user requirements. There are five domains which include personalization, consultation processes and task involve, features and multimedia communication components, consultation document and management. Each domain is described below:

5.1.1.1 Personalization

Facilitators and students have their own authentication to access the prototype using unique usernames and passwords. Other visitors are not allowed to access the prototype. Users may search and view the announcements, news, calendar events, and help documentation. They can even send feedback form to the administrator.

5.1.1.2 Consultation Processes & Task Involved

In general, there are three core phases (see Table 5.3) involved in the instructional consultation of HEIs: Pre-consultation, online consultation session, and post-consultation. Online consultation session contains sub-processes which are problem-posting, discussion, and decision making.

Table 5.3: Consultation Phases and Common Tasks

Phases	Task involved
Pre-consultation	• Students make appointment online • Consultation time scheduling • Send Invitation mail
Online Consultation Session	• Students post problem • Students and lecturers discuss the problem • Lecturer provides solution
Post-session Discussion	• Retrieving and playback of recorded session online • Peers online collaboration (Synchronous and Asynchronous) • Retrieving of consultation documentation uploaded by facilitator.

5.1.1.3 Features and Multimedia Components

Twelve multimedia components have been proposed as derived from the literatures and e-consultation models. These components and features consist of asynchronous and synchronous communication components as listed in table 5.4.

In order to retain the interactivity as in face-to-face consultation, modification on these communication components is necessary. For example, customization of participant lists by adding "raise hand" function to enable students to have control over the online collaboration when presenting their point of views. Although the consultation applies the facilitator-led approach, the use of self-paced led approach with peer discussion after a consultation session may give better results.

Table 5.4: Multimedia Communication Components of OICon Model

Asynchronous Communication	Synchronous Communication
• Question & Answer (Q&A) with FAQ feature • E-mail • Online Polling • Electronic Notepad • Time Schedule & Announcement Board • Document Conversion & Sharing	• Video Conference • Instant Messaging • Shared Window Function • Shared Whiteboard • Consultation Session Recording • List of Participants

Eight new multimedia communication components are proposed, which are:

• Frequently Asked Question (FAQ)

• Document Conversion and Sharing function

• Attendance List or Logbook Management

• Time Scheduling and Announcement Board

• Consultation Session Recording, retrieving and playback function

• Consultation Document Management

• Dynamic Video Player

• Search Engine

5.1.1.4 Consultation Contents

In an online consultation environment, the contents are mostly contributed by online participants. For example, presentation files are uploaded by the online participants together with the consultation document, and recorded consultation session. Other contents such as user manual, instruction video, latest news and events are created by the administrator. There are three main categories of OICon contents based on personal and group domains:

a) Personal contents - student's personal detail and e-mail address can only be granted by the owner.

b) Group content - sharing of consultation document that is accessible to all the members, allowing information sharing among them.

c) Other contents - announcements, recorded consultation session, and calendar events are eligible to be granted by all users including the non-members.

Besides, there are two types of consultation contents as shown in Table 5.5 i.e. audio-visual recording session and other consultation document such as presentation file uploaded by participants during or after a consultation session. Both consultation contents and documents uploaded can be retrieved using a search engine. Consultation recorded session in audio-visual form can be playback through Flash video player that is embedded in web sites. Students are allowed to download the consultation documents.

Table 5.5: Audio-visual recording session and types of consultation contents

Audio-visual Recorded Document	Other Consultation Document
1) Conducting video conferencing through Live Streaming Media Player, the recorded media can be playback through Recorded Media Player.	1) Enable students to retrieve and download consultation documents and content from the repository.
2) Retrieving the media through search engine from multimedia database.	2) Retrieving of documents through search engine from database.
3) Media are organized in a list of dynamic thumbnail.	3) Documents are organized in thread and sequential form.

5.2 Key Differences of Online Instructional Consultation (OICon) Model from Other Models

It is important to note that the features and components that are listed in this model as supporting components for consulting service online are not meant to represent an exclusive list. Instead, the "mapping" of CMC tools to the manner and strategy provides a useful source to facilitate the relevant consultation activities. The key differences of OICon model from other models are:

a) The OICon model takes into account the holistic consultation approach starting from pre-consultation, consultation session and post-session discussion. Before a consultation session starts, it is necessary to recruit people and inform them the purpose and agenda of consultation as suggested by Steven (2002). Sometimes, the consultation session is initiated by the lecturer. For this reason, the researcher adds the time schedule and announcement board components to the OICon model in which this component enables lecturers to make announcement to invite their mentees to join consultation besides sending invitation mail.

Different from other consultation models and telementoring programs that emphasize only on synchronous communication tools (for example: Tutor.com and Financial Service Remote Consultation model) and asynchronous communication (For example: MentorNet), OICon model consists of blending modes of communication tools that not only provide verbal cues but also non-verbal cues that contribute to a sense of social presence among participants. Humans are not all alike. Some of them are poor in writing skills but probably may communicate their problem effectively through video and audio conference. Some of them are rather shy and may find instant messaging and e-mail the easy way to pose their problem.

Besides that, the OICon model consists of consultation session recording feature that is not included in the Financial Service Remote model and Virtu@l Consult@tion for Telemedicine Education model. Recorded consultation session is important for future retrieval and reviewing. This differs from other telementoring systems such as MentorNet and Emissary Telementoring in which they emphasize only on e-mail message archive. Audio-visual recording decreases information loss for meeting recording as compared to written note recording since a verbatim record is produced (Whittaker et al, 2006).

Dissemination of consultation contents and results are important for those who are absent from the consultation session and willing to get the knowledge through post-session discussion with their peers. The OICon model is equipped with post-session discussion platform with instant messaging feature that can recruit peers to discuss on the recorded-consultation session as well as presenting their point of view by leaving comments in either textual or audio-visual form.

Different from the other e-consultation models, this OICon model takes into consideration the nature of long-term relationship telementoring. Consultation contacts and feedback management feature help the facilitator to inform and give feedback to mentees. Besides that, the facilitator's terminal also provides consultation and document management that is not included in other model.

b) The eight new features and components which are determined from preliminary study and literature review are:

- Frequently Asked Question (FAQ)

- Document Conversion and Sharing function

- Attendance List or Logbook Management

- Time Scheduling and Announcement Board

- Consultation Session Recording, retrieving and playback function

- Consultation Document Management

- Dynamic Video Player

- Search Engine

This OICon model is acknowledged by all experts who review it. Mr. Mohamed Nizam Saad, a lecturer from College of Arts and Science (CAS) adds that this model is different from other e-learning system as it includes logbook management features which differentiate it from other e-learning applications. The model clearly portrays all the features and components of an online consultation system. However, Dr. Michael Morgan suggests that the model should include the capability of keeping track of the consultation recorded session especially with the participants. Table 5.6 summarizes all the communication components and features of OICon with other e-consultation models of various contexts.

Table 5.6: Communication Components and Features of OICon with Other E-consultation Model of Various Contexts

Communication Components & Features	Major E-consultation Components of Public Policy Consultation	Financial Service Consultation	Virtu@l Consultation for Medical Curriculum	OICon Model
Video Conferencing	×	√	√	√
Shared-screen Feature	×	√	×	√
Shared whiteboard	×	×	√	√
Instant Messaging	√	×	√	√
List of Participants	×	×	√	√
Multimedia Database	×	×	√	√
Q&A with FAQ feature	√	×	×	√
E-mail	√	×	×	√
Electronic Notepad	×	×	√	√
Online Polling	√	×	×	√
Leave Comments	√	×	×	√
Consultation Contact Management & Feedback	√	×	×	√
Document Conversion and Sharing function	×	×	×	√
Attendance List or Logbook Management	×	×	×	√
Time Scheduling and Announcement Board	×	×	×	√
Consultation Document Management	×	×	×	√

Dynamic Video Player	×	×	×	√
Search Engine	×	×	×	√
Consultation Session Recording, retrieving and playback function	×	×	×	√
Summary of Features	**6/19**	**2/19**	**6/19**	**19/19**

5.3 Online Instructional Consultation (OICon) Prototype Development

The objective of the development phase is to develop a functional OICon prototype for testing and evaluation purposes. The development is based on the proposed OICon model that begins with the formulation of multimedia components modules which will then combined to form a functional prototype. The development of OICon prototype involves a number of information technologies. This section describes these technologies' development platform and client-server architecture.

5.3.1 Prototype Development Platform

A platform that can deliver consultation information and enables online collaboration synchronously and asynchronously require a system and a server that can handle streaming of dynamic data efficiently. Thus, in this study, Flash Media Server 3.5 (FMS 3.5) and open-source cross-platform web server XAMPP have been chosen for the OICon prototype development. XAMPP is the acronym for cross platform Apache HTTP server, MySQL database, PHP and Perl. In the development of the OICon prototype, all the applications provided XAMPP except Perl application. The XAMPP consists of application server, web server, security and other fundamental functions such as:

- MySQL Database: Storing purpose. It also enables retrieval of data in the form of images, audio, video, documents and relational data.
- E-mail Functionality: Built-in e-mail system with PHPmailer SMTP function that enables users to send and receive mail. PHPmailer makes use of the PHPMailer class and sends the e-mail based on the specified parameters.

The XAMPP is also integrated with other document converter services including:

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- JODConverter: the Java OpenDocument Converter that converts documents of different office formats. JODConverter automates all conversions supported by OpenOffice.org. It is integrated as a web service, invoked from application written in PHP language.
- SWFTools: SWFTools is a collection of utilities for working with Adobe Flash files (SWF files). The tool collection includes programs for reading SWF files, combining them, and creating them from other contents (like images, sound files and videos).

Apart from that, real time communication server, Flash Media Server 3.5 is chosen due to its capability to deliver video on demand (VOD), and stream live video, audio and data in real time that runs in Adobe Flash Player and work consistently across platforms and browsers. It is chosen to develop and serve the OICon prototype as it provides a solution that can meet the OICon prototype requirements and offers wide range of advantages.

5.3.2 Database Design

Three databases are created to support the OICon prototype. The data stored in database can either be restricted for individual only, group, or open accessed for public.

5.3.2.1 Mapping the Individual Levels

Breakout room for online consultation prototype is needed to allow only selected users to enter a particular room at one time. In a consultation breakout room, each participant will be assigned with a particular role such as mentee, instructor, or presenter by using his/her own username. In other words, the resource contents of a

particular consultation session can only be accessed by the participants in that particular session. Likewise, the facilitator is given privileges to assign or pass the presenter role to a mentee to speak to prevent chaos during video conference session. For this reason, access control for content mapping approach is used in which Access Control List (ACL) with personal, group, public access level and roles is set up. Table 5.7 shows the access control table for online consultation for session 001 for room A.

Table 5.7: Access Control Table for Online Consultation for Session 001 and Room A

Role Name	Group Name	Resource Name
Mentee	ConsultSession001	Consult/room_A
Instructor	ConsultSessionFaci001	Consult/room_A
Presenter	ConsultSessionPresent001	Consult/room_A

Each entry in an access control table has three parts: the name of the resource with the application instance name (for example: room_A) in each consultation, the group name and role name that are involved in room A. Each user is associated with a group name as shown in Table 5.8.

Table 5.8: Access Control Table for Online Consultation for Session 001 and Room A

UserName	Group Name
Charice	ConsultSession001
Dr.Smith	ConsultSessionFaci001
Lim	ConsultSessionPresent001

5.3.2.2 Using Access Control for Content Mapping

Table 5.9 shows the access control table with content mapping. There are three types of OICon contents categorized based on user role and access level:

- Personal Content: Once users are registered and login to personal spaces, their personal content such as personal details, personal mail and announcements sent by lecturers are displayed. It is impossible for them to view other people's information. Each individual has his/her unique member ID and username as identification.
- Group Content: Users' access to group contents is restricted based on their roles. For example, a user who login as a student can only view announcements but cannot modify announcements.
- Public Content: Some contents such as announcements, feedback form, FAQ, help and documentation can be accessed by either non-registered or registered user.

Table 5.9: Access Control Table with Content Mapping

Content	Access Level	Group Name
Personal	Username	-
Group	Username and Group Name	ConsultSession001
Public	All user	-

5.3.3 Client-Server Architecture and Module Functionality of OICon Prototype

Client-server architecture, a web-based consultation platform that serves as client-side, is used to access the HTML page with the online consultation that has built-in Shockwave (SWF) file embedded. The server-side serves the HTML page contents, delivers the contents stored in database to be displayed in web-sites.

Figure 5.2 shows the client-server architecture of the OICon prototype which consists of two main servers: Web and Flash Media. In Adobe Flash Media Server, a client and a server are connected through RTMP Protocol. A web server delivers the clients over HTTP. A PC that acts as the server side has a web server and a Flash Media Server. Firstly, the client will send a request to view the website that contains Flash player in the web server. Then, the web Server streams the data to display the Flash on the web browser through reliable HTTP protocol. After that, the SWF file is connected to an application on the Flash Media Server and the server will stream the data over a persistent connection using RTMP. This means that users work on both protocols simultaneously.
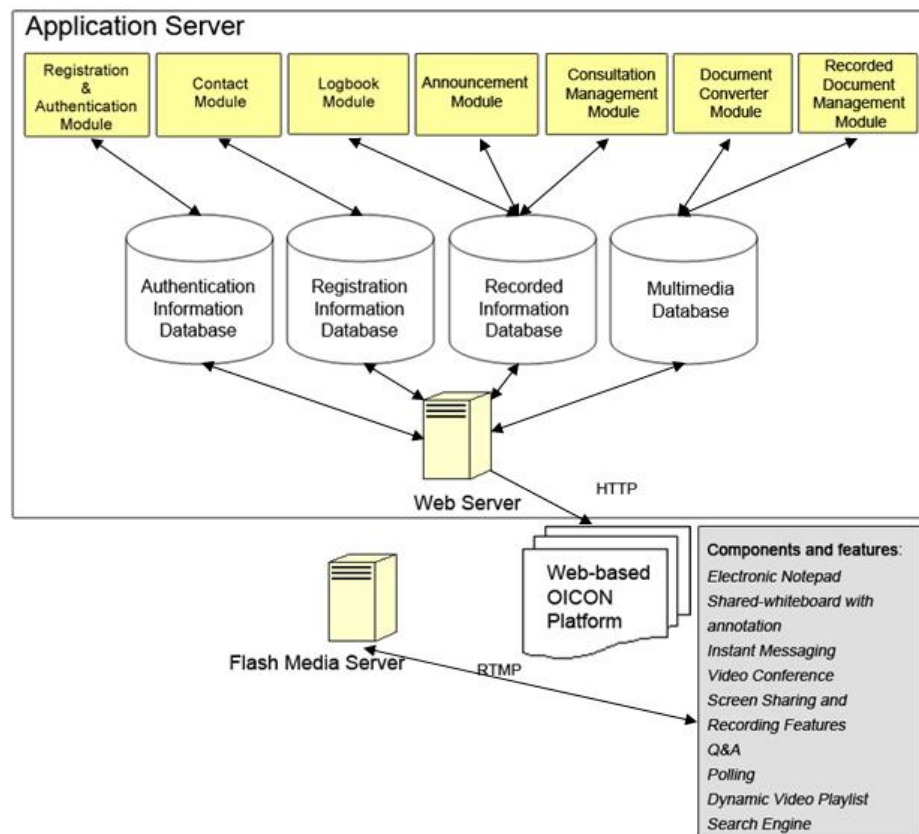

Figure 5.2: Client-server Architecture of the OICon Prototype

The synchronous communication tools such as instant messaging, video conferencing and screen sharing that stream data in real time are supported by the functionality provided by Flash Media Server. The RTMP is a reliable TCP/IP protocol developed by Adobe system for delivering the high impact audio, video and data stream over the Flash player and server. Besides that, it also covers the Flash video stream and MP3. RTMP enables multiple transmission of synchronous audio, video and data channel along a single communication channel.

In this study, the versatility of the media components offered by Flash Media Server is used to develop the OICon prototype which works in the clients' web browser. This prototype comprises of small modules including:

- **Registration and authentication module:** This is required to control accessibility and to identify authentication of users in the online consultation platform. Verification of username and password is done by checking against those stored in the registration information database.
- **Contact Module:** When a facilitator or a student passed the authentication, the contact and authentication modules will transfer list of personal details and online activities option that corresponds to the identity and access level of user login to registration information database.
- **Logbook / Attendance List Module:** This module is accessible by students and lecturers. The students can access their personal logbook or attendance information while the lecturers can access their mentees' logbook or attendance information stored in recorded information database.
- **Announcement and Consultation Management Module:** Both modules can be accessed by lecturers who permit them to create, or delete announcement and consultation information. However, the students can only view and search the announcements content and consultation information.

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- **Document Converter Module:** This module converts documents format to a viewable format such as Shockwave (SWF) format. Once the document is converted, it will appear at whiteboard viewport. The media such as image, video, audio, and word document is stored in multimedia database.

- **Recorded Document Management Module:** Recorded consultation video session is stored in a multimedia database and can be retrieved, and playback at online media player. This capability allows authorized users to easily upload documents such as Microsoft Office, and PDF to the related knowledge repository.

In general, there are two kinds of applications sharing, which are screen sharing of facilitator's and student's terminal; and document sharing by using presentation slide show on both the facilitator's and student's terminal. Table 5.10 lists the differences of these two applications sharing.

Table 5.10: Differences of Computer Screen Sharing and Document Sharing

Computer Screen Sharing	Document Sharing
Installation of Camtasia Studio is needed.	Implementation of document converter as web service to convert document in Portable Document Format (PDF), Movie (.avi) and Powerpoint Slide (.ppt) to shockwave (SWF) format.
The recorded session is published via Flash video player.	The document is loaded on Flash document viewer (rfxview viewer or SWFPresentation component for PowerPoint presentation).
Combined used of Camtasia Studio and Flash video player with customization of coding.	Integration of shared object function in Flash document viewer and can usually combine use with shared-whiteboard component.
Only one participant can share his screen with others at a time.	The document sharing owner shares his document and draw on it by using shared-whiteboard.

The OICon prototype offers sharing functionality to allow participants to share their desktop screens. However, before they can share screen and record the consultation session, they need to install Camtasia Studio in their computer. The output of the recording session can be broadcasted to all participants.

Participants can initiate the document presentation by uploading and converting the material to SWF format to be presented on the shared-whiteboard. This shared-whiteboard is provided with annotation button, and mouse pointer in which each participant's name will appear near his/her own pointer. The user can even specify the colour that they want. The function also enables users to print certain document area.

5.3.4 Online Instructional Consultation (OICon) Characteristics & Advantages

By creating a central point of browser-based online consultation platform, the accessibility of information stores, delivery of information through CMC tools, websites and online service will be accelerated across the virtual community. The OICon model provides a systematic way to facilitate the shifting of the face-to-face consultation to an online consultation with the use of CMC tools. A few characteristics and advantages of the OICon are discussed below:

a) Integration

OICon model provides a wide range of support for any information source, system and data as described below:

i. Support document conversion of different types of media in various formats such as PDF, .JPEG, .AVI, and Openoffice formats.

ii. Support document uploading and sharing different types of formats such as images (*.jpg, *.jpeg, *.gif, *.png), PDF files (*.pdf), text files (*.txt, *.rtf), and video files (*.avi, *.flv, *.mov, *.wmv)

iii. Support different modes of communication tools such as instant messaging, e-mail, video or audio conferencing and various cooperative tools including electronic whiteboard, online notepad, screen-sharing function, and media player.

iv. Support real time audio, video, and data exchange.

v. Support attachment of system camera and microphone to capture audio and video.

vi. Support delivery of live video and audio, whether from a web cam or digital video camera.

b) Memory Space

The OICon prototype with the integration of Flash Media Server (FMS) 3.5, provides video streaming functionality that delivers live communication media (video conference) and video on demand (VOD). It enables users to view certain video segment by dragging the timeline that appear on media player. It is secured and occupied fewer clients' computer memory space as well as minimizing the network load because only a portion of the video needs to be downloaded. In order to support the interactive and multimedia environment, online consultation platform is developed in a Flash form. As long as the users have the Flash player plug-ins to web browser and can access Internet, they can access the online consultation website.

c) Recording, Retrieval and Playback

Recording of a consultation session to be kept as archive provides great advantage for those who missed the consultation session to catch up or conduct a peer discussion. With the use of Camtasia Studio Screen Recorder and Presentation, a facilitator can record the consultation session including the online collaboration activities and its screen sharing activities. Playback of the online recorded session is applicable with the Flash media player embedded in the OICon website. Additional communication components such as "leave comment" and "instant messaging" enable peer-to-peer discussion. The online consultation platform hosts the ongoing discussion or provides link to relevant external online discussion space where students can keep discussion and retrieve multimedia document.

d) Management

Organization and coordination of the recorded document and mentees are specially tailored for facilitators. These recorded documents include consultation session recording, presentation slide and personal recorded document that are uploaded or stored by participants, session agenda and minutes that record date, time, and list of participants of a consultation session. Mentee's management function refers to the storing of mentee's details kept in a database. Feedback tools are provided for mentees to give feedback after a consultation session.

e) Privilege

Facilitators are given greater access to the OICon functionality compared to the students. Some functionality of button and features are added to the facilitator terminal to provide greater control on students' activities. For example, the facilitator is given authority to grant privileges on content while students are not allowed to do so.

5.4 Online Instructional Consultation (OICon) Interface

This OICon prototype and interfaces are developed from scratch in which development of prototype is based on rapid prototyping of Tripp and Bichelmeyer (1990).

5.4.1 Home Page

The home page (see Figure 5.3) provides clear overview of the OICon information. The general contents of the OICon prototype are arranged into prominent structure to make it easily accessible by users. The latest updated information is displayed in text format with embedded link to guide the users to navigate the chosen topic. The contents are organized in six parts:

a) **Latest Information**

This database-based panel lists five latest news related to the OICon which are contributed by the administrator. To view additional news, visitors can click on "more" button and will be redirect to a list of news page, allowing visitors to search for various news based on certain keyword or date.

b) **Login & register link**

This panel shows the login and registration link in which by clicking the "login" button, visitors are redirected to the login form or registration form.

c) **Contact**

This small panel displays the site administrator contact information.

d) Event Calendar

This simple database-based events calendar displays the day's details on the bottom space of the calender when one mouse over the date.

e) Introduction to Online Instructional Consultation

This panel presents a brief view of the OICon prototype, its purpose and objectives in text and video formats.

f) Consultation Announcement

This panel lists the five latest announcements added by the facilitator. Details of the announcements are displayed in a different page containing relevant detailed information such as topics, posted dates, mentees, and mentor names.

g) Help Panel

The function of the help panel provides a service to guide users in utilizing the OICon prototype in video, print screen image, and text formats.

h) Academic Links

This panel shows the academic links related to the OICon prototype.

Figure 5.3: Home page

5.4.2 Member's Personal Page

As mentioned in the previous section, an individual needs to login using a self-declared password and username to access their profile page. A list of activities is shown in Figure 5.4 [A]. The facilitator's profile is shown in Figure 5.4 [B] and the student's profile is shown in Figure 5.5.

Figure 5.4: Facilitator's Profile page

Figure 5.5: Student's Profile page

5.4.3 Request for Consultation Page

Figure 5.6 shows the request for consultation page which displays the form to make appointment. There are two conditions, as stated below, in which the online collaboration can be initiated:

a) Facilitator will schedule a meeting, create a new conference room or join the existing conference room, send invitation mail to students and join in the meeting room.

b) Students make an appointment online with the facilitator and schedule the meeting, join the existing conference created by their facilitator, send invitation to other peers and join the meeting room created by students.

Both students and lecturers can make appointments by filling up the appointment form (see Figure 5.6) and send to an individual or groups of students to invite them to attend online consultation (see Figure 5.7).

Figure 5.6: Request Meeting page

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Figure 5.7: Send Invitation Page

5.4.4 Online Consultation

Figure 5.8 shows the breakout room for online consultation that is created by the lecturer. The username field cannot be edited to prevent individuals from changing their usernames to an anonymous name that cannot be recognized by other participants. The room list shows the existing breakout room. Users are restricted to login to these rooms if their username and room ID do not match those stored in the repository. The functionality of breakouts room provides easy access for those participants to continue the delayed consultation session with the same information and recorded consultation documents.

After logging in into the online conference room, the instruction video panel will appear in the middle to provide guidance and instruction to online participants using OICon communication components as shown in Figure 5.9 [A]. Participants can choose the list of activities from the dynamic slide menu shown in Figure 5.9 [B]. These activities include shared screen, shared whiteboard, add note, upload file, polling, sign the guestbook, view meeting information, view instruction help and record consultation session. The OICon model is designed for the maximum of 10 participants to use video conference component (see Figure 5.9 [C]) and the instant messaging tool (see Figure 5.9 [D]).
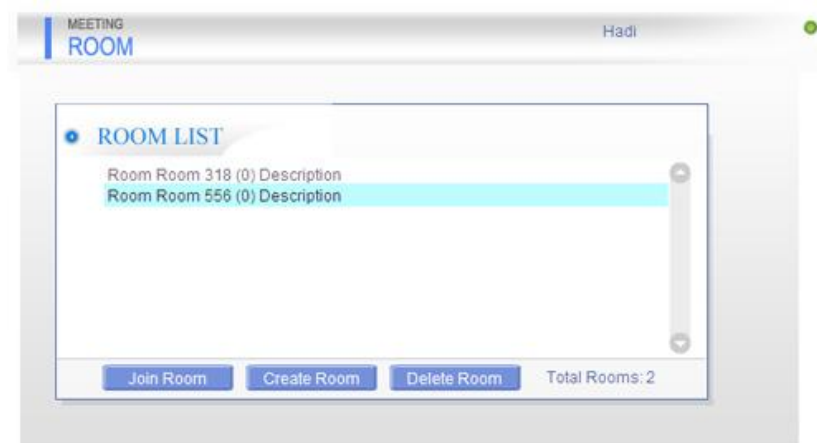
Figure 5.8: Online Collaboration Platform Login Interface
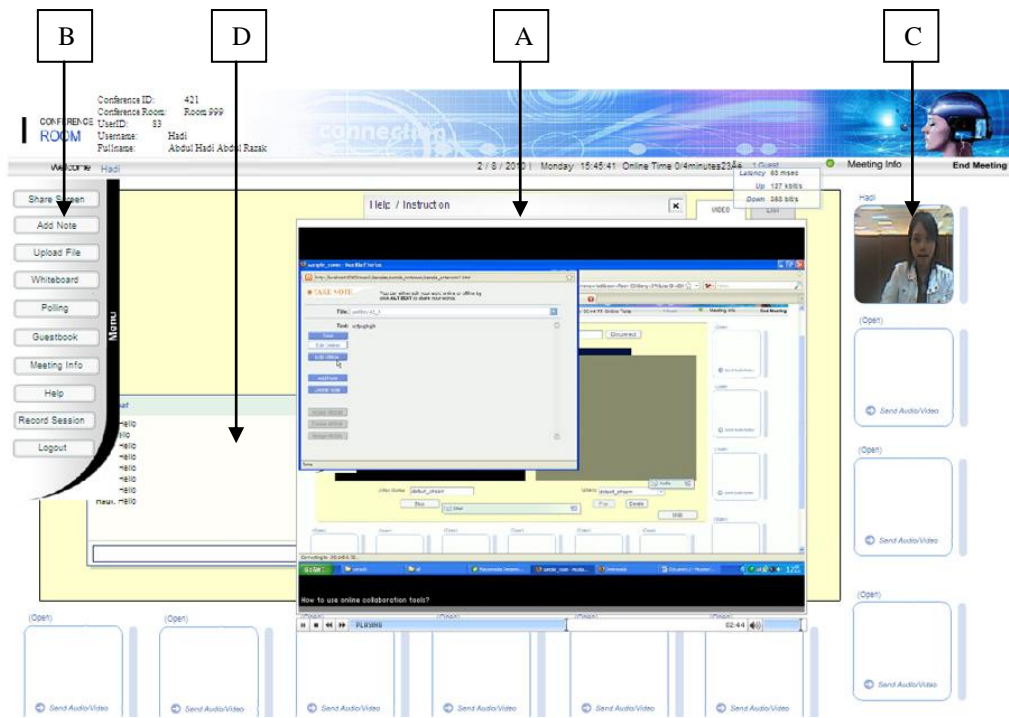
Figure 5.9: Online Collaboration between Student and Facilitator

5.4.4.1 Online Collaboration: Document Sharing

Figure 5.10 presents the document sharing activity interface and the components involved. Figure [A], [B] and [C] present the function button of converted PDF document, images, and movie document to shockwave (SWF) format and the output is loaded onto the viewport area of the document viewer as shown in Figure 5.10 [D]. Presentation of document on shared-whiteboard are provided with presentation aids (see Figure 5.10 [E]) such as pointer arrow, annotation, and print button, which offer the participants accessibility control on the presentation slide on common shared-view. Besides that, the whiteboard tools (see Figure 5.10 [F]) let participants to create, edit, and draw on the document in real time and share environment. Participants can drag the document viewer area by clicking the drag area button (see Figure 5.10 [I]) and print it by click "print" button (see Figure 5.10 [H]). Figure 5.10

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[G] shows the list of participants in a consultation session that has a green light indicator to indicate that the participant is raising his/her hand and talking.
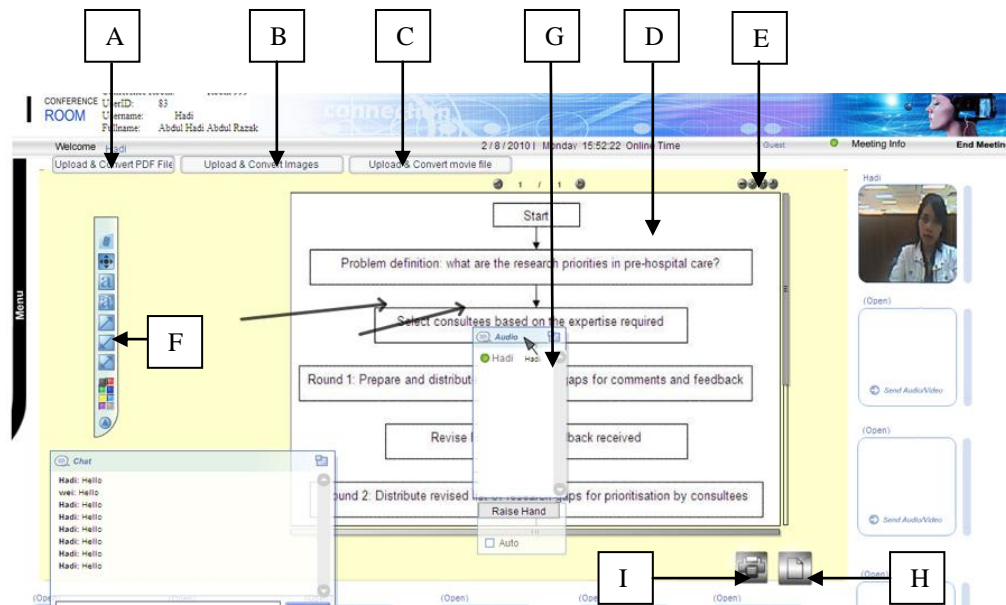
Figure 5.10: Online Collaboration Component: Sharing of Document on Whiteboard

5.4.4.2 Online Collaboration: Facilitator Control

Figure 5.11 illustrates the video conference components and the list of participants. The facilitator is given the privileges to pass the presentation role, to delete the troublemaker participant or view participant profile by selecting the name on the list. Besides that, the facilitator can mute or dismute video (see Figure 5.11 [A]) or audio (see Figure 5.11 [B]) of the conference component of the participant in chaotic situation. Participant can click the "raise hand" button if they want to present and "lower hand (see Figure 5.11 [C])" button if they have finished presenting.

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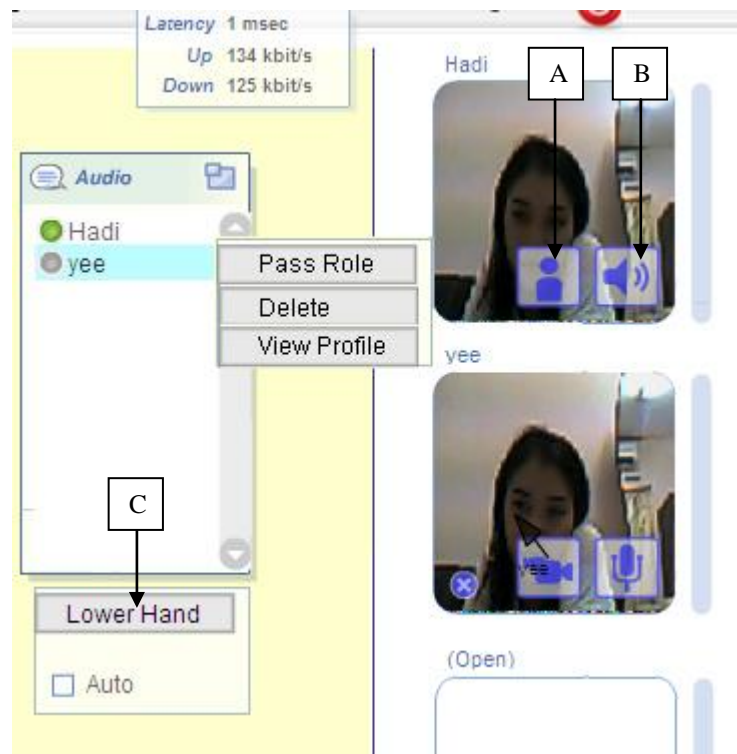
Figure 5.11: Video Conference Component and list of Participants

5.4.4.3 Online Collaboration: Add Note Function

The "add note" function (see Figure 5.12) allows multi-participants to create, edit, and save their notes simultaneously. If a participant needs to share the notes taken online while running this prototype, they can click the "Edit Online" button. If a participant is editing the notes online while the other edits the note offline, the "Accept Alt Edit", "Delete Alt Edit", and "Merge Alt Edit" button are activated. This activation allows the participants to accept, delete, and merge the alternate text editing.

Figure 5.12: Online Collaboration: Add Note Components

5.4.4.4 Online Collaboration: Polling Components

The polling component is necessary for a decision-making process (Sutherland, 1994). The OICon model includes this component (see Figure 5.13) due to its importance and usefulness in collecting participants data and distributing the results at real-time. It supports the multiple-choice questions in which a user creates the title and question. Users can even vote and go through the survey to see the results (see Figure 5.14).

Figure 5.13: Online Collaboration: Polling Function
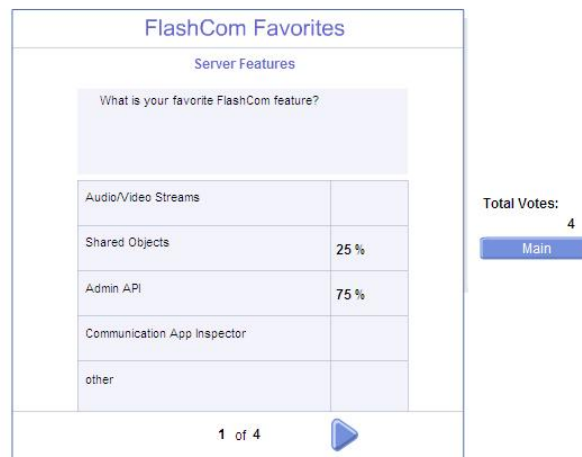
Figure 5.14: Online Collaboration: Voting Result

5.4.4.5 Online Collaboration: Share Screen Function and Record Session

In OICon prototype, both student's and facilitator's terminal are provided with shared-screen functionality but the facilitator is given the privileges in which he or she can record a consultation session by clicking on the "record" button (see Figure 5.15 [C]). The recorded session can be viewed using media player as shown in Figure 5.15 [B] while Figure 5.15 [A] presents the live shared screen. The shared-screen function enables the facilitator to record the consultation session in a separate

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segment without replacing the previous segment and selecting the segment from the list menu (see Figure 5.15 [D]).
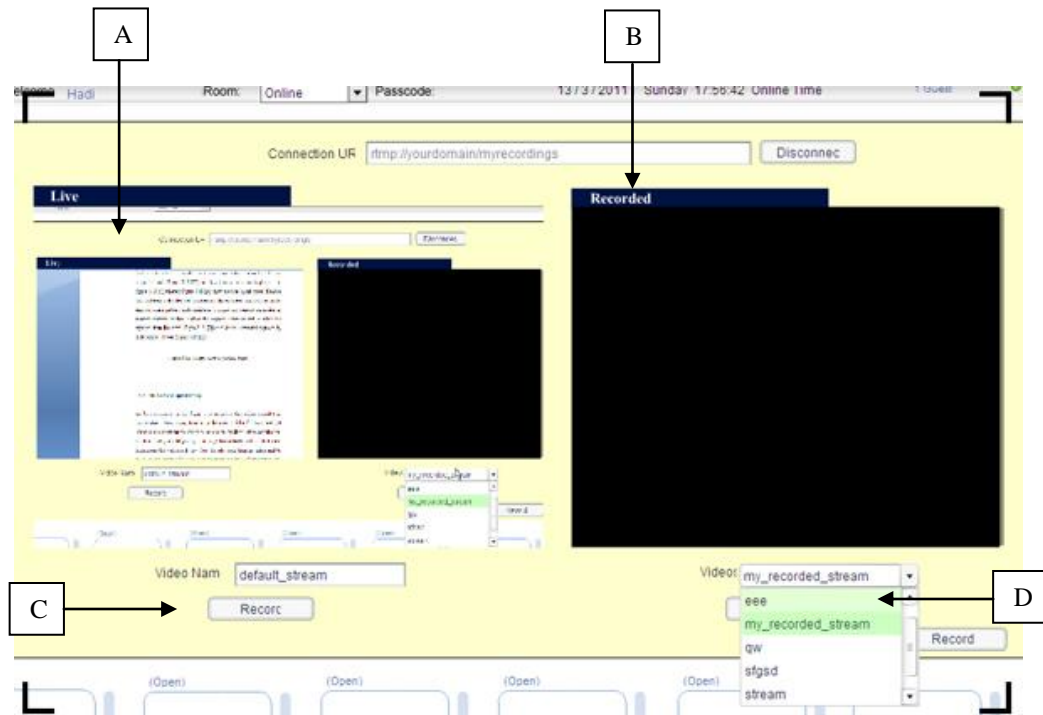
Figure 5.15: Live Shared-screen Media Player and Recorded Media Player

5.4.5 Frequently Asked Question

Figure 5.16 shows Question and Answer (Q&A) component with the most frequently asked question displayed. Participants can type the question and click the "ask" button. At the same time, questions that match (see Figure 5.16 [A]) will be displayed together with the suggested answers as shown in Figure 5.16 [B]. Participants can answer the questions by filling up the form as shown in Figure 5.16 [C]. The lecturer can make decisions by choosing the most suitable solution or answer.
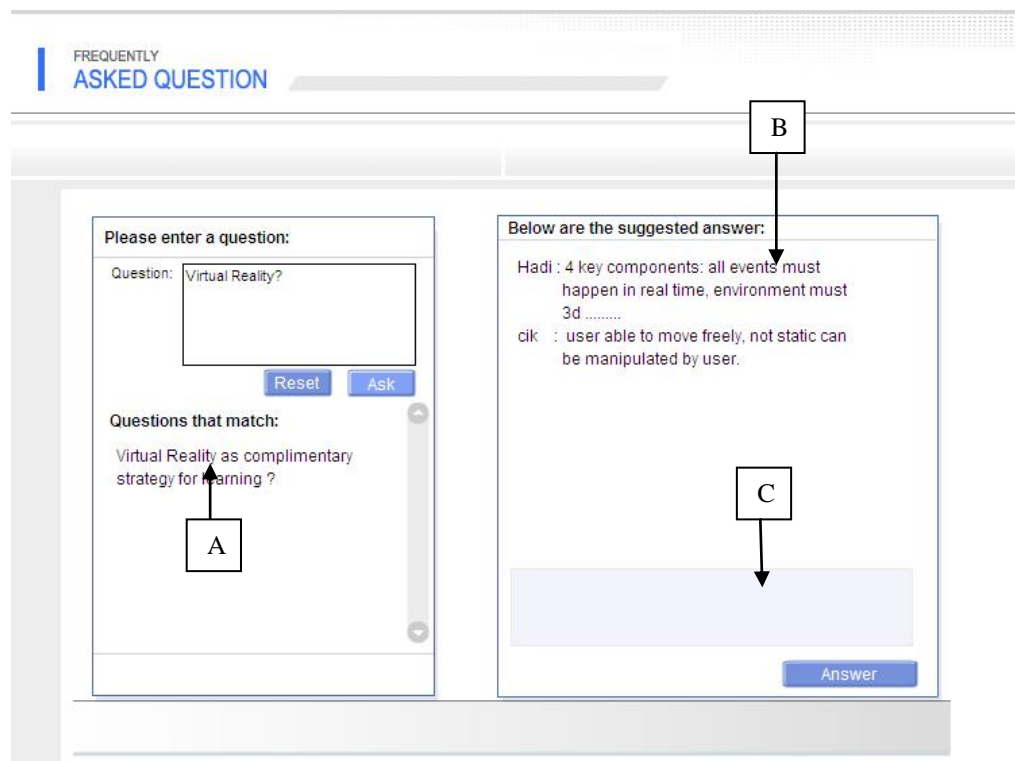
Figure 5.16: Question and Answer (Q&A) Component

5.4.6 Students' Management Page

As discussed earlier, Fagan et al (2006) suggested that online consultation prototype should have a way to manage the contacts, either for keeping them informed about the consultation events or sending them feedback after consultation. The facilitator is given the priority to manage their mentees such as by blocking them from accessing the webpage. If they obey the rules, the facilitator sends them an invitation mail to online events (see Figure 5.17).
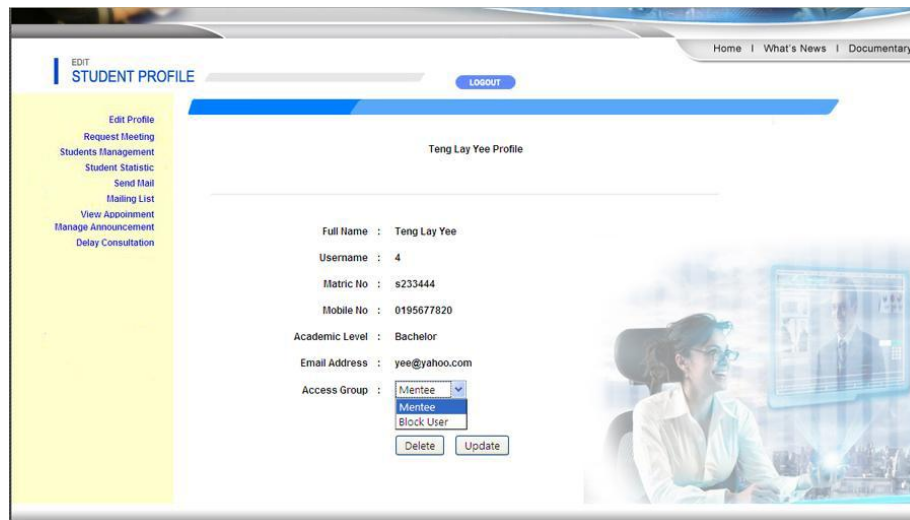
Figure 5.17: Student Management Page

5.4.7 Announcement's Management Page

The OICon prototype allows facilitators to make online announcements in which they can either display or hide the announcements (see Figure 5.18) to control the appearance in the latest announcements page (see Figure 5.19).
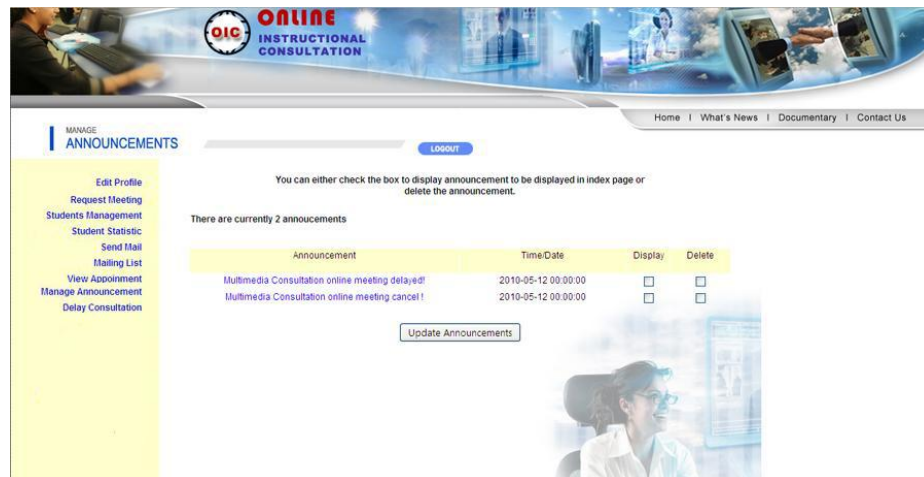
Figure 5.18: Announcements Management Page

Figure 5.19: List of Announcements

5.4.8 Attendance List

As suggested by an expert, the OICon model should include an attendance list. This attendance list record consists of agenda, activities, date, and time that students are involved in the online consultation (see Figure 5.20).

Figure 5.20: Consultation Information and List of Participants

5.4.9 Consultation Document Management Page

Some of the online collaboration platforms such as e-learning have built-in third party management tools for handling the learning document efficiently and effectively to prevent the overloading of document. However, in this study, no outsource management software is used since the consultation material are not as many as the learning document that is necessary for learning purposes. The designation of the management consultation document is simple and easy enough to be utilized. The advantages of this simple online consultation documentation management are:

- Provides the lecturer with a systematic way to collect and manage recorded consultation session in which the recorded documents are displayed in thread and sequential form. The details of a particular consultation document (see

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Figure 5.22) are displayed when the facilitator clicks the "view" button (see Figure 5.21 [B]).

- Allows the lecturer to access the consultation document by checking checkbox in the "display" to allow video participation on dynamic video player or uncheck to hide the video.

- The lecturer can view the status of each consultation session (see Figure 5.21 [A]). The "done" status indicates that consultation session is successfully conducted. The "pending" status indicates that the consultation session has not yet started whereas the status "delay" indicates that problems have not been solved and delayed to the next consultation. The facilitator can continue with the delayed-consultation session by retrieving the consultation document and recruiting the same participants or add other mentees by sending invitation mail. The detail information of a particular consultation session will be displayed in another page when the lecturer clicks on "view" button (see Figure 5.21 [B]). This page contains the existing online participants, the document uploaded during online consultation session as well as summary outcome of delayed-consultation session.

Figure 5.21: List of Consultation Document

VIEW
CONSULTATION DETAIL

Edit Profile
Request Meeting
Students Management
Student Statistic
Send Mail
Mailing List
View Appoinment
Manage Announcement
Delay Consultation

Consultation Topic	multimedia
Facilitator Name	Hadi
Consultation Description	multimedia
Consultation Date	2010-05-14
Start Time	14:30:00
Consultation Status	
Consultation File	view Files	Playback Recorded Video
List of Participants	

Figure 5.22: Consultation Document Details

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5.4.10 Recorded Document Retrieval and Playback

The search engine component has been integrated in order to let users retrieve and playback the recorded video session by keying-in the video title and date of publication (see Figure 5.23). Figure 5.24 shows the dynamic video playlist or also known as post-session discussion platform. This page is divided into five sub parts (see Figure 5.24) which are:

a) Video on demand player: User can retrieve and playback the video, pause video playing, draw on the video scene (see Figure 5.25 [A]) and click the "print" button (see Figure 5.25 [B]) to capture the scene with the drawing.

b) Instant Messaging with list of participants Panel: This panel enables the user to chat on real time (see Figure 5.24[B]). It can also view the attendee's name.

c) Video Playlist: This dynamic video playlist lists the recorded video consultation session (see Figure 5.24 [C]).

d) Consultation Information: Consultation information such as the consultation title, name, and video URL will be displayed on this panel (see Figure 5.24 [D]).

e) Leave Comments Panel: Unlike instant messaging, the leave comments panel makes use of audio and video recording function in which the user can choose either to leave comments in a text form (see Figure 5.25[C]) or record their voice and video (see Figure 5.25 [B]), submit and publish as recorded comments.
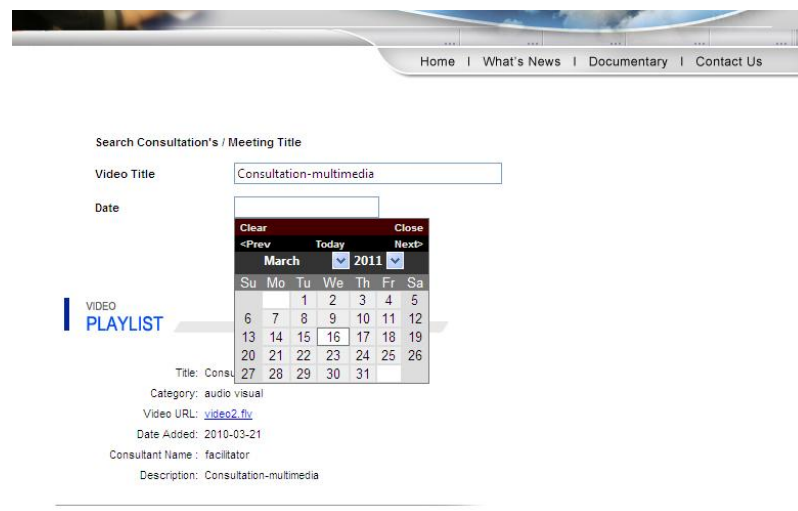
Figure 5.23: Retrieval of Recorded Video Consultation
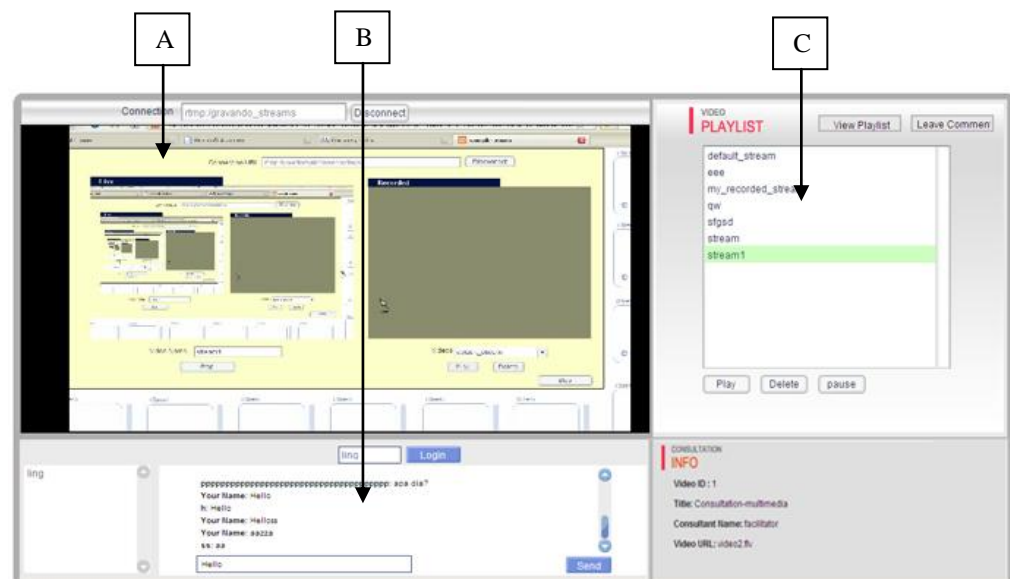
Figure 5.24: Post Session Discussion Platform
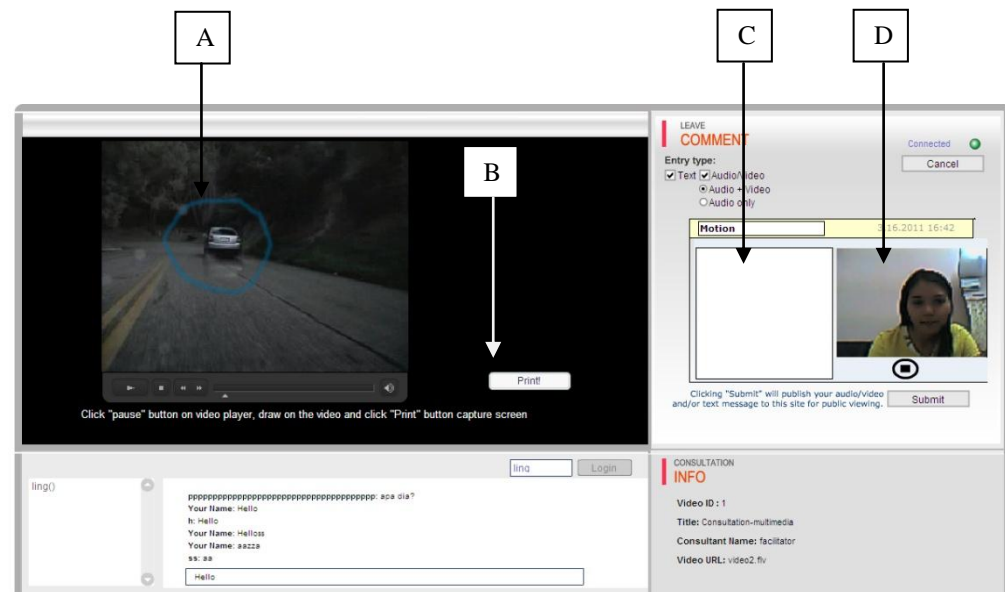
Figure 5.25: Post Session Discussion Platform with the Leave Comments Feature

5.5 Customization on Media Components

Flash Media Server provides media components that are required in the development of the OICon prototype. However, some customization of these components is needed to enhance the online interaction of participants to suit the online instructional purposes.

5.5.1 Customizing the Text Chat and Audio Conference Components

The facilitator has the autonomy to set permission to allow a student to talk at a particular time through audio-visual conferencing while preventing others making noise. The text chat component that is usually accompanied by the participant's list of component may work efficiently by adding some useful features in achieving the following purpose:

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a)   Allow both facilitator and students to send and receive messages on real time.

b)   Provide the means on identifying who is the sender.

c)   Provide a sense of virtual presence by integrating the list of participants.

d)   Store the text chat history for reviewing of participants who join the meeting late.

e)   Provide the authority for the facilitator to clear the text chat message.

f)   Show the status of participants.

g)   Allow participants to speak in an orderly manner to prevent chaos.

The relatively simple text chat components and the list of participants included in the Flash Media Server 3.5 provide these functionalities as in a), b), and c). For the participant's list, replacements with an audio conference component provide more features as needed without further complex coding. Another small modification made is by adding the "raise hand" button and server-side action script. Figure 5.26 depicts the audio conference components with the added raise-hand function. The indicator light will remain grey (the light's off state) on default until the participant clicks on the "Raise Hand" button. If the indicator colour turns to green, this indicates that the participants are talking.
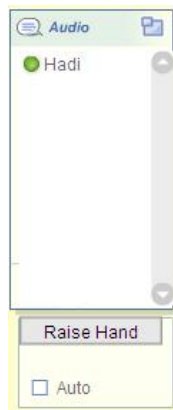
Figure 5.26: Audio Conference Component with "Raise-hand" button added

There is a need for assigning privileges for the facilitator to clear the text chat history especially when she or he does not want the previous text chat to be revealed. Hence, modification on text chat components is made by adding the "clear chat history" button that follows the action script embedded inside as shown in listing A (Appendix H) and Figure 5.27. Whereas for the server side, modifications on the already built-in server-side action script are needed to allow the client-side action script (allowclear.as) invoke the clear chat function in server side as shown in listing B (Appendix H). For the clear History function (clearchat.as), delete history coding and broadcast it to all connected clients are added as shown in listing C (Appendix H).
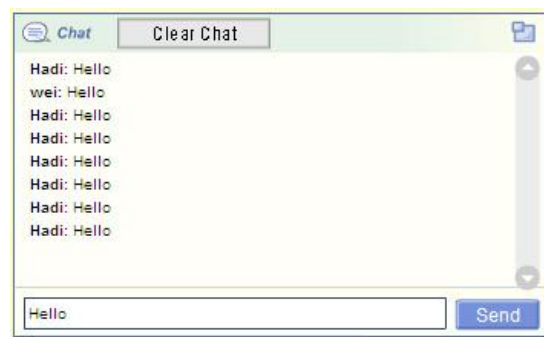
Figure 5.27: Text Chat components with clear chat button added

5.5.2 Customizing the SWFPresentation, Slideshow and Whiteboard

Flash media server 3.5 consists of SWFPresentation components that allow PowerPoint (.ppt) to be conveyed through SWFPresentation slide show. Combining the use of SWFPresentation Slide Show, and Whiteboard works effectively for document-sharing on real time while allowing participants to draw and annotate on it. However, both components appear as different components and hence, some coding are added to connect both components at the client-side and server-side's action scripts. The remote shared object (RSO) provides a means of letting the participants to keep track and share the synchronized data among the multiple client sides. This is indicated when client A changes the data and shared object that are updated and sends the changes to another client who are connected with the client asynchronously.

5.5.3 Customizing the Dynamic Video Playlist

Flash CS4 consists of video player components and playlist that allow users to develop a dynamic video playlist such as Youtube.com and TVstation Version 2. By following the instructions on building a dynamic video playlist on adobe.com (http://www.adobe.com), a simple XML-based dynamic video playlist is developed. However, this dynamic playlist requires an administrator to customize XML file every time a new video is added. This procedure is not flexible and time-consuming. Thus, some modifications on the dynamic video playlist were made as follows:

a) Add coding on playlist so that every time when a new video is stored, the video name list is updated automatically.

b) Add instant text chat to allow online collaboration on related video.

c) Add leave comment function in either text or audio visual form.

5.5.4 Customizing on Camtasia Shared-screen and Recording

As discussed before, Camtasia studio provides shared screen and recording functions that are needed in the OICon prototype. In order to broadcast the shared screen output for other clients, a video player is developed to stream the live video output recorded. Some coding is added to the live video player to connect to the Flash Media Server 3.5 and Camtasia Studio Video Capture Driver as shown in listing D (Appendix H).

5.5.5 Conversion of Document Files using SWFtools, JODConverter and Implementation of Output file on Document Viewer

SWFtools (http:// www.swftools.org) is a document converter that comprises of various modules that convert documents into SWF files. It includes the program for reading SWF file, combining them and creating them from other contents (SWFTools). It can either exist as stand-alone software that is installed on computer or applied as web service written in suitable programming language. In this study, five SWFTools modules are applied; PDF2SWF, JPEG2SWF, GIF2SWF, WAV2SWF, AVI2SWF and FONT2SWF converters. For example, listing E (Appendix H) shows the conversion of a Portable Document Format (PDF) to a Shockwave File (SWF) by invoking the PDF2SWF module and hence, combining the SWF file output with the document viewer (rfxview.swf). Apart from that, free

source document converter applications such as JODConverter (http://www.artofsolving.com) that offer a wide range of conversion services is also integrated in this prototype to compensate for other document conversion formats that are not included in the SWFTools.

Once the document files had been converted, the output SWF file is linked to the viewport of document viewer (rfxview.swf) in which the coding is shown in listing E (Apendix E). The output of the SWF file that integrates with the rfxview viewer (http://www.swftools.org/flash/paper5.html) is displayed on whiteboard. This rfxview viewer is a Flash document viewer that is integrated with the annotation and navigation button. It enables the converted file to be loaded on the viewport area. The source code of the implementation of RSO with Shared-whiteboard is shown in Listing F (Appendix H). Table 5.11 summarizes the communication components with the additional features and functions.

Table 5.11: Communications Components with Additional Features and Function

Existing Communications Components	Features added/ Customising	Functions
Text Chat & Attendance list	Raise Hand, User Status, Clear Chat History	Facilitator is given the privileges to pass the role, clear the chat history whereas a student needs to click the "raise hand" button to ask or answer question.
RFXviewer	Annotation tools, dragging and printing area button, online PDF, movie and image converter.	Allows participants to share document, convert the document file, annotate, draw and print the drawing area.
SWFPresentation Slide Show	Integrated use with whiteboard	Enables PowerPoint slides to be conveyed, edited, and drawn.
Dynamic Video Playlist	Instant Text Chat and Leave Comment	Allows users to playback and discuss on the recorded session
Camtasia Shared-screen and Recording	Integrated used with Flash video player	Allows facilitator and students to share screen and record the session

5.6 Conclusion

The proposed OICon model is formulated based on the extraction of communication components from the existing consultation system, web conferencing and dynamic video playlist. As a result, 17 multimedia components are proposed. Each component has its own pedagogical values that are appropriate for consultation purposes. Customization on the multimedia communications is made by adding several codings in order to facilitate the online consultation session processes.

This OICon model consists of five interrelated domains: personalization, processes and tasks involve features and communication components, consultation document management, content and interactivity. The technologies involved in this OICon model include Flash Media Server, Apache HTTP server, Camtasia Studio and SWFConverter. The functionality and multimedia components offered in the Flash Media Server 3.5 are fully implemented and customized to suit users' needs as well as to promote interactivity among participants using real-time communication technologies and RTMP protocol.

Throughout this chapter, the client-server architecture and the technologies implemented are illustrated and discussed. Development of small modules, multimedia database and repository and their functionalities have been described in detail.

CHAPTER SIX

ANALYSIS AND DISCUSSION OF THE USERS' PERCEPTION AND ACCEPTANCE TOWARDS ONLINE INSTRUCTIONAL CONSULTATION MODEL

This chapter discusses the evaluation analysis, results, and findings of the study by conducting description and regression analysis. Technology Acceptance model (TAM) was utilized to investigate student's and lecturer's acceptance towards OICon prototype. Eleven null hypotheses that are derived are tested and the results are interpreted.

6.1 Aims and Methodology

The aim of this study is to find out how students and lecturers perceived the implementation of multimedia communication components in OICon. TAM model has been employed to examine the communication components with student's Perceived Usefulness (PE), Perceived Ease of Use (PEOU), Attitude, Behavioral Intention (BI) and three external variables which are Self-efficacy (SE), Low level Anxiety, importance of multimedia communication components of the OICon prototype. TAM model is chosen to be applied in this research study due to its suitability in predicting general individual acceptance and influences towards technology for HEI purposes. Besides that, it is the most influential and commonly employed theory in information systems (Lee et al. 2003). A sample of eight lecturers, tutors and 40 students, including postgraduate and undergraduate students who enrolled in the Information Technology (IT) and Multimedia programs are drawn from the UUM College of Arts and Science (CAS). These students and

lecturers were required to test the OICon prototype by performing a series of tasks as shown in Table 6.1 besides filling up the questionnaires given. Data were collected from 13 October 2010 to 25 February 2011.

6.2 The Testing Environment

Standard evaluation environments were situated in the library, multimedia lab, and research lab to ensure participants perform their evaluation tasks in a quiet environment without interruption. Windows XP was used as the operating system. Both the server-side and client-side computers are provided with built-in and plug-in webcam.

Table 6.1: Tasks Scenario Performed by Students and Lecturers

Task Scenario for Students	Task Scenario for Lecturer
Scenario for Registering as Member	**Scenario for Registering as member**
You are a student who comes to the OICon site to conduct online consultation with your lecturer. You are a newbie for this site. Therefore you have to register as member.	You are a lecturer who comes to the OICon site to conduct online consultation with your students. You are a newbie for this site. Therefore you have to register as member.
- Sign-up as a member by filling up the online member registration form - Login as OICon's member - View or update your profile	- Sign-up as a member by filling up the online member registration form - Login as OICon's member - View or update your profile
Scenario for Making Appointment Online	**Scenario for Making Online Appointment**
After registration and login as a member, you can decide to conduct an online consultation. Thus, you need to:	After registration and login as a member, you can check your mailing list whether you have received any student's appointment request mail or not. If you receive the appointment mail request, you need to respond to the mail by:
- make an appointment by filling up the appointment form. - select a lecturer that you want to seek consultation. - submit the appointment form.	creating an online conference room.

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After that, you need to check your mailing list.

Scenario for Joining Online Consultation

Check for your latest mailing list. You will find a feedback mail from your lecturer. Click to view the details. The mail contains the consultation time and date and the URL address of a particular consultation room. Click to join the consultation session. After joining the room, you need to follow the instructions below:

- Play the video instruction on how to use the communication tools or close it if you want to explore the prototype by yourselves.

- You can use video conference components and instant messaging components to communicate with your lecturer.

- State the agenda and meeting date

- Send an invitation mail to recruit other participants if you want to conduct group mentoring

Scenario for Joining Online Consultation

Use the search engine to search for consultation or view list of consultation that has pending status. Click to view more details. The consultation detail contains the consultation time, date, and the URL address of a particular consultation room. Click to join the consultation session. After joining the room, you need to follow the instructions below:

- Play the video instruction on how to use the communication tools or close it if you want to explore the prototype by yourselves.

- You can use video conference and instant messaging components to communicate with your students.

- You can either upload PDF document, image or short video. Convert it into viewable format by using online converter provided in this prototype.

- After the conversion, the document will be displayed at the whiteboard. You can use the editing tools to draw or erase on the document.

- You can use the navigation tools to annotate, zoom-in, or zoom-out the document.

- You can drag on the drawing area and print it.

- You can use shared-screen component to share your desktop activities.

- You can use add note components.

- You can leave comments by using guestbook.

- You can ask questions by using Q & A components and search for questions that match.

- You can create online polling to get other participants'

- You can either upload PDF document, image or short video. Convert it into viewable format by using online converter provided in this prototype.

- After conversion, the document will be displayed in the whiteboard. You can use the editing tools to draw and erase on document.

- You can use the navigation tools to annotate, zoom-in or zoom out the document.

- You can drag on the drawing area and print it.

- You can use shared-screen component to share your desktop activities.

- You can use add note components

- You can leave comment by using guestbook

- You can ask question by using Q & A components and search for question that match

- You can create online polling questions and ask

participants to answer them.

- You can change the presenter's role, delete troublemakers, mute or unmute student's video conference function.

- You can record consultation session and playback online.

- After that you can dismiss the consultation session by logging out.

Scenario for Managing of Consultation Document

You can search for the existing consultation that you have created. The list of consultations is displayed. Choose a particular consultation and view more detail information and consultation document. You can hide or display the recorded consultation video. Besides that, you can upload consultation document to online folders for your students to download. You can also search for your students and view their logbook or attendance list.

opinions and view the results

- After that you can logout.

Scenario for Retrieval and Playback Consultation session

Use search engine to search for recorded consultation. Re-login as member and take part in the post-session consultation with students. You can use the communication tools to either chat with them at real-time using instant messaging or leave comments in text or video form. You can search for the previous consultation that you were involved in and download the consultation file.

6.3 Structure of Questionnaire

This questionnaire comprises of two parts in which the first part is about the respondents profile while the second part concerns with the seven variables of OICon prototype as shown in Appendix F and Appendix G. These are the seven dimensions used in this study:

a) Perceived Usefulness (PU)
b) Perceived Ease of Use (PEOU)
c) Self-Efficacy (SE)
d) Low Level Anxiety
e) Behavioral Intention (BI)
f) Attitude
g) Importance of OICon Communication Components and Features

6.4 Surveys' Results and Discussion

6.4.1 Pilot Study Reliability and Validity Analysis

A reliability analysis was conducted by using Cronbach's alpha with the sample size n=30 which can be advantageous (Isaac and Michael, 1995). Table 6.2 shows respondents profile of pilot study which consists of 40 students and 8 lecturers.

Table 6.2: Respondent Profile of Pilot Study

	Frequency	Percentage
Students	40	83
Lecturer	8	17

Table 6.3 shows the results of reliability analysis of the pilot study. Several scales of TAM constructs show a good degree of reliability while the scale of reliability of constructs such as PE and SE are below 0.70. However, due to Cronbach and Shavelson (2004), Cronbach's alpha (α), with a coefficient in the range of 0.6–0.8 indicates acceptable-to-good reliability.

Table 6.3: Reliability Analysis (n=30)

TAM Construct	Cronbach's Alpha	Number of Items
Perceived Usefulness	0.685	4
Perceived Ease of Use	0.822	4
Self-Efficacy	0.651	3
Behavioral Intention	0.724	2
Attitude	0.827	4
Low Level Anxiety	0.933	4
Features of OICon prototype	0.880	19

Table 6.4 shows the factor analysis on the measure of the validity of questionnaires in which the Kaiser-Meyer-Olkin (KMO) value for all dimensions is greater than 0.5 and are acceptable (Kaiser, 1974).

Table 6.4: Factor Analysis (n=30)

TAM Construct	KMO Value	Number of Items
Perceived Usefulness	0.872	4
Perceived Ease of Use	0.786	4
Self-Efficacy	0.587	3
Behavioral Intention	0.770	2
Attitude	0.665	4
Low Level Anxiety	0.680	4
Perceived Importance Features of OICon prototype	0.863	19

6.4.2 Description of Respondents Profile for User Testing

In the prototype evaluation and data gathering phase, there are 48 respondents involving 40 undergraduate and postgraduate students from UUM College of Arts and Sciences (CAS) and eight lecturers. 63.8% of them are female while 36.2 % are male. The respondents profile is tabulated in Table 6.5 in terms of frequency and percentage.

Table 6.5: Respondents Profile of User Testing

Student		
	Frequency	Percentage (%)
Age		
20-25	28	58.33
26-30	10	20.83
31-35	2	4.17
36-40	0	0
41-45	0	0
Programs:		
Bachelor of IT	10	20.83
Bachelor of Multimedia	15	31.25
Postgraduate (Coursework)	5	10.42
Postgraduate (Research)	10	20.83
Lecturer		
Age		
20-30	2	4.17
31-40	4	8.33
41-50	2	4.17
51-60	0	0

A descriptive finding is described in this section in terms of frequency and standard deviation in which the score is divided into two sections; student's and lecturer's score. The participants in this study consists of 28 students with the average age ranging from 20-25 years old who are mostly undergraduates, and 15 postgraduate students who either take Phd or master programmes. Fifteen of them are Multimedia students, ten are Information Technology candidates; another five are doing their masters degree by Coursework, while the rests are masters and PhD students. As depicted in Table 6.5, two out of the eight lecturers are in the age between 20-30 years old. Four of them aged between 31-40 while two of them are between 41-50.

6.4.3 Descriptive Findings

6.4.3.1 Descriptive Statistics for Perceived Usefulness

Table 6.6 presents the descriptive analysis regarding the Perceived Usefulness by using the scale of 1 (Strongly Disagree) to 5 (Strongly Agree). These scores are presented in terms of the mean and standard deviation.

Table 6.6: Descriptive Statistics for Perceived Usefulness

No	Items	Users	
		Mean	St.Dev
PU1	I find OICon prototype useful in consultation.	4.23	0.690
PU2	Using OICon prototype enables me to complete task more quickly	3.92	0.670
PU3	Using OICon prototype increases my productivity.	3.77	0.630
PU4	If I use OICon prototype, I will increase my chances of getting a better consultation.	4.79	0.750

Note: Scale from 1- Strongly Disagree to 5-Strongly Agree

On overall, the findings of this research reveal that users are generally positive about the potential usefulness of OICon prototype. Respondents are strongly satisfied that OICon prototype increases their chances of getting a better consultation with a mean near the scale of strongly agree (mean-4.79). Besides that, respondents are satisfied that OICon prototype is useful (mean-4.23), enables them to perform task quickly (mean-3.92) as well as increases productivity (mean-3.77).

6.4.3.2 Descriptive Statistics for Perceived Ease of Use

No	Items	Users	
		Mean	St.Dev
PEOU1	My interaction with OICon is clear and understandable.	3.85	0.618
PEOU2	It is easy for me to become skillful at using OICon prototype.	4.42	0.577
PEOU3	I find OICon prototype easy to use.	3.94	0.697
PEOU4	Learning to operate OICon prototype is easy for me.	4.04	0.771

Note: Scale from 1- Strongly Disagree to 5-Strongly Agree

Table 6.7 provides the descriptive analysis of users' perception regarding the Perceived Ease of Use. Generally, students tend to agree with all the items under the Perceived Ease of Use construct which include their interaction with the OICon prototype that is clear and understandable (mean-3.85), easy to become skillful (mean-4.42), easy to use (mean-3.94) and learn to operate the prototype (mean-4.04).

6.4.3.3 Descriptive Statistics for Attitude

Table 6.8: Descriptive Statistics for Attitude

No	Items	Students	
		Mean	St.Dev
A1	Using OICon prototype is a good idea	4.02	0.699
A2	Working with OICon prototype is fun	3.90	0.805
A3	I like working with OICon prototype	4.21	0.617

Note: Scale from 1- Strongly Disagree to 5-Strongly Agree

Table 6.8 depicts users' perceptions on the Attitude construct. Respondents indicate positive reaction towards using the OICon prototype. The highest is scored by the lecturers who chose the third item; I like working with OICon prototype (mean= 4.21). They tend to agree that using OICon prototype is a good idea (mean-4.02) and fun (mean-3.90).

6.4.3.4 Descriptive Statistics for Self-Efficacy (SE)

Table 6.9: Descriptive Statistics for Self-Efficacy

No	Items	Mean	SD
SE1	I could complete most of the tasks using the OICon prototype if there was no one around to tell me what to do.	3.96	0.742
SE2	I could complete most of the tasks using OICon prototype if I could call someone for help if I got stuck.	3.90	0.805
SE3	I could complete most of the tasks using OICon prototype by just using the built-in help facility for assistance.	3.98	0.699

Table 6.9 shows the results of responses regarding the third construct, i.e. self-efficacy. Based on the evaluation results in terms of mean value, it can be concluded that lecturers felt that they can complete most of their tasks without any assistance (mean=3.96). Similarly, they felt that they can complete most of their tasks if they can get someone to help when they encountered with problem (mean=3.90) or by just using the built-in help facility for assistance (mean=3.98).

6.4.3.5 Descriptive Statistics for Low Level Anxiety

Table 6.10: Descriptive Statistics for Low Level Anxiety

No	Items	Students	
		Mean	St.Dev
A1	I feel apprehensive about using OICon prototype.	2.56	0.770
A2	It scares me to think that I could lose a lot of information using OICon prototype by clicking the wrong button.	2.42	0.895
A3	I hesitate to use the OICon prototype for fear of making mistakes I cannot correct.	2.21	0.944
A4	OICon prototype is somewhat intimidating to me.	2.10	0.831

Note: Scale from 1- Strongly Disagree to 5-Strongly Agree

Table 6.10 presents the users' responses in terms of the perceived degree of an individual's apprehension, or even fear, when using computers. Overall, respondents do not have high level of anxiety when using the OICon prototype. They tend to disagree that OIcon prototype is intimidating to them (mean-2.10), fear of making mistakes that they cannot correct (mean-2.21), scares them to think that they could lose a lot of information using OICon prototype by clicking the wrong button (mean-2.42), and make them feel apprehensive about using OICon prototype (mean-2.56). This may due to the fact that people nowadays are highly exposed to and familiar with the utilization of information communication technology.

6.4.3.6 Descriptive Statistics for Behavioural Intention (BI)

Table 6.11 presents the users' responses in terms of perceived Behavioural Intention. The results show that both students and lecturers have high level of anxiety on the use the OICon prototype in terms of Behavioural Intention. In addition, the lecturers show a high mean value (mean=4.21) of perceived planning to use OICon in the future. They agreed that they intend to use OICon prototype this semester (mean-3.92) and will return to OICon often (mean-3.94).

Table 6.11: Descriptive Statistics for Behavioral Intention (BI)

No	Items	Users	
		Mean	St.Dev
BI1	I intend to use OICon prototype during this semester.	3.92	0.710
BI2	I will return to OICon often.	3.94	0.600
BI3	I plan to use OICon prototype in the future.	4.21	0.650

Note: Scale from 1- Strongly Disagree to 5-Strongly Agree

6.4.3.7 Descriptive Statistics for Features and Components

Table 6.12: Descriptive Statistics for Features and Components

No	Items	Users	
		Mean	St.Dev
C1	Audio-Video Conference	4.02	0.700
C2	Dynamic Video Player	4.29	0.651
C3	List of Participants	4.31	0.624
C4	Document Conversion and Sharing	3.75	0.758
C5	Instant Messaging	4.31	0.689
C6	Time Schedule & Announcement Board	4.29	0.651
C7	Shared-whiteboard	4.00	0.744
C8	Consultation Contact Management and Feedback	4.13	0.641
C9	Consultation Document Management	4.38	0.744
C10	Student's Logbook Management	4.02	0.699
C11	E-mail	4.19	0.704
C12	Electronic Notepad	4.21	0.683
C13	Q&A with FAQ feature	4.10	0.722
C14	Multimedia Database	4.25	0.699
C15	Shared-screen Function	4.27	0.736
C16	Consultation Session Recording, Retrieving and Playback Online Function	4.48	0.583
C17	Search Engine	3.30	0.989
C18	Leave Comment	4.15	0.618
C19	Survey/Polling	4.35	0.565

Note: Scale from 1- Strongly Disagree to 5-Strongly Agree

Table 6.12 presents the importance of the features and components of the OICon prototype based on the respondents' perceptions. The results indicate that they agreed that the features and components of the OICon prototype are important for an online consultation in which all the items mean score are above 4 except document conversion and sharing (mean-3.75) as well as search engine (mean-3.30). The lowest mean value for search engine component scored by the respondents indicates that they appeared to be somewhat neutral towards the search engine component. From the observation, respondents tend to navigate through directory to seek and retrieve consultation document without conducting search engine queries. They tend to navigate through the consultation document page that consists of date entries arranged in reverse chronological and time-stamp order in which the most recent consultation content and document post first.

Surprisingly, the new features suggested by experts provide the highest score for feature "Consultation Session Recording, Retrieving and Playback Online Function". This indicates that respondents perceive verbatim recording of verbal and non-verbal interactions among online participants are important for future retrieving and playback. Besides that, they agree that e-mail is important for consultation (mean-4.19). A high mean value (Mean=4.39) for polling indicates that the students perceived this component as important in helping them in decision-making by giving access to other participants' opinions.

In general, the high mean value for consultation contact management (Mean=4.13) and consultation document management (Mean=4.38) indicate that the lecturers strongly felt that these management components are crucial. This may be due to the fact that they usually need a systematic way in storing, organizing and retrieving consultation information for future review and references. Apart from that, respondents perceived that real time communication components such as video conference (Mean=4.02), instant messaging (Mean=4.31) and shared-whiteboard function (Mean=4.00) are important as compared to the other features. They also rely on the audio-video conference component to control presenters in talking-turn to regulate flow of conversation. The real time communication tools provide instant feedback and create a sense of social presence when communicating online. Besides, high mean values for electronic notepad (Mean=4.21) and question and answer (Q&A) components (Mean=4.10) indicate that the lecturers perceived these two components as important because they might need the electronic notepad to write down notes and share with their students. By using the Q&A component, they can indirectly simplify their works especially in dealing with similar questions asked by students. In fact, other students can also help the lecturers to answer such questions.

6.4.4 Regression Analysis

Regression analysis is used to access the association between two variables. It is used to examine how the variation in dependent variables depends on one or more predictors (independent variables or external variables). The variable that possesses the largest variation value of standardise coefficient beta (β) would be the largest effect on the dependent variable (Zikmund, 2000). Significance level (p-value) of 0.05 or lower is considered as significant (Attua, 1996) . In this study, eleven hypotheses are derived as stated earlier in the literature review. Table 6.13 shows the regression analysis between perceived independent variables and external variables with respect to the behavioural intention to use the prototype.

Table 6.13: Regression Analysis between Attitudes and PU towards Behavioural Intention to Use Prototype

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.259	.532		2.367	.022
	PU	.237	.102	.271	2.313	.025
	Attitude	.532	.118	.526	4.492	.000

Dependent Variable: BI

According to Zikmund (2000), the variable that possesses the largest variation value of standardized beta coefficient would be the largest variation of effect on the dependent variable. Independent variables, both attitude and PU are significant with the p value lower than 0.05. The variable Attitude has the largest effect with strong positive beta coefficient of value 0.526 (p=0.000) as compared with variable PU which shows the beta coefficient value 0.271 (p=0.025). The $H_0 10$ and $H_0 11$ hypotheses are supported. Table 6.14 shows the regression Analysis between

Attitudes, Low Level Anxiety, PEOU and perceived importance of Communication components and features.

Table 6.14: Regression Analysis between Self-efficacy, PEOU, Low Level Anxiety and Perceived Importance of Communication Components and Features towards PU

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.655	1.418		1.872	.068
	Self Efficacy	-.171	.160	-.147	-1.071	.290
	PEOU	.461	.195	.363	2.363	.023
	Low Level Anxiety	-.184	.169	-.149	-1.087	.283
	Features	.157	.323	.074	.486	.630

Dependent Variable: PU

Surprisingly, the study did not show any statistically significant relationships between external variables with respect to user perceived usefulness except the independent variable Perceived Ease of Use which shows positive value ($\beta = 0.363$, p=0.023). Thus, H_07 significantly explained that the variance is supported by the result whereas the other external variables (H_01, H_03 and H_05) are rejected.

Table 6.15: Regression Analysis between Self-Efficacy, Low Level Anxiety and perceived importance of Communication components and features towards PEOU

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.816	1.090		.749	.458
	SelfEfficacy	.082	.123	.089	.664	.510
	Low Level Anxiety	-.032	.131	-.033	-.245	.808
	Features	.736	.223	.443	3.295	.002

Dependent Variable: PEOU

Table 6.15 shows the Regression Analysis between Attitudes, Low Level Anxiety and perceived importance of Communication components and features towards Perceived Ease of Use. Of these three variables, the only one that shows positive effect at significance 0.002 levels (β = 0.443) is importance of components and features. Thus, $H_0 2$ and $H_0 4$ are rejected while $H_0 6$ is accepted.

Table 6.16: Regression Analysis between Perceived Usefulness, Perceived Ease of Use towards Attitude

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.583	.692		5.176	.000
	PU	.314	.131	.363	2.391	.021
	PEOU	-.242	.167	-.220	-1.451	.154

Dependent Variable: Attitude

Table 6.16 presents the Regression Analysis between Attitudes, Low Level Anxiety and perceived importance of Communication components and features on Attitude. Independent variable PU has positive influence on Attitude (β = 0.363, p=0.021). The positive influence of PU and on Attitude as suggested by original TAM is confirmed from this study. However, PEOU as one of the determinants on attitude to use prototype is rejected. Thus, $H_0 8$ is supported while $H_0 9$ is rejected. On overall, Figure 6.1 shows the hypotheses testing results in which $H_0 6$, $H_0 7$, $H_0 8$, $H_0 10$ and $H_0 11$ are accepted with $H_0 1$, $H_0 2$, $H_0 3$, $H_0 4$ $H_0 5$ and $H_0 9$ rejected.
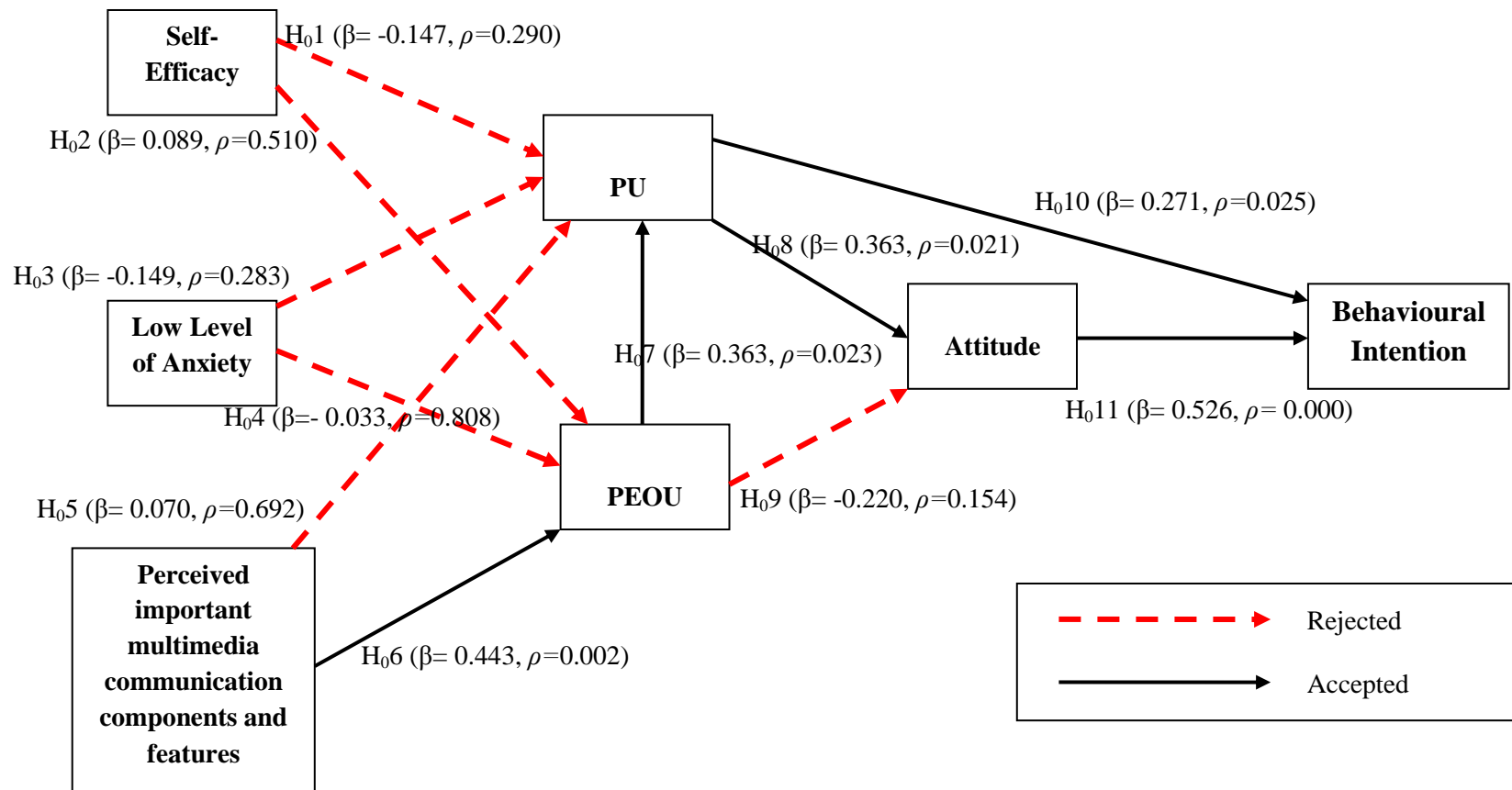
Figure 6.1: Hypothesis Testing Results

6.5 Discussion and Conclusion

Overall, the descriptive findings show that students and lecturers are satisfied with the OICon prototype. Respondents agree that they will use the OICon prototype in the future in terms of PU and Attitude. The result regression analysis shows that users' acceptance towards the OICon prototype in terms of Behavioural Intention is positively influenced by the Perceived Usefulness and Attitude. The difference is respondents' favorable and behavioural intention to use OICon is more influenced by their attitude than its perceived usefulness. Attitude seems to be the solely strong significant predictor of intention of use (β>0.5). PU shows moderate positive effectiveness with intention to use (β-0.271) that is inconsistent with prior research that PU has strong positive effect on BI (Davis et al., 1989; Hu et al., 1999; Venkatesh, 1999). However, it is consistent to what Davis (1989) underlines that attitude towards using is partial mediator of the effect of perceived usefulness on intention to use. PEOU influences intention to use only indirectly through PU. The result supports Davis' (1989) point that PEOU could be a determinant for PU. However, contrary to what TAM hypothesizes, attitude is found to have no effect on intention to use. It does not support Davis' contention that PEOU could be a direct parallel determinant for Attitude. Besides that, as hypothesized in TAM model, PEOU has a positive relationship with PU but with moderate effect (β=0.363). At most, external variable which is perceive importance of multimedia communication components and features play an important role in the formation of PEOU of OIcon prototype indirectly impact intention of use through PEOU. Unfortunately, Self-efficacy and Low Level of Anxiety do not show any regression with PU and PEOU.

Both variables are not determinants for Perceived Ease of Use and Perceived Usefulness in using OICon.

Implications to this finding suggest that for future research, Low Level Anxiety and self-efficacy can be excluded as the determinants for PU and PEOU but can be hypothesized as determinants for other independent variables in OICon model. Users agree and show their positive attitude that they will use OICon in the future if they find that OICon is useful. Users perceive the communication components are important if the components are easy to use.

CHAPTER SEVEN

CONCLUSION

7.1 Summary of Research Findings

This study has proposed a model for an online consultation for HEIs known as the OICon model. For maximum effectiveness, the designation of the OICon model is also based on the preliminary study on the following: (a) Students' requirement for mentor-mentee prototype in HEIs; (b) The functionality and features to be included, and (c) Online consultation principles and guideline.

This model enables effective consultation document and contacts management that differ from other e-consultation models such as enabling individuals or group to distribute consultation information and results and recruiting other students to the post-session discussion within the browser-based consultation environment. This model consists of five interrelated domains which are personalization, consultation processes, and task involved, features and multimedia components, consultation content and consultation document. Based on the literature review and interview with the IT and education experts, the first research question which is "What are the processes of instructional consultation in higher education institution?" has been answered. The consultation processes with sub-tasks have been identified as follows:

a) Pre-consultation

b) During Consultation Session

- Problem posting

- Discussion

- Decision-making

c) Post-consultation

- Management of Recorded Consultation Document

- Post-session discussion

In order to answer the second question which is "What are the multimedia components and features that are suitable to be composed in OICon model?" A preliminary study has been conducted through literature review, interviewing experts and lecturers as well as a quantitative survey among students. As a result, there are a total of 12 multimedia communication components and eight other consultation components and features implemented to match with the consultation processes and tasks. The first objective which is "Identify suitable multimedia components to be implemented in the OICon model" is achieved. All these components are compulsory for online instructional consultation. It is because when properly planned and matched with consultation processes, these blending modes of communication provide non-verbal and verbal cues that do not exist in telementoring program. Non-verbal communication is a natural, unconscious language that broadcasts humans' true feelings and intentions in any given moment. Besides that, to answer the third question which is "What is the appropriate model to be adapted in the online instructional consultation at the higher education institution?"

Two existing e-consultation models which are financial service consultation and virtual consultation for medical curriculum are reviewed. However, none of these models are suitable to be adapted except the multimedia communication components that are found to have pedagogical value. Besides that, the major e-consultation components for public policy e-consultation are also reviewed and suitable communication components are extracted. Each component and feature has its own pedagogical value, which enhances the characteristics of the multimedia and consultation components and features that are suitable for online instructional consultation. They are as follows:

a)   Communication tools:
- Question and answer (Q&A)
- E-mail
- Leave comment
- Live chat events or instant messaging
- Online polling
- Electronic notepad
- Shared-window function
- Video conference
- List of participants
- Shared-whiteboard

b) Consultation contact management and feedback
c) Multimedia database

Besides that, the eight new features and components that are recommended by experts and lecturers are:

a) Frequently asked question (FAQ)
b) Document conversion and sharing function
c) Logbook management
d) Time scheduling and announcement board
e) Consultation session recording, retrieval and playback function
f) Consultation document management
g) Dynamic video player
h) Search Engine

Several principles and guideline as proposed by Steven's principles and guideline (2002) are adapted as the following:

a) Academic Support Required
b) State Purpose & Share Context
c) Build audience and Inform Other Students
d) Choose Model and Elements
e) Create Structure from Beginning to an End
f) Online Help and Instruction
g) Dissemination of Content and Result and Post-session Discussion

These principles and guidelines are then implemented in online instructional consultation processes as shown in Figure 2.3. In addition, a preliminary study has been conducted to determine user requirements by collecting quantitative data through questionnaires. From the initial study, several user requirements on the functionality of OICon are as below:

a) Allow students make appointments online

b) Deliver information in real-time

c) Leave message online

d) Deliver information clearly in audio-visual form

e) Store and retrieve consultation document and agenda record

f) Playback video online in video player

g) Get consultation announcement online

In order to enhance a sense of community and promote interactivity among the students and lecturers, the communication components with functional and features are added as shown in Table 7.1.

Table 7.1: Communication Components with Additional Features and Functions Added

Existing Communications Components	Features added/ Customising
Text Chat and Attendee list	Raise Hand, User Status, Clear Chat History
RFXviewer	Annotation tools, dragging and printing area button, online PDF, movie and image converter.
SWFPresentation Slide Show	Integrated use with whiteboard
Dynamic Video Playlist	Instant Text Chat and Leave Comment
Camtasia Shared-screen and Recording	Integrated used with Flash video player

Implementation of CMC tools for enhancing online instructional consultation is conceptualized as an effective way by taking into consideration both students' and lecturers' requirements. The OICon model provides alternative means of the contents and services delivery as well as providing a range of options to the participants.

Having this kind of model, students, lecturers, and subject matter experts can participate in the online consultation at any place. The focus of this study is on the implementation of CMC tools to facilitate online consultation processes for academic advisory purposes. Holistic approach is used in developing the model by incorporating multimedia components that support consultation activities starting from scheduling until terminating a consultation session as well as managing the online recorded document and consultation contacts.

Reduced TAM model is applied as evaluation model in which the actual system uses variable that is excluded. Three other variables which are low level of anxiety, attitude and importance of communication components and features are added. In summary, eleven hypotheses are proposed as shown in section 2.13.1. This helps to answer the last question which is "What are the criteria of testing to be used for the user technology acceptance of the online instructional consultation?"

The OICon model is then transformed into a prototype that is evaluated by 40 students and 8 lecturers and tutors. They are required to fill up the questionnaire that is adapted from the TAM model after performing a series of tasks. The findings suggest that when users are using OICon prototype, the perceived usefulness is an important perception that enhances users' satisfaction when using OICon, which in turn makes the users continue using OICon in the future. Moreover, users' attitude is another important factor that prompts a user to use the OICon in the future. Users who accept OICon prototype possess good voluntariness in which they are willing to use OICon if they find that OICon is easy to use. Besides that, users' perceived importance of communication components and features influence the perceived ease

of use of OICon prototype. From descriptive analysis, both students and lecturers agree that OICon prototype is useful, enables them to perform task quickly and increases the chances for getting better consultation. This also indicates that users find that communication components which include non-verbal, verbal cues, auditory and visual cues enable them to communicate and deliver their message proficiently. This indirectly helps to solve the first and second problems, which are miscommunication due to lack of non-verbal cues and the need or competency in written and technical skills. From the descriptive analysis on user perceived importance of communication components and features, it shows that users highly perceive all communication components of OICOn as important except the search engine. At the end of the evaluation, the last objective which is "Test the acceptance of online consultation prototype by students and lecturers" is achieved.

7.2 Research Limitations

This study builds on qualitative data gathered through literature review and interviews with the experts. Much of the previous literatures on consultation for HEIs qualitatively analyses the experiences of students and lecturers regarding the mentor-mentee prototype. However, in this study, literatures of consultation processes as well as useful principles and guidelines on developing e-consultation prototype are studied. The value of this research study does not rely solely on the quantitative data collected, but also on the proposed model.

However, there are still some limitations with respect to the generality of the findings. The evaluation merely involved a specific group of people and only some

of the possible conceptualizations of variables. Thus, it may be uncertain whether the findings will generalize to other people or other conceptualizations of the variables. Although measures are taken to ensure that the sample size reflects the population, there are some limitations in this research. First, the sample size does not represent the whole population for HEIs in Malaysia as it only takes into consideration undergraduate and postgraduate students who are taking IT and multimedia programmes, which is not the case for a good part of the sample. Second, the small sample size of 48 respondents may have profound effect on the study. Researchers tend to use large sample size because these samples provide an ability to better detect significant differences between values.

Besides the sample size, another limitation of this study is that it ignores the issues on privacy and confidentiality issues, which are also considered as challenging matters related to telementoring program (McLoughlin, Brady, Lee, & Russell, 2007; Ensher et al, 2003). The two issues are not included in this study because they are more related with ethical issue. Apart from that, the researcher does not study deeply on the information and video retrieval method in which only a simple search engine function is implemented. This search engine only allows users to search for information and video based on date and consultation title as well as the consultant name.

As regarding the prototype efficiency, this study focuses on evaluation of technology acceptance among respondents. However, TAM model does not analyze the qualities of interaction of prototype interface with the same precision as usability testing. Although rapid prototyping method is conducted during the action taking phase, it

merely tests on interaction and functional design with a relatively small number of users (4-8 users). Some other usability testing is needed for future study.

7.3 Recommendations for Further Study

Increasing concerned on the online instructional consultation would help to generate motivation for researchers to study on the user requirements as well as bringing in a fresh perspective to existing issues. In view of the previous section of research limitations, improvement is needed for future study. Here are some recommendations:

a) Increase sample size by following the rule of thumb. The rule of thumb suggests that sample size for regression analysis should exceed the number of predictors at least 50 (Harris, 1985). Larger samples will more accurately represent the characteristics of the populations from which they are derived (Cronbach, Gleser, Nanda, & Rajaratnam, 1972; Marcoulides, 1993).

b) Widening the scope of the sample by recruiting students and lecturers from other universities if the research area is focused on HEIs in Malaysia. By this way, more accurate result could be yielded instead of narrowing the scope of the sample that may lead to bias result.

c) Conduct usability testing on the prototype such as evaluate on the prototype interface layout, navigation, performance as well as accuracy.

In particular, the new data collected instruments and result findings can be a building block for future research. The analysis of quantitative data collected during the preliminary study is useful for showing how communication components can enhance online consultation's research and evaluation. Apart from that, in future research regarding online consultation for HEIs, the researcher needs to determine design functionality such as the following:

a) Advance Search Engine: The capability of the e-consultation prototype to search across multiple content sources, to enable users to search for information using natural language, keyword, tag category, and Boolean.

b) Categorization: The capability of the e-consultation prototype in providing users with navigation directory by indexing data source through search queries. This will enable users to navigate through category tree to seek for interesting information.

As mentioned earlier, the researcher does not explore on issues regarding e-consultation technology malfunction as well as issues of privacy and confidentiality. Thus, it is recommended that for future work and refinement, it would be a great advantage if the potential researchers can focus on overcoming these problems. In summary, future research in this context is essential if we are to understand the communication and collaboration environment more efficiently and thus learning how to improve the participant's quality of online consultation is required.

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Appendix A

Permission Letter

Tuan/Puan

Jabatan Hal Ehwal Akademik

Universiti Utara Malaysia

06010 Sintok,

Kedah Darul Aman.

04 Oktober 2010

 Tuan/Puan,

PERTANYAAN MAKLUMAT TENTANG JUMLAH BILANGAN PELAJAR KOLEJ SASTERA DAN SAINS (CAS) DI UNIVERSITI UTARA MALAYSIA (UUM) PADA TAHUN 2010

Untuk makluman Tuan/Puan, saya Ang Ling Weay (No.Matriks: 802328) pelajar sarjana yang membuat penyelidikan sepenuh masa dari Kolej Sastera dan Sains ingin mendapatkan maklumat tentang jumlah bilangan populasi pelajar bagi Universiti Utara Malaysia (UUM). Hal ini bertujuan untuk mengumpul sampel data bagi pelajar untuk membantu saya dalam membuat penyelidikan. Berikut adalah maklumat yang saya perlukan:

● Jumlah bilangan pelajar dari Kolej Sastera dan Sains (CAS) termasuk pelajar sarjana muda, sarjana, PHD dan pelajar pendidikan jarak jauh mengikuti program yang diambil.

Kerjasama tuan/puan amat dihargai dan saya dahului dengan ucapan terima kasih.

Sekian. Terima kasih.

(ANG LING WEAY)

Pelajar Sarjana Penyelidikan Sepenuh Masa

Kolej Sastera dan Sains,

Universiti Utara Malaysia

Appendix B

Questionnaires: Preliminary Study on Students' Perception and Perspective towards Conducting Consultation Online

College of Arts and Science
Universiti Utara Malaysia

PRELIMINARY STUDY QUESTIONNAIRE

Dear Mr./Mrs./Miss,

This research is being conducted as fulfillment of UUM's Master of Science (Information Technology). The aim of the study is to obtain information on the multimedia requirement for online consultation model in HEIs.

Your honesty and sincerity are highly required in attempting this questionnaire in order for the research to be able to get a complete understanding about the users' perception on the instructional consultation in HEIs and use of multimedia communication technology as essential support in instructional consultation. You information given is confidential and will not be disclosed for third party and for will be used for academic purpose only

Your time and cooperation are highly appreciated. Thank you.
Your truly,

ANG LING WEAY
Master of Science (Information Technology)
College of Arts and Science
Universiti Utara Malaysia

A. Demographic Background

Please tick (√) your answer for given statements.

1) Name: _____

2) Age (Years)
— Under 20
— 20-30
— 31-40
— 41-50
— 51-60

3) Gender: ___ Male   ___ Female

4) What is your college?
— College of Business (COB)
— College of Arts and Science (CAS)
— College of Law, Government and International Studies (COLGIS)

5) Program taken in UUM
__ Degree (Bachelor)   __ Doctor of Philosophy (PHD)
— Master (M.sc)   __ Distance Learning Program

6) Which semester you are in UUM?

__ Semester 1	__ Semester 2
__ Semester 3	__ Semester 4
__ Semester 5	__ Semester 6
__ Semester 7	__ Semester 8
__ Semester 9	__ Semester 10

7) Race
— Malay   __ Chinese
— Indian   __ Arab
— Other. (Please Specify) _____

8) Are you currently
— Married   __ Single
— Separated or Divorced   __ Widowed
— Living with partners
— Not disclosed

9) Are you having working position currently?
— Yes (Part-time)   __ Yes (Full-time)
— No, jobless.

B. General Computer Competencies
Please answer the questions about your computing experience:

10) How would you classify your degree of familiarity with computer system? (Please check one)
__ Beginner   __ Some experience but need help
__ Relatively experience   __ Very Experience

11)   Which web browser have you use?
  — Internet Explorer   __ Mozilla FireFox
  — Opera   __ Netscape Navigator
  — Other (Please specify)_____

12)   Which platform you use now?
  — Window XP   __ Macintosh
  — Window Vista   __ Linux
  — Other (Please specify) _____

13)   What size and resolution of your monitor?
  — 640 X 480 pixels   __ 1024 X 768 pixels
  — 760 X 450 pixels   __ Other (Please specify) _____
  — I don't know

14)   What do you typically use your computer for?
  __ Games and pleasure   __ Word Processing
  __ Graphics   __ Decisions Support
  __ Accounting/Finance   __ Programming
  __ Database   __ Other (Please specify)_____

15)   What (relevant) online activities do you participates in?
  __ Forum   __ chatting
  __ web conferencing   __ e-mail
  __ online assessment   __ Others (Please specify)_____

16)   Do you prefer to learn new technology that can assist you in teaching and learning purpose?
  — Yes   __ No
  If **No**, please go to question **17**
  If **Yes**, how you prefer to learn about the new technology?
  — Learn via user manual or book assuming you are given focused time to read the documentation and use the tool.
  — Learn one-on-one with an expert.
  — Learn on your own working environment with small group of people getting instruction.
  — Other. (Please specify) _____

17)   Year Online
  __ First year online   __ 1-2 years   __ 3-4 years   __ Over 5 years

18)   Have you ever been take part in desktop/web conference session?
  __ Yes   __ No
  If **No**, please answer question 20.

19)   If **Yes**, what kind of desktop/web conference session had you been participating before?
  — Discussion with group member
  — For entertainment (For example: Yahoo Messenger)
  — For training purpose
  — For lecturer consultation
  — Other (Please specify) _____

20)   Have you ever try to use the virtual meeting application that currently applied in UUM website? (if **No**, please proceed to question **21**)
  ___ Yes   ___ No
  If **Yes**, how do you feel about the virtual meeting application?

235

    ___ Good   ___ Sound or voice quality are bad

    ___ Session cannot be recorded more than one time

    ___ No effective management of consultation session recording document.

21) If you are interested in communicate online, what kind of online communication tools you like? Please tick that available

    __ Video conferencing   __ Audio conferencing

    __ Instant Messaging   __ Asynchronous E-mail

    __ Forum Discussion

22) Which e-mail program do you use? Please tick that available

    — Microsoft Outlook Express

    — Eudora

    — Express

    — World Wide Web e-mail such as yahoo mail, Gmail or hotmail.

    — None above

    — Other (Please Specify) _____

_____

C: Online Communication Experience

Listed below are questions about your online communication experience: For each question, please tick (√) the box which comes closet to how often the communication tools you use, how satisfied you are the communication tools you use. Remember to tick the box for each question.

23) How often you use the communication tools as listed below?

Very Often	Often	Sometimes	Rarely	Never
1	2	3	4	5

Instant Messaging/ Online textual chatting	☐1	☐2	☐3	☐4	☐5
Video conferencing	☐1	☐2	☐3	☐4	☐5
Audio conferencing	☐1	☐2	☐3	☐4	☐5
Forum Discussion	☐1	☐2	☐3	☐4	☐5
E-mail	☐1	☐2	☐3	☐4	☐5

Listed below are items that describe functionality of online communication tools. Please indicate the importance given to each item.

Not Important	Somewhat Important	Quite Important	Very Important	Extremely Important
1	2	3	4	5

24) Ability to deliver the information clearly in visual and audio form	☐1	☐2	☐3	☐4	☐5
25) Ability to deliver the information in real-time (live). Participants can communicate on the same time	☐1	☐2	☐3	☐4	☐5
26) Ability to store and retrieve the consultation document and consultation agenda for references	☐1	☐2	☐3	☐4	☐5
27) Ability to record the consultation session	☐1	☐2	☐3	☐4	☐5
28) Ability to customize profile online	☐1	☐2	☐3	☐4	☐5

29) Ability to make appointment online (schedule consultation time online) easily	☐1	☐2	☐3	☐4	☐5
30) Ability to upload and share document online	☐1	☐2	☐3	☐4	☐5
31) Ability to playback video online without download to hard-disk	☐1	☐2	☐3	☐4	☐5
32) Ability to view document such as powerpoint, spreadsheet and word document online without download to PC hard-disk	☐1	☐2	☐3	☐4	☐5
33) Ability to get consultation announcement online	☐1	☐2	☐3	☐4	☐5
34) Ability to take note online and upload note for sharing	☐1	☐2	☐3	☐4	☐5
35) Ability to leave message or comments online	☐1	☐2	☐3	☐4	☐5

36) Do you prefer to learn new technology that can assist you in online consulting purpose?
    — Yes   __ No
      If **No**, please go to question **38**.

37) If **Yes**, how you prefer to learn about the new technology? (Check all that apply).
    — Learn via user manual or book assuming you are given focused time to read the documentation and use the tool.
    — Learn one-on-one with an expert.
    — Learn on your own working environment with small group of people getting instruction.
    — Other. (Please specify) _____

38) Would you like us to provide the instruction on how to conduct the online consultation and use the features in form of video or textual?
    __ in video form   ___ in textual form
    __ both

C: Consultation Experience:

39) How you make appointment with your supervisor/mentor?
    __ With refer to consultation time table allocate outside supervisor room
    __ Contact through phone
    __ With refer to consultation time table uploaded online (for example: on portal)
    __ Other (Please specify) _____

40) How frequent you meet with your supervisor/mentor?
    __ More than twice time per week
    __ Twice time per week
    __ One time per week
    __ One time per month
    __ More than one time per month
    __ Other.(Please Specify) _____

41) How long the consultation time taken?
    __ < 5 minutes
    __ Around 5 to 10 minutes
    __ Around 30 minutes
    __ About 1 hour
    __ Other (Please specify) _____

42) Have you ever face the problem in consultation before?

    __ Yes   __ No

If **No**, go to question **48**

If **Yes,** please tick (√) the box which comes closet to how often the problem occurs from question **43- 47**

Very Often	Often	Sometimes	Rarely	Never
1	2	3	4	5

43) How often you meet lecturer for consultation per semester?	□1	□2	□3	□4	□5
44) How often do you have problems with the timing of the consultation? (consultation time are not fixing with your time schedule)	□1	□2	□3	□4	□5
50) How often do you have problems in conduct the consultation with lecturer when both of you are at a distance?	□1	□2	□3	□4	□5
46) How often do you have problems in record the consultation session and agenda for later follow-up and references?	□1	□2	□3	□4	□5
47) How often you meet your lecturer for emergency consultation without follow the consultation time table?	□1	□2	□3	□4	□5

Listed below are questions about your attitudes and behavioral towards face-to-face consultation:

Please scale by tick (√) on the following statements.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

48) I know my problem very well and can present my problem clearly to lecturer face-to-face	□1	□2	□3	□4	□5
49) I am involved actively by give many opinions during consultation session	□1	□2	□3	□4	□5
50) The consultation decision can be made without delay to later consultation	□1	□2	□3	□4	□5
51) It is always prompt for me to take notes while lecturer deliver the information	□1	□2	□3	□4	□5
52) I always record my consultation activities into log book	□1	□2	□3	□4	□5

53) How long the consultation time taken?

    __ < 5 minutes

    __ around 5 to 10 minutes

    __ around 30 minutes

    __ about 1 hour

    __ Other (Please specify) _____

54) Does the consultation decision always been made before the consultation session ended?

    __ Yes   __ No, sometimes may delayed to next time consultation.

_____

D: Websites Interface:

Listed below are questions about your opinion on the web interface: For each question, please tick (√) the box were suitable.

Very Unlikely	Unlikely	Neutral	Likely	Very Dislike
1	2	3	4	5

55) How like are you the below color to be applied in web design?

Blue	☐1	☐2	☐3	☐4	☐5
Red	☐1	☐2	☐3	☐4	☐5
Orange	☐1	☐2	☐3	☐4	☐5
Yellow	☐1	☐2	☐3	☐4	☐5
Green	☐1	☐2	☐3	☐4	☐5

56) How like are you the ways of navigate the website?

Pull-down menus	☐1	☐2	☐3	☐4	☐5
List of Links	☐1	☐2	☐3	☐4	☐5
Search Engine	☐1	☐2	☐3	☐4	☐5
Folder & Files	☐1	☐2	☐3	☐4	☐5
Left-panel panel	☐1	☐2	☐3	☐4	☐5
Tab	☐1	☐2	☐3	☐4	☐5

57) How like are you the styles of website design?

Basic/ Clean/ Simple	☐1	☐2	☐3	☐4	☐5
Corporate/Professional	☐1	☐2	☐3	☐4	☐5
Fun/Artistic	☐1	☐2	☐3	☐4	☐5

58) If the content in a page is too long, do you prefer the contents to be displayed in one   page by implement scrolling bar OR separate the contents in different pages?

— Use Scrolling Bar   __ Separate in different pages

59) Do you prefer welcome page (dynamic introduction flash)?

__ Yes   __ No

60) What kind of word processing you use? (Check all that apply)

— Microsoft Word   __ Open Office
— Acrobat PDF   __ Other. (Please Specify)_____

END
Many thanks for your time and assistance with completing this questionnaire

Appendix C

Questionnaires: Preliminary Study on Students' Perception and Perspective towards Conducting Consultation Online, Consultation Problem Encountered and Multimedia Communication Tools Used

Part	Source of Adoption
A: Student's Demographic	Mashal & Ehab (2008)
B: General Computer Competencies	Vivian (1999) and NongLuck (2008)
C: Online Communication Experience	Michelle (2007)
D: Face-to-face consultation experiences	Azman, Kamsiah, Rizal, & Hashim (2007), Diana, Ariff, & Yasmin (2007) and Christina (2007)
E: Web Interface	Thomas & Jacqueline (2004)

Appendix D
Experts' Profile

No	Name	Speciality & Title	University/ Department
1.	Fakhrul Anuar Aziz	Multimedia, Information Technology (Lecturer)	School of Multimedia Technology & Communication (SMMTC), UUM College of Arts & Sciences (UUM CAS), Universiti Utara Malaysia
2.	Abd Hadi Abd Razak	Multimedia, Information Technology (Lecturer)	School of Multimedia Technology & Communication (SMMTC), UUM College of Arts & Sciences (UUM CAS), Universiti Utara Malaysia
3.	Dr Michael Morgan	Director of Research, Berwick Campus	Berwick School of Information Technology, Faculty of Information Technology, Caulfield School of IT, Monash University

Appendix E

Table of Multiple Regression Sample Size

Sample size for multiple regression (quick table)

This table presents sample size in the most common situation where α=0.05 and power=0.8.
u=number of independent variables, R=multiple correlation coefficient

R	u=1	u=2	u=3	u=4	u=5	u=6	u=7	u=8	u=9	u=10
0.05	3055	3789	4305	4723	5085	5406	5699	5969	6221	6459
0.1	760	944	1072	1177	1266	1346	1420	1488	1551	1611
0.15	334	416	474	519	560	595	627	657	686	712
0.2	186	231	264	290	312	332	350	366	382	399
0.25	117	147	167	183	197	210	222	233	243	252
0.3	81	101	113	126	134	145	152	160	167	174
0.35	58	72	83	89	96	105	110	116	121	126
0.4	43	53	62	68	73	78	83	88	91	95
0.45	33	42	47	51	56	61	64	69	72	74
0.5	25	32	37	42	45	48	51	53	56	59
0.55	20	26	29	32	35	38	41	44	47	48
0.6	16	21	24	27	29	32	33	36	37	38
0.65	12	17	20	23	24	27	28	31	32	33
0.7	10	13	16	19	20	23	24	25	28	29
0.75	8	11	14	15	16	19	20	21	24	25
0.8	6	9	10	13	14	15	16	17	20	21
0.85	6	7	10	11	12	13	14	15	16	17
0.9	4	7	8	9	10	11	12	13	14	15
0.95	4	5	6	7	8	9	10	11	12	15

Appendix F

Questionnaires: Evaluation for Online Instructional Consultation (OICon) Prototype (Lecturers' Copy)

College of Arts and Science
Universiti Utara Malaysia (UUM)

Dear Mr./Mrs./Miss,

This research is being conducted as fulfillment of UUM's Master of Science (Information Technology). The purpose of this study is to determine lecturers' acceptance towards online consultation model in HEIs.

Your honesty and sincerity are highly required in attempting this questionnaire in order for the research to be able to get a complete understanding about the users' perception on the instructional consultation in HEIs and use of multimedia communication technology as essential support in instructional consultation. You information given is confidential and will not be disclosed for third party and for will be used for academic purpose only

Your time and cooperation are highly appreciated. Thank you.

Your truly,

ANG LING WEAY
Master of Science (Information Technology)
College of Arts and Science
Universiti Utara Malaysia

Note: Scale from 1-Strongly Disagree to 5- Strongly Agree

Note: Scale from 1-Least Important to 5-Very Important

Gender: Male___   Female ___   Age: 20-25___   26-30___   31-35___ 36-40___ 41-45___

Technology Acceptance (TAM) model					
	Strongly Disagree (1)	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly Agree (5)**
Perceived Usefulness (PU)					
I find OICon prototype useful in consultation.					
Using OICon prototype enables me to complete task more quickly.					
Using OICon prototype increases my productivity.					
If I use OICon prototype, I will increase my chances of getting a better consultation.					
Perceived Ease of Use (PEOU)					
Learning to operate OICon prototype is easy for me.					
I find OICon prototype easy to use.					
It is easy for me to become skillful at using OICon prototype.					
My interaction with OICon is clear and understandable.					
Attitude					
Using OICon prototype is a good idea.					
Working with OICon prototype is fun.					
I like working with OICon prototype.					

	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Self-Efficacy (SE)					
I could complete most tasks using OICon prototype if there was no one around to tell me what to do as I go.					
I could complete most tasks using OICon prototype if I could call someone for help if I got stuck.					
I could complete most tasks using OICon prototype with just the built-in help facility for assistance.					
Low Level of Anxiety					
I feel apprehensive about using OICon prototype.					
It scares me to think that I could lose a lot of information using OICon prototype by clicking the wrong button.					
I hesitate to use the prototype for fear of making mistakes I cannot correct.					
OICon prototype is somewhat intimidating to me.					
Behavioral Intention (BI)					
I intend to use OICon prototype during this semester.					
I will return to OICon often.					
I plan to use OICon prototype in the future.					

	Least Important (1)	Less Important (2)	Not Important (3)	Somewhat Important (4)	Very Important (5)
Features and components of OICon					
Audio-Video Conference					
Dynamic Video Player					
List of Participants					
Document Conversion and Sharing					
Instant Messaging					
Time Schedule & Announcement Board					
Shared-whiteboard					
Survey/ Polling					
Consultation Contact Management and Feedback					
Consultation Document Management					
Students' Logbook Management					
E-mail					
Electronic Notepad					
Question and Answer (Q&A) with Frequently Asked Question (FAQ)					
Multimedia Database					
Shared-screen Function					
Consultation Session Recording, Retrieving and Playback Online Function					
Search Engine					
Leave Comment					

Note: Scale from 1-Strongly Disagree to 5- Strongly Agree

Note: Scale from 1-Least Important to 5-Very Import

Appendix G

Questionnaires: Evaluation for Online Instructional Consultation (OICon) Prototype (Students' Copy)

College of Arts and Science
Universiti Utara Malaysia (UUM)

Dear Mr./Mrs./Miss,

This research is being conducted as fulfillment of UUM's Master of Science (Information Technology). The purpose of this study is to determine students' acceptance towards online consultation model in HEIs.

Your honesty and sincerity are highly required in attempting this questionnaire in order for the research to be able to get a complete understanding about the users' perception on the instructional consultation in HEIs and use of multimedia communication technology as essential support in instructional consultation. You information given is confidential and will not be disclosed for third party and for will be used for academic purpose only

Your time and cooperation are highly appreciated. Thank you.

Your truly,

ANG LING WEAY
Master of Science (Information Technology)
College of Arts and Science
Universiti Utara Malaysia

Note: Scale from 1-Strongly Disagree to 5- Strongly Agree

Note: Scale from 1-Least Important to 5-Very Important

Gender: Male ___   Female ___   Age: 20-25___   26-30___   31-35___ 36-40___ 41-45___

Program taken: _____ (eg: master by research (IT))

Technology Acceptance (TAM) model					
	Strongly Disagree (1)	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly Agree (5)**
Perceived Usefulness (PU)					
I find OICon prototype useful in consultation.					
Using OICon prototype enable me to complete task more quickly.					
Using OICon prototype increases my productivity.					
If I use OICon prototype, I will increase my chances of getting a better consultation.					
Perceived Ease of Use (PEOU)					
Learning to operate OICon prototype is easy for me.					
I find OICon prototype easy to use.					
It is easy for me to become skillful at using OICon prototype.					
My interaction with OICon is clear and understandable.					
Attitude (A)					
Using OICon prototype is a good idea.					
Working with OICon prototype is fun.					
I like working with OICon prototype.					

	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Self-Efficacy (SE)					
I could complete most tasks using OICon prototype if there was no one around to tell me what to do as I go.					
I could complete most tasks using OICon prototype if I could call someone for help if I got stuck.					
I could complete most tasks using OICon prototype with just the built-in help facility for assistance.					
Low Level of Anxiety					
I feel apprehensive about using OICon prototype.					
It scares me to think that I could lose a lot of information using OICon prototype by clicking the wrong button.					
I hesitate to use the prototype for fear of making mistakes I cannot correct.					
OICon prototype is somewhat intimidating to me.					
Behavioral Intention (BI)					
I intend to use OICon prototype during this semester.					
I will return to OICon often.					
I plan to use OICon prototype in the future.					

	Least Important (1)	Less Important (2)	Not Important (3)	Somewhat Important (4)	Very Important (5)
Features and components of OICon					
Audio-Video Conference					
Dynamic Video Player					
List of Participants					
Document Conversion and Sharing					
Instant Messaging					
Time Schedule & Announcement Board					
Shared-whiteboard					
Survey/ Polling					
Logbook Management					
E-mail					
Electronic Notepad					
Question and Answer (Q&A) with Frequently Asked Question (FAQ)					
Multimedia Database					
Shared-screen Function					
Consultation Session Recording, Retrieving and Playback Online Function					
Search Engine					
Leave Comment					

Appendix H

List of Codes

Listing A: The clear History Function

```
function clearHistory() {
this.chat_mc.clearHistory();
};
```

Listing B: Allow clear history function (allowclear.as)

```
// Allow clients to clear history
FCChat.prototype.allowClear = true;
```

Listing C: Start clear history and broadcast to all connected clients (clearchat.as)

```
FCChat.prototype.clearHistory = function( client ) {
//start clear history
this.history_so.setProperty( "history", null );
this.history_so.flush();
delete this.history;
this.history = new Array;

// Broadcast a clearHistory command to all clients
this.message_so.send("clearHistory");
return true;
}
this.history = new Array;
```

Listing D: Coding on connect Flash Media Server 3.5 to Camtasia Studio Video Capture Driver

```
var cam:Camera = Camera.get(getLiveCamera());
function getLiveCamera():Number {
for (var i:Number = 0; i < Camera.names.length; i++) {
if (Camera.names[i] == "Camtasia Studio Video Capture Driver") {
return i;
} else {
return null;
}
}
}

for (i = 0; i < camera.names.length; i++) {
        if (camera.names[i] == "Camtasia Studio Video Capture Driver") {
                break;
        }
}
// Get a reference to the Live Output camera object
client_cam = Camera.get(i);
// Set the camera object width, height, and frame rate.
// Set the last parameter to true to maintain the requested capture size and frame rate.
client_cam.setMode(320, 240, 5, true);
// Set the quality and/or bandwidth for video sent to the Flash Communication Server
// This example ensures a minimum quality of 80, no matter how much bandwidth it takes
client_cam.setQuality(0, 80);
// Start capturing video and displaying it in the Video object on the stage
camtasia.attachVideo(client_cam);

//client_cam = Camera.get();
// client_mic = Microphone.get();
camtasia.attachVideo(client_cam);
function initStreams() {
client_nc = new NetConnection();

        client_nc.connect("rtmp:/gravando_streams");
        client_nc.onStatus = function(info) {
        trace("Level: "+info.level+" Code: "+info.code);
         };
        out_ns = new NetStream(client_nc);
         in_ns = new NetStream(client_nc);
        Replay_video.attachVideo(in_ns);
```

```
initStreams();
function doRecord() {
if (Record_btn.label == "Record") {
out_ns.attachVideo(client_cam);
 //out_ns.attachAudio(client_mic);
 out_ns.publish("my_recorded_stream", "record");
 Play_btn.enabled = false;
Record_btn.label = "Stop";
} else if (Record_btn.label == "Stop") {
 out_ns.close();
Play_btn.enabled = true;
Record_btn.label = "Record";
}
}

function doPlay() {
in_ns.play("my_recorded_stream");
}

Play_btn = _root.createClassObject(mx.controls.Button, "Play_btn",
_root.getNextHighestDepth(), {_x:120, _y:375, label:"Play"});

var Record_btn = _root.createClassObject(mx.controls.Button, "Record_btn",
_root.getNextHighestDepth(), {_x:15, _y:375, label:"Record"});

Record_btn.onRelease = function():Void {
doRecord();
};

Play_btn.onRelease = function():Void {
doPlay();
};
```

List E: Coding of convert PDF file to SWF file and Combination of Output file with Document Viewer

```php
<?php
if ($_FILES["file"]["error"] > 0){
  echo "Return Code: " . $_FILES["file"]["error"] . "<br />";
  }
 else{
  echo "Upload: " . $_FILES["file"]["name"] . "<br />";
  echo "Type: " . $_FILES["file"]["type"] . "<br />";
  echo "Size: " . ($_FILES["file"]["size"] / 1024) . " Kb<br />";
  echo "Temp file: " . $_FILES["file"]["tmp_name"] . "<br />";
  if (file_exists("" . $_FILES["file"]["name"])){
   echo $_FILES["file"]["name"] . " already exists. ";
   }
  else{
   move_uploaded_file($_FILES["file"]["tmp_name"],
   "" . $_FILES["file"]["name"]);
   echo "Stored in: " . "" . $_FILES["file"]["name"];
   }
// convert swf1.pdf by using pdf2swf module
       system('c:/swftools/pdf2swf.exe -o tmp.swf 1.pdf');
// combine the output swf file (test.swf) with document viewer rfxview.swf
     system('c:/swftools/swfcombine.exe -o test.swf rfxview.swf viewport=tmp.swf');
      }
?>
```

Listing F: Shared Object on Whiteboard

```
stop();

//setting client_nc to connect_mc.main_nc, SC's already-connected nc
trace(client_nc = connect_mc.main_nc);
// Create a remote shared object
my_so = SharedObject.getRemote("LVC_remote", client_nc.uri);
my_so.connect(client_nc); // Connect to the shared object

// Update shared object slots
my_so.onSync = function(list) {
whiteboard_mc._visible = my_so.data.wb_visi;
whiteboard_mc._alpha = my_so.data.wb_alpha;
presentation_mc._visible = my_so.data.pres_visi;

grantPrivsBtn_mc.onPress = function (){
        if (my_so.data.privs != true){
                my_so.data.privs = true;
        }else {
                my_so.data.privs = false;
        }
}

//initialise shared object slot values
my_so.data.wb_visi = false;
my_so.data.wb_alpha = 100;
my_so.data.pres_visi = true;
my_so.data.wbModeFlag = false;
my_so.data.annotateModeFlag = false;
my_so.data.privs = false;

stop();

loadWhiteboardBtn_mc.onPress = function(){
if (my_so.data.wb_visi !=true && my_so.data.annotateModeFlag!=true){
my_so.data.wb_alpha = 3;
my_so.data.wb_visi = true; // make wb visible
my_so.data.pres_visi = false; //hide presentation
my_so.data.wbModeFlag = true; // note wb is visible
loadWhiteboardBtn_mc.setLabel("Return to Slides");
}
else if (my_so.data.wb_visi == true && my_so.data.annotateModeFlag == true){
my_so.data.wb_alpha = 3;
my_so.data.wb_visi = true; // make wb visible
```

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```
my_so.data.pres_visi = false; //hide presentation
my_so.data.wbModeFlag = true; //note wb is visible
my_so.data.annotateModeFlag = false;
loadWhiteboardBtn_mc.setLabel("Return To Slides");
annotateSlideBtn_mc.setLabel("Annotate Slide");
}
else {
my_so.data.wb_alpha = 3;
my_so.data.wb_visi = false; //hide wb
my_so.data.pres_visi = true; //make presentation visible
my_so.data.wbModeFlag = false; //note wb is hidden
my_so.data.annotateModeFlag = false;
loadWhiteboardBtn_mc.setLabel("Load Whiteboard");
}
        }
annotateSlideBtn_mc.onPress = function(){
if (my_so.data.wb_visi !=true && my_so.data.wbModeFlag != true){
/*if wb is not visible / visi == null && we aren't in wb mode
(opaque whiteboard) i.e. if we can only see normal slides */
my_so.data.wb_alpha=1; //make wb see-through to show slide
my_so.data.wb_visi=true; //now make wb visible
my_so.data.annotateModeFlag = true; //note we are annotating
annotateSlideBtn_mc.setLabel("Remove Annotation");
}
else if (my_so.data.wb_visi == true && my_so.data.wbModeFlag == true){
/*if wb IS visible && we ARE in wb mode (opaque whiteboard)
i.e. we are just using wb as a WhiteBoard */
my_so.data.wb_alpha=1; //make wb see-through to show slides
my_so.data.wb_visi=true; //now make wb visible
my_so.data.pres_visi = true; //make presentation visible
my_so.data.wbModeFlag = false;
my_so.data.annotateModeFlag = true;
loadWhiteboardBtn_mc.setLabel("Load Whiteboard");
annotateSlideBtn_mc.setLabel("Return To Slides");
}
else {
//wb is visible and we aren't in wb mode ie are in annotate mode
my_so.data.wb_visi = false;// hide whiteboard
my_so.data.wb_alpha = 3; // set wb up to be opaque
my_so.data.pres_visi = true; //make presentation visible
my_so.data.annotateModeFlag = false;
my_so.data.wbModeFlag = false;
annotateSlideBtn_mc.setLabel("Annotate Slides");
}
        }
```

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RESEARCH PUBLICATION

A. **Journal**

1. Weay, A. L. & Hadi, A. A. R. (2011). Online Instructional Consultation for Higher Education Institutions in Malaysia: The System Architecture. International Journal of New Computer Architectures and their Applications (IJNCAA), 1(4), 1067 - 1079. Indexed by INSPEC.

2. Hadi, A. A. R. & Weay, A. L. (2010). Enhancing Multimedia Communication Components in Instructional Consulting Service Online: Students' Perspective and Perception. Advances in Multimedia - An International Journal (AMIJ), 1(2), 12-23.

B. **Proceedings**

1. Hadi, A. A. R., Weay, A. L. & Fadziana, N. F. M. (2011).Online Instructional Consultation (OICon) Model for Higher Education Institution (HEIs). 3rd International on e-Learning (ICEL 2011): Proceedings of the ICEL 2011, Bandung, Indonesia, 23 - 24 November 2011.

2. Hadi, A. A. R. & Weay, A. L. (2011). Design and Development of Online Instructional Consultation for Higher Education in Malaysia. Digital Information Processing and Communications: International Conference (ICDIPC 2011): Proceedings of the ICDIPC 2011 (Springer-Verlag Berlin Heidelberg Lecture Notes in Computer Science (LNCS)), (SDWIC Conferences), Ostrava, Czech Republic, 7-9 July 2011 (pp. Part 1 546–559). Indexed by SCOPUS.

3. Hadi, A. A. R., Weay, A. L. & Nizam. M. S. (2010). Online Instructional Consultation Model: User Requirements & Perceptions of Conducting Instructional Consulting Service Online. International IT & Society Conference (IISC 2011): Proceedings of the IISC, Kota Kinabalu, Malaysia, 08 - 10th June 2010 (pp. 12).

4.   Hadi, A. A. R., Weay, A. L. & Saad, M. N. (2009). Online Consultation Applications As A Tool In Assisting Distance Learning. International Conference on University Education: Proceedings of the INCUE, Kuala Lumpur, Malaysia, 8 - 9 December 2009 (pp. 9 - 16).