CUSTOMER RELATIONSHIP MANAGEMENT SYSTEM DESIGN FOR METU-ONLINE

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ABSTRACT

CUSTOMER RELATIONSHIP MANAGEMENT SYSTEM DESIGN FOR METU-ONLINE

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METU-Online, a distance education tool developed and maintained by Middle East Technical University (METU) Informatics Institute, can be defined as Customer-to-Business-to-Customer (C2B2C) e-business. In this thesis, a new design and improvement of this system based on Customer Relationships Management (CRM) is presented. With this approach a CRM system is designed, an organizational change is recommended, customer-centered business processes are improved to a certain extend, a CRM data warehouse is broadly defined and a basic reporting system is designed. The result of a system analysis of METU-Online, methods used in this analysis, and the CRM model and the recommended design are presented.

Keywords: customer relationship management, distance education, e-business

ÖZ

METU-ONLINE SİSTEMİ İÇİN MÜŞTERİ İLİŞKİLERİ YÖNETİMİ SİSTEM TASARIMI

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Yüksek Lisans, Bilişim Sistemleri Bölümü

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Orta Doğu Teknik Üniversitesi (ODTÜ) Enformatik Enstitüsü tarafından geliştirilen ve yönetilen bir uzaktan yönetim aracı olan METU-Online, bir Müşteri-İş-Müşteri e-ticaret ortamı olarak tanımlanabilir. Bu tezde, bu sistemin Müşteri İlişkileri Yönetimi (MİY) temel alınarak hazırlanan yeni tasarımı ve geliştirilmesi sunulmuştur. Bu yaklaşımla, bir MİY sistemi tasarlanmış, bir organizasyonel değişiklik önerilmiş, müşteri odaklı iş süreçleri belirli bir noktaya kadar geliştirilmiş, bir CRM veri ambarı tanımlanmış ve temel bir raporlama sistemi tasarlanmıştır. METU-Online'nın sistem analizi sonuçları, bu analizde kullanılan yöntemler, CRM modeli ve önerilen tasarım METU-Online için sunulmuştur.

Anahtar sözcükler: Müşteri ilişkileri yönetimi, uzaktan eğitim, e-iş.

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ABBREVIATIONS

B2B : Business to Business

B2C : Business to Customer

C2B2C : Customer to Business to Customer

C2C : Customer to Customer

CLC : Customer Life Cycle

CRM : Customer Relationship Management

e-CRM : Electronic Customer Relationship Management

ERP : Enterprise Resource Planning

FAQ : Frequently Asked Questions

HTML : Hyper Text Markup Language

METU : Middle East Technical University

OLAP : Online Analytical Processing

WAP : Wireless Access Protocol

CHAPTER 1

INTRODUCTION

1.1. Problem statement

METU-Online is a distance education platform developed and maintained by Informatics Institute, Middle East Technical University. METU-Online supports instructors design and conduct of their courses in the Internet environment. The main purpose of METU-Online is to extend the understanding of the concept of distance education among instructors and increase the utilization of METU-Online.

Moreover, NET-Class which is the learning management tool used by METU-Online, can be sold to other organizations for their distance education needs. Furthermore, METU-Online which has been operating since 1998, has a vision of becoming a virtual university and wants to be a leader in Turkey.

In distance education, we face different needs and requirements of various stakeholders such as instructors, students, technical and managerial personnel that provide distance education service and manage relations among these users.

In this study, a Customer Relationship Management System design is developed for METU-Online which can be defined as Customer-to-Business-to-Customer (C2B2C) e-business model.

The reasons of developing such a CRM system design for METU-Online are mentioned as follows:

- Defining the needs and requirements of stakeholders
- The virtual university vision of METU-Online
- The increase in the number of courses given on the Internet
- The stakeholders' requirements for improvement of the quality of online courses and services
- The need to manage the relations among stakeholders in the Internet environment.
- Developing the systems' tools and services with the help of these needs and requirements
- The fact that acquiring a new user (customer) is much more expensive/difficult than keeping the current ones.
- The need for considering stakeholders' needs and wants thoroughly in developing strategies.

1.2. Structure of the thesis

This thesis is presented in five chapters.

Chapter II presents the existing studies in the literature about customer relationship management and distance education. An overview of CRM software is also provided in this chapter.

Chapter III is devoted to system analysis of METU-Online. The general description of METU-Online and its organizational structure are defined. Moreover, the needs and requirements of users such as instructors, students and visitors are given in detail.

Chapter IV describes the system design of METU-Online based on CRM approaches. The changes in business processes necessitated by the customer

needs are presented. The organizational change and recommended CRM model are explained briefly. Implementation issues are also mentioned in this chapter.

Summary, lessons learned and possible future work is presented in Chapter V.

CHAPTER 2

LITERATURE SURVEY

2.1. What is Customer Relationship Management?

Giving a unique definition to the Customer Relationship Management is not easy, since different business with different customers gives different meaning to the CRM. Even so, there are some explanations of what the CRM is.

Peter Keen defines CRM in the *CRM at the speed of Light: Capturing and Keeping Customers in Internet Real Time, by Paul Greenberg* (2002), as "the commitment of the company to place the customer experience at the center of its priorities and to ensure that incentive systems, process, and information resources, leverage the relationship by enhancing the experience" (p. 24).

According to Deck (2001, para. 1), Customer Relationship Management is "a strategy used to learn more about customers' needs and behaviors in order to develop stronger relationships with them". Thompson (2002, para. 4) asserts that CRM is used to select and manage the most valuable customer relationships. CRM also focuses on all the ways that "enterprises service their stakeholders" (Andrade, 2003, p. 38). "CRM requires a customer-centric business philosophy and culture to support effective marketing, sales and service processes" (Thompson, 2002). Besides these definitions, CRM can also be explained as a dynamic process of managing a customer–company relationship (Bergeron, 2002).

CRM is a new concept in business world, and it seems there are lots of explanations for CRM, however, all the definitions converge in some points about CRM. Bergeron (2002, p. 53) lists some of basic concepts about CRM in the following way:

- CRM is a business strategy, not an information technology tactic.
- A prerequisite to practicing cost-effective CRM is that knowing who your customer is—and is not.
- CRM is about conserving and focusing resources on transactions that provide the greatest return on investment.
- CRM can have a long- or short-term focus, depending on the business.

CRM makes company handle the customer knowledge, grasps the meaning and therefore better serves them. "It is an umbrella concept that places the customer at the center of an organization" (Bose & Sugumaran, 2003, p. 4). CRM mainly concentrates on customer quality service with the help of communicating with customers and give the information and solutions focusing on customer problems, willingness, and requirements (Bose & Sugumaran, 2003).

Within all these explanations and ideas, it is clearly seen that simply, CRM tries to answer these basic questions,

1. What is the benefit of the customer?
2. How can we add to the customer's value? (Gray & Byun, 2001).

Since CRM stands for Customer Relationship Management, it is helpful to remember the three worlds to understand CRM:

- Customer,
- Relationship, and
- Management (Imhoff, Loftis, & Geiger, 2001, p. 9-24).

Customer

Customer definition for a company is the first starting point since every business unit has a different customer definition. It is crucial before identifying the customer, and then determining the information of the customer needs.

A customer is "a party who is involved with the acquisition of your company's goods and services and who is of interest to the organization" (Imhoff et. al., 2001, p. 9). On the other hand, customer is "the individual or group with whom you exchange value" (Greenberg, 2002, p. 4) since "to retain customers, you have to create a new value (Dunn & Vervest, 2000, p. 4). Therefore the first thing the organization should do is to "identify the characteristics of its customer relationship, and, on this basis, to define the customer unit and the customer lifetime cycle" (Gurău, Ranchhod, Hackney, 2003, p. 204). "To define customer does not mean all types of customers are the same importance to your organization. It is difficult to differentiate who is the real and most valuable customer" (Wyner, 1999 cited in Gray & Byun, 2001, p. 8). For instance, students, parents, faculty, staff, government organizations, vendors, corporate sponsors and the community can be customers for colleges and universities. Consumers, business-to-business customers and internal customers can be subtitles for all customers (Fayerman, 2002, p. 58).

Relationship

Relationship is defined in the book of *Building the Customer-Centric Enterprise*, (Imhoff, et al., 2001, p. 17-19) as "the type of involvement a party has with the organization or with other customers". The first known relationship in CRM perspective is customer-organization relationship, second is organization to customers known as B2B, the last one is the customer-to-customer relationships C2C. Moreover, customer to business to customer relationship (C2B2C) can be seen as a general view of the all these

relationships that organization can neglect easily. The organization should know how these relationships affect the customer, and customer behavior. CRM should manage this relationship so it is profitable and mutually beneficial to get a larger customer lifetime (Gray & Byun, 2001, p. 9).

Management

When the organization defines its customers and its relationships, the next step is the management of customer relations as:

> "The ability to use the information you have gathered about your customers to start changing the way your organization interacts with these customers" (Greenberg, 2001).

For that reason, CRM requires changing of business philosophy, the way of business, then the culture of your organization. As Gray & Byun (2001, p. 9) emphasize "CRM required a comprehensive change in the organization and its people".

There are four fundamental tasks to obtain CRM targets as in the following subtitles (Peppers, et al., 1999 cited in Gray & Byun, 2001, pp. 22-23):

Customer Identification

In the first stage, the company should define who its customers are. This means the company should have basic information about the people, which it is in relations. The basic information is name, address, e-mail, phone, etc.

Customer Differentiation

It cannot be assumed that all customers will have similar needs. "Different needs sets for different types of customer or for one customer at different stages in their lifecycle" (Stone, Woodcock, & Wilson, 1996, p. 682). The company should know the variety of customers to give them different value (Gray & Byun, 2001, p. 21).

Customer Interaction

First, the company gets information about its customers, then identify its needs. However, customers' requirements are changing day by day. From the CRM point of view, it is crucial to be in relations with customer. The company should keep following customer's manner, wants and needs (Gray & Byun, 2001). Therefore the company should dialog with its customers to satisfy needs and requirements to create a value.

This interaction does not necessarily have to be with humans. Customers may look for their needs, for example from Amazon.com, instead of directly interacting with human beings (Greenberg, 2002). For this reason, the organization should think all touch points or channels that customer may prefer for interaction.

Customization/Personalization

"Treat each customer uniquely is the motto of the entire CRM process". With the help of personalization, customer loyalty will probably increase (Gray & Byun, 2001).

2.1.1. Customer Life Cycle (Customer Life Time)

Customer Life Cycle includes stages of customer motion considering the acquiring of products or services. In each stage during the relations with organization, there are different customer needs and expectations. Understanding the Customer Life Cycle and connecting it to customer information and interaction gives the organization a chance to build successful customer relationships **(**Imhoff et. al., 2001, pp. 62-65).

It is crucial to understand the Customer Life Cycle, since it is directly related to customer revenue and customer profitability. Freeman (1999) cited in Rygielskia, Wang & Yen (2002, p. 493) states that determining these life cycles help organizations to keep customers for longer periods of time.

2.2. History of CRM

CRM became popular at the end of the 1990s. Bryant (2002, p. 2) describes, CRM evolution by showing the market changes with in a timeline.

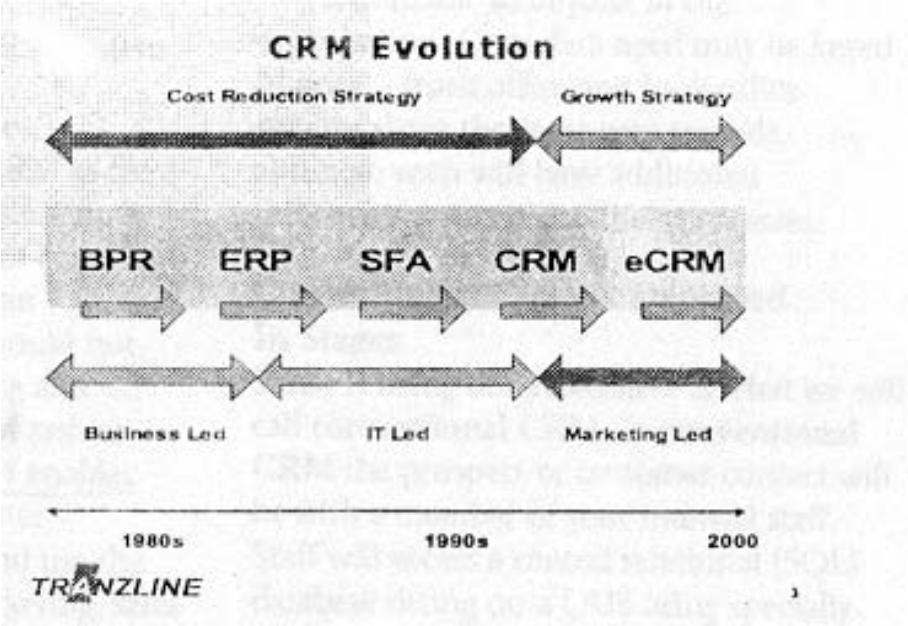

Figure 1: CRM Evaluation by Bryant (Source: Bryant, 2002)

It can be seen from Figure 1 that there is a change from Enterprise Resource Planning (ERP) systems to CRM. The reasons to shift from ERP system to CRM are as follows:

- The lack of success of ERP system due to the trouble in acquiring funds for the project. CRM is seen as capable to keep company alive.
- The freedom of customer's selection, shrinking of the markets for vendors, changes in production life cycle concepts
- Internet enables customers to find information about competitors and their products easily, can change the company within a mouse click (Thompson, 2002, para. 4; Greenberg, 2002, p.25; Bryant, 2000, p.2).

Moreover, the main reason for this alteration is that the marketing concepts are changing, and evolving. With the advent of the Internet and information in hands, there is no longer a mere sellers market. The old marketing concepts were based on the product, selling and promotion, and profits through sales volume. The new marketing concept points out customer needs, integrated marketing and profits through satisfaction. On the other hand, electronic marketing concepts give importance to customer expectations. Electronic marketing also includes new marketing concepts as interactive marketing and profits though customer perceived value as well as customer satisfactions. Figure 2 shows different marketing concepts.

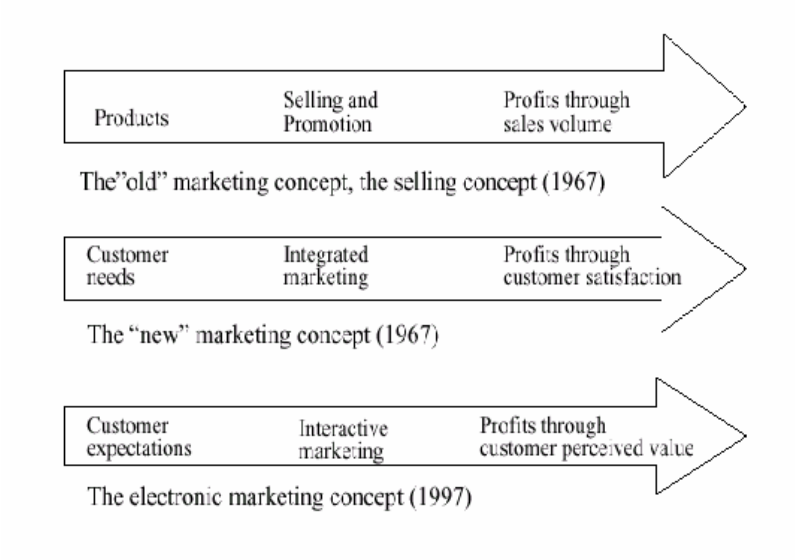

Figure 2: Different marketing concepts (Source: Brännback, 1999)

2.2.1. Electronic Marketing Concepts as e-business

E-business is running any business on the web and is a wider concept than e-commerce. According to (2001, p. 629), "E-business entails the strategic use of information and communication technology to interact with customers and partners through multiple communication and distribution channels". E-business creates a capacity for a firm to connect electronically to a supplier, logistics, providers, wholesalers, and customers in many ways, for many

purposes (Fahey, Srivastava, Sharon, & Smith, 2001, para. 7).

There are many e-business definitions for different purposes. Generally e-business can be explained as; "publishing information, and performing different types of transactions, or chains of them, electronically over Intranets, Extranets, and the Internet. This may be within organizations, or between them, and with the involvement of individual customers" (Bakry, & Bakry, 2001, p.103).

There are many types of e-business including e-commerce, e-helpdesk, e-training, e-learning, e-procurement, e-healthcare (Thuraisingham, Gupta, Bertino, & Ferrari, 2002, p. 44; Bakry, & Bakry, 2001, p. 10). As well, customer-to-customer (C2C), customer-to-business (C2B) or business-to-customer (B2C) are the general types of e-business. Mostly businesses in the Internet are seen as customer-to-business-to-customer (C2B2C).

Within e-business environment, traditional business process has been reshaped; from developing new goods and managing customer relationships (Fahey, et. al., 2001, para. 8). Therefore, "a strong business component is essential for e-business", technology will only be a tool to make e-business more efficient (Thuraisingham, et. al., 2002, p. 44).

2.2.2. What is e-CRM?

People who were communicating with customers in new ways, typically referring to using the Web as the interaction point first coined the term "e-CRM" (Greenberg, 2002, p. 31). By adding "e" part to CRM, the difference between CRM and e-CRM is that, nowadays, e-CRM was "web-enabled, self-service application, while CRM tend to be client/server application. Then e-CRM was seen as CRM portal. However, the difference between e-CRM and CRM is not obvious (Greenberg, 2002, p. 50). Moreover, Greenberg (2002) states that at the end of the 2001, adding "e" or not to add was a question that could not be solved (p. 51). The use of Internet is the main reason of changing CRM concepts continuously.

No matter how the difference is blurring, there are lots of definitions and ideas about “e”. “e-CRM provides companies with the means for conducting interactive, personalized interactions with the customers seamlessly across electronic as well as traditional channels. e-CRM allows achieving this in a manner that can earn customers trust and satisfaction“(Frawley, n.d.). The emerge of new, dynamic customer interaction channels, such as the Web, the speed of Internet, the complaint about mass mailing and spam e-messaging are the driven forces to give importance to e-CRM (Frawley, n.d.).

According to Czypicki (n.d.), e-CRM consists of two main elements,

- The use of direct-to-customer channels, mainly email, Web, as well as WAP, ATMs and kiosk
- Using IT to select material to be offered to the customer (part 3).

Nowadays, online companies seeing e-CRM as major elements of their strategy since technological applications allow segmentation, profiling and targeting of customers, and make them to integrate customer-centric culture in the aggressive digital markets (Gurău, et al., 2003, Abstract).

2.2.3. What is a Channel?

Interaction with customers is accomplished through different channels of communication. A channel is a means by which "the enterprise contacts or provides offerings to customers” (Greenberg, 2002, p. 185).

With the advent of Internet, how the channels are crucial has become the new problem for the business environment. Holland & Baker (2001, p. 35) emphasize that traditional marketing channels are enabling user to communicate either for product or information flows; however, Internet makes these channels integrated with added new channels of interaction.

Every customer is different and the Internet makes customers more powerful than with the traditional marketing channels. Adapting a combination of channels most well suiting to the customer segment gives organization a

chance to get the greatest return. At the same time, several types of channels may be used for making relationships (Payne, 200, p. 4).

First of all, the organization should understand the nature of channel types, how it functions, benefits and its limitations, customer segment, and its needs in the context of the organization' business situation. This assessment emerges the most appropriate channel strategy (Payne, 2001, p. 4). According to Payne (2001, p. 8), these are the channel strategies that companies may select:

- **A mono-channel provider strategy** is customer interaction through one main channel.
- **A customer segment channel strategy** emphasizes the fact that different customer segments may prefer different channels.
- **A graduated account management strategy** is for existing and future potential value of customers.
- **A channel migratory strategy** is based on migrating customers from one channel to another due to willingness to reduce channel cost.
- **An activity-based channel strategy** shows that customers may want to apply different channels for different tasks. The user may use the Internet to select the specification of computer, however, may apply call center to confirm the specification.
- **An integrated multi-channel strategy** uses all the channels to answer customer and combines the channels. Here, the business should catch the information of customers from all channels and integrate it; therefore business can remember prior interaction with customers.

Customer expectations, willingness, and requirements should be the most crucial concepts of organization before designing channels (Payne, 2001, p. 7-8).

Figure 3 provides an overview of different types of electronic communication channels**. (**Hennig-Thurau, Hansen**,** 2000, p. 236). Figure 3 shows the customer communication needs as:

- General information about the company
- General information about the products
- Targeted, individual retrieval of information about products
- Targeted, individual retrieval of information about supply and customer status
- Targeted, individual provision of information
- Answers to inquiries, supporting information
- Articulation of satisfaction/dissatisfaction
- Sharing experiences with other customers.

Some CRM channels are passive such as bulletin boards, fan clubs and news groups. Chat rooms, discussion groups are active one. Others are interactive like online focus groups, interactive online interviews (Romano & Fjermestad, 2003, p. 241).

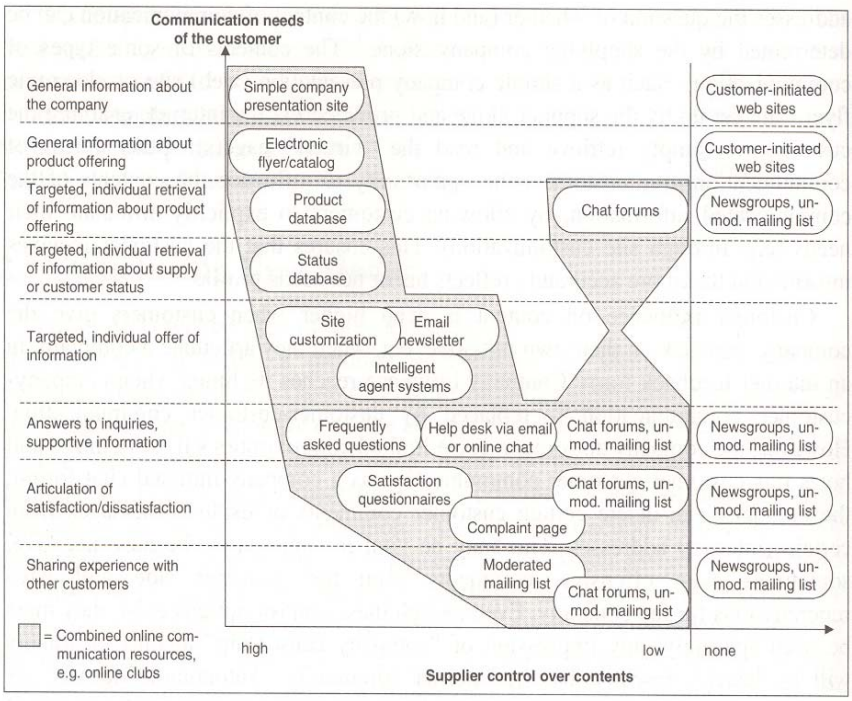

Figure 3: Overview of the different types of electronic communication (Source: Hennig-Thuraw, Hensen, 2000)

Web site is an important channel for especially electronic business environment, since it is the easiest way to communicate with customers. Therefore, effectiveness of the web site becomes a major subject to gain customer satisfaction.

2.3. Effectiveness of web site

Web is the most commonly and frequently used channels with the advent of Internet. Therefore, effectiveness of Web sites can be a subtopic in the effective usage of channels from CRM perspective.

According to Chakraborty, Lala & Warren (2002, p. 68) personalization, interactivity, informativeness and organization are the major factors that affect the use of web site.

- **Personalization** is an act toward each customer as an individual when they revisit a site (Peppers, & Rogers, 1999 cited in Chakraborty, et. al., 2002, p. 53).
- **Interactivity** is the capacity of an organization to use information technology to deal with an individual and remember its response (Deighton et. al., 1996, pp. 151-152).
- **Informativeness** is the available information capacity of a web site (Hoffman, & Novak, 1996, pp. 50-60).
- **Organization** is the ability of a web site to arrange content, information, images, graphics, etc in a manner that increases clarity of information and makes it easy for a visitor to find the needed information (Chakraborty, et al., 2002, p. 57).

Among these four factors, Chakraborty, Lala & Warren (2002, p. 68) found that informativeness is the most important factor in the effectiveness of web sites.

2.3.1. Information quality on the web (informativeness)

According to Salaün & Flores (2001), "Good quality information" is now becoming an essential condition for making active relationship between an organization and customer.

Miller (1996) suggests that there are ten dimensions of information quality:

- **Relevance:** Whether the information fits customers' needs and expectations is the major component of information quality. If not, no matter how well your web site suits other dimensions, the customer will probably go off.
- **Accuracy:** The information should be real.
- **Timeliness:** The speed of information processing and communication with the customers is important to keep the information up-to-date.

- **Completeness:** Lack of information may cause customer to go away from the web site, as well as from the organization. It should never be forgotten that complete information for one person may not be enough for another.
- **Coherence:** How properly the information "hangs together" and coherent with itself can be a determinant factor in keeping a customer.
- **Format:** Two perspectives should be considered in the format. One is the customers' and the other is the designers' point of view.
- **Accessibility:** It is the information that can be retrieved when needed.
- **Compatibility:** How information can be joined with other information.
- **Security:** There are two ways of security, information security protected from people, and natural disasters.
- **Validity:** Information is valid when it fits other standards related to dimensions as accuracy, timeliness, completeness and security.

2.4. Classification of CRM

CRM can be divided into three components: operational CRM, analytical CRM and collaborative (communicational) CRM (Fayerman, 2002, p. 61; Gurgul, Rumyantseca & Enkel, 2002; Greenberg, 2002, p. 45; Steward, 2001).

Operational CRM: Operational CRM involves the business processes involving front office including marketing, recruiting, and customer service and back-office application such as human resources, financial students, and alumni systems (Fayerman, 2002, p. 63). Operational CRM is mostly concerned with products, services, and operational capabilities to make the organization take care of its customers.

Analytical CRM: According to Fayerman (2002, p.63), the main reason for analytical CRM is to develop a general picture of customer.

If the definition is needed, as Paul Greenberg (2002, p.43) states, Analytical CRM is "the capture, storage, extraction, processing, interpretation, and reporting of customer data to a user". Applications capture data from several channels, sources, and keep them in customer data repository, and train algorithms to analyze, interpret the data needed. It is seen clearly from the definition that analytical CRM consists usually of electronic stock of customer data (Gurgul, et. al., 2002, p. 7).

Analytical CRM naturally includes strategies and tools to make customer-centric business decisions (Seybold Group, 2001). In this component of CRM, several types of analytical tools are used for its specific purpose (Bose, & Sugumaran, 2003, p. 7). Business intelligence systems, data mining tools and customer-tier strategies are in this type of CRM (Seybold Group, 2001). Examples of this type of CRM are Product/Service profitability, customer demographic profiling, campaign analysis, customer buying behavior, sales analysis and market segment analysis (Imhoff, et. al., 2001, p.38). Here, Fayerman (2002) suggests a general view of CRM including all components in Figure 4.

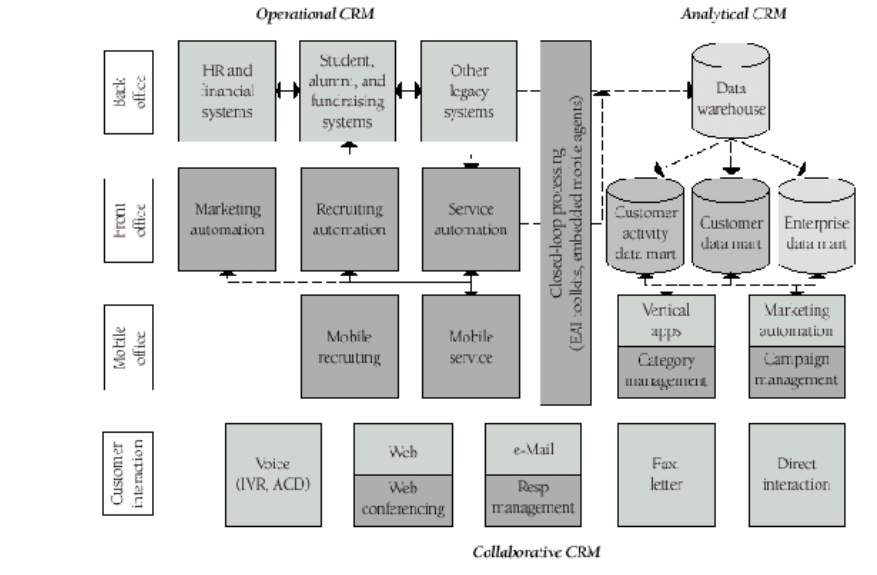

Figure 4: General view of CRM (Source: Fayerman, 2002)

Communicational (Collaborative CRM): In some cases, collaborative CRM can be referred to as communicational CRM interchangeably. The communicational CRM involves direct interaction with the customer, (Fayerman, 2002, p. 63; Gurgul, et al., 2002, p. 7). It is like a "communication center" of organization between company and its customers (Greenberg, 2002, p. 9). It includes several customer interaction tools such as Internet, e-mail, web conferencing and web portals (Fayerman, 2002, p. 63; Gurgul, et. al., 2002, p. 7).

2.4.1. Tools in Analytical CRM

Nowadays, customers have different choices and favorites that are not easy for companies to group to create marketing strategies. Each customer wants the services based on his/her unique needs and expectations. Customer relationships can only be successful by giving importance to the customer desires, requirements and willingness (Shaw, et. al. 2001, pp. 128-132).

The meaning of the concept of making and keeping interaction with customers is that organization must maintain, get records and/or data in an on-line system (Rygielski, et. al., 2002, p. 484). However, insufficient knowledge about customers and managing this knowledge system makes organization suffer from inefficient customer interaction. In these situations, data mining tools are essential to resolve the unclear or unseen knowledge about customers (Shaw, et. al., 2001, pp. 128-134).

With the help of data mining, organizations develop their view of customer behavior. It means, understanding customer gives organization a chance that they can make marketing strategies based on the results of data mining and have better targets, with relation to customer needs, wants and desires (Thearling, 2003). "Data mining plays a critical role in the overall CRM process, which includes interaction with the data mart or warehouse in one direction, and interaction with campaign management software in the other direction" (Rygielski, et. al., 2002, p. 494).

It can be defined that the data marts and the data warehouses are the components of analytical CRM, which are explained below.

Data warehouse: In the book of *Building Customer-Centric Enterprise*, data warehouse is defined as "the central point of data integration for business intelligence and the source of data for the data marts, delivering a common view of enterprise data. It is subject oriented, integrated time variant and non-volatile collection of data for strategic analysis" (Imhoff, et. al, 2001, p. 278).

Data mart: It is adapted and/or encapsulated data that is retrieved from the data warehouse and tailored to support the specific analytical requirements of a given business unit or business function. Online analytical processing and data mining warehouse are the types of data marts" (Imhoff, et. al., 2001, p. 279).

Online analytical processing: "OLAP contains data that is customized and reformatted to support the specific multidimensional analytical requirements of a given business unit or function" (Shaw, et. al., 2001, pp. 134-135).

Data mining warehouse: "It is created so analysts can test or prove their hypotheses, assertions, and assumptions developed in the exploration warehouse. Specific data mining tools containing intelligent agents are often used to perform these tasks" (Shaw, et. al., 2001, pp. 134-135).

There are 3 major areas of data mining (Shaw, et. al., 2001, pp. 134-135).

- Customer profiling
- Deviation analysis
- Trend analysis

Below, each of them is introduced separately.

Customer profiling: "A customer profile is a model of the customer, based on which the marketer decides in the right strategies and tactics to meet the needs of that customer." The following are the profiling elements:

- Frequency of purchases
- Size of purchases
- Recency of purchases
- Identifying typical customer groups
- Computing customer lifetime values
- Prospecting
- Success/failure of the marketing program

Deviation analysis: Data mining tools supply for detecting and classifying deviations (Shaw, et al., 2001, p. 134).

Trend Analysis: Trends are patterns that persist over a period of time. These are the elements in trend analysis:

- Evaluate performance of products or marketing programs
- Forecast future sales

2.4.2. Some CRM software packages

This section gives an incomplete list of current CRM software packages in use today. These are shown in Table 1.

Table 1: Well known CRM products and their companies

Company	Product and current version (as of 7/2003)	Web page
Applix Inc.	Applix iEnterprise v. 7.5	www.applix.com
ClientXchange	ClientXchange 2000	Clientxchange.com
E-solutions Software Inc.	e-volve v. 3.0	e-solutions.com
Onyx Software	Onyx Customer Center v. 4.5	onyx.com
Optima Technologies	ExSellence v. 3.1	optima-tech.com
PeopleSoft Inc.	Vantive Enterprise 8.2	peoplesoft.com
Pivotal Corp.	Pivotal eRelationship	pivotal.com
SalesLogix Corp.	SalesLogix2000	saleslogix.com
Siebel Systems Inc.	Siebel 99.6	siebel.com

Applix: Applix, Inc. is a provider of Internet-based Customer Relationship Management (iCRM), customer analysis and business planning solutions. The product consists of three modules named sales, service and help desk that run integrated with each other. There are also analytical CRM tools for decision support and management report. The software is based on an open system, so it can run on multiple platforms.

mySAP CRM: Released in September 2001, mySAP CRM 3.0 contains all interactivity cycle with the customer. The offered solution includes sales, marketing and service domains. Additionally, SAP order and track processing includes solutions integrated with the offered solutions.

Pivotal: Pivotal's eBusiness and CRM applications are mature and full-featured products. Pivotal defines its product as an enabler for web, wireless

connection and conservative channels. The product line includes integrated sales, marketing, service and support system.

Siebel Systems: Siebel is the market leader in the market. Siebel serves modern services like e-sales, product configuration, business partner management and staff management services on top of traditional CRM concepts like sales, service and marketing. The company has more than 200 different modules after the introduction of Siebel 7.

2.5. From Distance Education to CRM

Distance education has become abundant in many universities and commercials. The reason for this can be best explained as:

> "The web offers the possibility of providing a stimulating learning environment to engage learners in meaningful learning through reflection, application, and interaction (Macdonald, et. al., 2001, p. 14).

With the advent of Internet, as business models changing in business environment, traditional universities have designed or will have to design new models to meet customer expectation (Macdonald, et. al., 2001, p. 14) in case they failed or will fail in their distance program.

According to Macdonald, et. al. (2001, abstract), the new model should be established in customer needs, demands for the value of content, delivery and service that meet the customer demands.

"Online environment isolates the learner" (Macdonald, 2001, p. 11). Therefore the new learning models eliminate this isolation with the appropriate channels management to get the user's requirements, needs and expectations.

In addition, Ismail (2002, p. 331) states that e-learning projects are developed into technical process with expensive software implementations.

However, the main factor to success is that the designer should understand the basics and environment of e-learning "ecosystems". In this ecosystem, the system, designers and developers should see the environment in the users' point of view.

Kotler (1998) cites in Macdonald, et. al (2001, p. 11) that to be successful, web based education programs should include the process of determining the needs, willingness of "target markets and delivering more effectively and efficiently than competitors"

According to Ismail (2002, pp. 322-333), the critical component of online education is "Learning Content Design System, Learning Content Management System, and Learning Support System" (Ismail, 2002, pp.322 – 333).

The Demand Driven Learning Model has five main components: the quality standard of ''superior structure,'' three consumer demands (content, delivery, and service) and learner outcomes (MacDonald, et. al., 2001, p.21).

2.5.1. Benefits of CRM to distance education

It can be faced in the literature that students and instructors can be seen as customers. Many researches are about the relation between the students' characteristics, achievement and satisfactions (Hong, 2002, p. 268). Furthermore, new models such as demand driven learning models (MacDonald, et. al, 2001, p. 12) is based on the student/instructor's demands and needs.

In addition, Nachmias & Segev (2003, abstract) applied computer log files to "evaluate how online contents are consumed and to identify individual differences among students in terms of content usage and among of content that are presented in web-supported course sites". For instance, Offir, et. al. (2003, p. 67) collected teacher-related data and student-related data such as questions and comments to "help-desks".

With the help of CRM system applied to distance education environment, it becomes easy to access to the collection of data, log files, survey results, student habits in web sites, etc. Since the system is designed for the new data collection methods, the researchers can find the different types of data collected in the past or present without difficulty. With the help of these data and information, advanced research can be performed.

2.6. Related examples

While searching for resources within this thesis, the channels for e-learning and listening to the customer are researched.

First of all, a meeting was held with the coordinator of Bilgi University e-learning program. This e-MBA (electronic master of business administration) program has more than 400 students with 8 core and 8 elective courses. Courses are held fully online. The audience mostly consists of students having a manager status with ages 25 or over. The courses are given by academicians and expert managers. In order not to have a communication problem between the student and the instructors, Bilgi University has set up 13 full time staff to coordinate among units. The staff deals with both the students and instructors and act as a bridge between them successfully (e-MBA, February, 2003).

Moreover, a talk was held with Kürşat Çağıltay who worked as an instructor in Indiana University and currently employed by METU. Indiana University has an online course management system called “oncourse”. The current structure is focused on student and instructor support. At the same time, there are units where both student and the instructor can get help from. For example, when the instructor needs help in order to prepare a course syllabus, he/she can get pedagogical support technical support from this unit (Oncourse, November, 2002).

Apart from these examples, information gathering methodologies are taken into consideration in order to investigate customer touch points used in

CRM. Within this scope, www.surveysite.com web site is examined. One of the methodologies given on this site is preparing online focus groups. At a given, specific date and time, customers gathering online can provide their suggestions. Forums can be used as online focus groups necessarily, too. Interviews, e-mails, observations are other examples of channels the site recommends (SurveySite, December, 2002).

CHAPTER 3

ANALYSIS OF METU-ONLINE

3.1.Description of METU-Online System

METU-Online is an online learning system developed by Informatics Institute. This asynchronous learning environment has been programmed since 1998 for all METU instructors and students. The main aim of METU-Online as described on the web site is "to disseminate the online learning concept among the departments and to supply an application platform for the users." (METU-Online, 2003).

The METU-Online system runs on a management system engine, which is called "NET-Class". NET-Class provides an asynchronous learning environment for the customers and instructors. NET-Class system is under a heavy development and each year new features are added. It can also be used as a supplementary tool for face-to-face communication in classroom based courses. NET-Class can be sold to another organization for their education/training needs.

Between 1998 and 2002, METU instructors have developed 175 courses by using METU-Online system, serving approximately 4000 students. In 2002-Fall semester, 38 courses have been prepared serving 1500 students. Up to now, NET-Class system has been sold to Süleyman Demirel University and Beykent University, and they use NET-Class in their organizations. Turk Telekom and Turkish Airlines have used METU-Online services for their

inservice training. It is expected that NET-Class system will be used in many universities in Turkey within the concept of virtual university. In this manner, METU Informatics Institute, Süleyman Demirel University, Selçuk University, Siemens Business Systems, Intermedia, Halıcı Yazılım and Enokta have gathered to start a virtual university project.

3.1.1. METU-Online system from e-business perspective

It is useful to analyze the business environment of METU-Online to get a general idea of the system. Getting acquinted with the overall picture of METU-Online business helps us to visualize the users of the system.

In the system, there is a transaction between students and instructions such that instructors provide the course material to students and students send and get information and data to instructors. Regardless of the courses (whether they are partially online, fully online or online support), as long as the instructors use METU-Online tools or use learning environment that METU-Online provides for their courses, METU-Online will be a mediator in this system.

METU-Online systems have properties of a typical C2B2C e-business model in the sense that students and instructors are the customers (consumers) of the system and the environment is the customer-to-business-to-customer form. For instance, the instructor prepares course material, and delivers the course with the help of METU-Online staff, the student receives this service from METU-Online with poor or few course meetings. Moreover, just like the courses conducted partially or full online support, the student may attend regular classes and additionally use METU-Online tools (assignment, announcement, grade book) as complemantary materials. Taking into considiration of all the cases of METU-Online, system's e-business perspective general schema is depicted in the Figure 5.

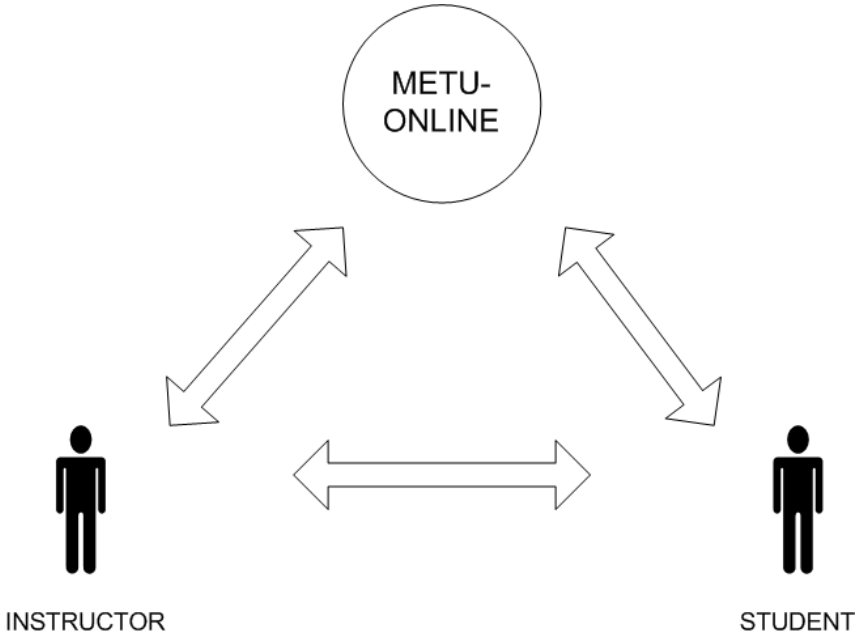

Figure 5: A general view of METU-Online from e-business perspective

The instructor is in relationship with student via METU-Online or face-to-face meetings as weel as using METU-Online as a supplementary material.

3.1.2. Course type at METU-Online

Basically, there are three kinds of courses on METU-Online.

- **Online Support Courses:** Such courses can be developed so that the instructor can continue with face-to-face class meetings. Some specific METU-Online features can be used for this kind of support such as syllabus, grade book, announcements and assignments.
- **Semi Online Courses:** In this course type, the instructor can provide lecture notes on METU-Online for all or some parts of the course. The traditional classroom meetings might be reduced in this case.
- **Fully Online Courses:** In these courses, teaching and learning occurs completely through the web utilizing METU-Online. Classroom meetings are none or only a few for discussion and examination purposes.

3.1.3. Tools used at METU-Online

The tools used at METU-Online can be classified as “communication tools”, “course tools” and “student tools”.

Communication tools facilitate the communication between the instructors and the students. These are:

- **Forum:** It supplies a communication environment among students and instructors. Both instructors and students can use this tool.
- **E-mail:** With the help of this tool, instructor sends e-mail to students easily.
- **Announcement:** Allows the instructor to place announcements such as exam dates or important deadlines for the course.
- **Latest news:** It offers instructors and students to follow latest news and announcements.
- **Term info:** It includes detailed information about the current term.

Course tools have the basic ability for publishing the course materials online such as;

- **Lecture notes:** It allows the instructors and the students to reach the lecture notes of the course. Preparation and revision of lecture notes are performed out of the system.
- **Syllabus:** It includes all basic information about the course and the instructor. The instructor can enter and update the syllabus information using this tool.
- **Course outline:** It provides information about the course structure and topics.
- **Course schedule:** It is used to announce and monitor the schedule for the course.
- **Assignments:** The instructor can give assignments, and receive

submitted assignments with the help of this tool. The students can see and submit assignments again using this tool.

- **Online exams:** The instructors can create/modify question pool and create/modify online exams. Students can take online exams again using this tool.
- **Grade book:** It is used to store grades of the students, display and monitor grade information, and get statistical reports about the grades.

Student tools help the student get additional information for a particular course at METU-Online such as

- **Profile:** It offers you to change/update your profile settings such as e-mail address.
- **Search**: It is used to search in course materials.
- **Help**: It is used to get information about tools and features.

3.1.4. Organization Structure of METU-Online

The aim of METU-Online is to provide a web platform for online learning. Therefore, the organization focuses on the main services unit as seen in Figure 6. It is important to define the organizational structure of METU-Online in order to identify METU-Online staff and services given in this system.

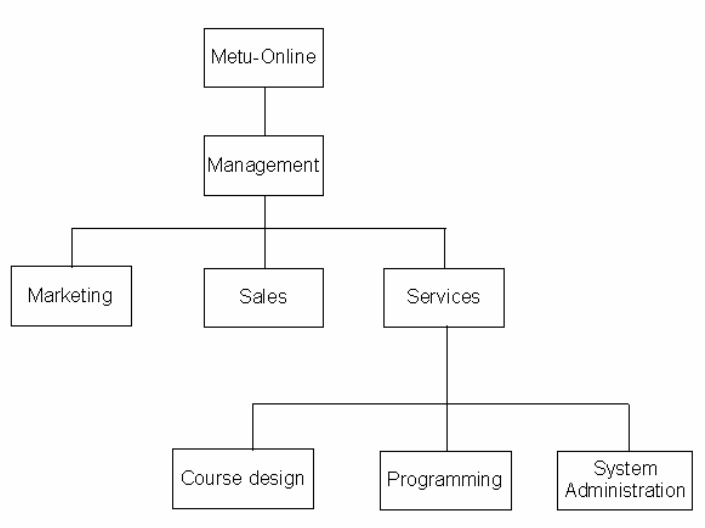

Figure 6 : Organizational structure of METU-Online

There are nearly twelve full time staff at METU-Online. Although the classification is not formally defined, the personnel can be categorized into four groups; managers, programmers, system administrators, course designers. Managers (two staff) are experts who have generally working with METU-Online since 1998. Another four are working as software engineers, graphic designers and programmers under programming units. System administrator (one staff) works under system administration unit. Five of the personnel are responsible for designing web pages of courses as a Web-team. Mostly, managers deal with projects/sales about solving distance education needs of other organizations/universities with the help of programmers and system administrators. An example about marketing activities in METU can be the seminars that are given to METU instructors to promote METU-Online.

3.1.5. Business processes of METU-Online

There are mainly five processes from a customer point of view within the core business of METU-Online. It is extremely important to understand these processes from a customer perspective since the main goal of our study is to

catch customer-centered business environment.

The processes of the organization are:

- Student registration process
- Instructor sign-up process
- Course conduct process
- Post course conduct process
- Publicizing METU-Online process.

These business processes are derived based on interviews with METU selected instructors (some of them are using METU-Online tools), METU-Online staff (Web team) and students. Using flowcharts with users' domain depicts the processes. The flowcharts of these processes are in Appendix A. Furthermore, Table 9 in Appendix B shows the business process and problems with each user.

Student Registration Process: includes the stage of student awareness and wonder about METU-Online, students registration and extends to logging in METU-Online. The most time-consuming event on this process for students is looking for instructors to get information about the courses. Since the student cannot find information about courses, METU-Online, NET-Class, and registration process easily, they mostly prefer to ask these types of questions to the instructor. Therefore, the instructor has to answer such questions originating from students. There are 40 students for each course, so both the instructor and the student wastes time during this process (See Table 9 in Appendix B). The flowchart in Figure 15 in Appendix A includes students' relations with other users of the system during registration.

Instructor Sign-up Process: begins with the decision of instructors about type of online courses, materials to be developed, designing and implementing the online course and installing the lecture notes to the system. The flowchart related to instructor sign-up process is given in Figure 16 in

Appendix A. Table 9 in Appendix B depicts the problems with the instructor sign-up process in summary.

From the instructors' point of view, basic steps of the instructor sign-up processes and the problems can be determined as follows:

- **Getting information about METU-Online:** The instructor may have information about METU-Online via either an e-mail announcing an introductory seminar or any other colleague. Mostly, the instructor asks Informatics Institute about METU-Online and the procedures about how to sign-up to this system.
- **Designing web pages:** If the instructor wants help with designing course materials, they are referred to the design unit (Web team), otherwise the instructor prepares course web pages by himself/herself.
- **Filling out the registration form**: Instructor then fills out a form called METU-Online Instructor/Assistant online application form to take an account for logging in to system.
- **Getting user name and password:** After filling out the form, the instructors are sent a user name and a password to install their lecture notes to the system by using an FTP program.
- **Filling out the syllabus and others:** When the instructor accesses the system with the user name and password, he/she can enter the necessary information about course tools such as syllabus, course outline and schedules. The instructors have problems on designing the web page, filling out a new form for each semester, uploading lecture notes by via FTP.

Course Conduct Process: covers the period of commencement and end of classes. This process involves problems encountered by students and an instructor about online lecture notes, passwords, and so on, that may effect online learning. The flowchart in Figure 17 in Appendix A also includes the stakeholders involved in the process. Main considerations of course conduct is,

- Instructors or students may want to get information about user names and passwords.
- The students may ask questions to the instructors and METU-Online about problems encountered during accessing the lecture notes, login problems, and some sudden disconnection, errors on pages.
- The instructors or students may want to get information about news, new features and new tools.
- The instructors may want to update their lecture notes, and ask for help.
- The instructors may want to back-up some files such as lecture notes, assignment and announcements (See Table 9 in Appendix B).

During this process, educational materials such as books and handouts are supplied by instructors and students themselves. Unfortunately most of these needs are not met properly. Hence, there is a room for improvement for METU-Online regarding these requirements and needs.

Post course Conduct Process: is associated with the maintenance, evaluation and planning needs that emerge after classes end. Instructor is the main actor in this process. However, this process is not clearly understood by the METU-Online system. The needs and expectations of students and instructors are ignored when the classes end. Hence, there is no flowchart of the current post course conduct process. On the other hand, with the help of interviews with instructors and students, some necessities have been identified. These are

- The instructors want to get feedback from students about their courses.
- The instructors want to get results of the evaluation conducted by METU-Online.
- The instructors want to give feedback about the courses and usage of METU-Online to Informatics Institute.
- The instructors want to backup of their lecture notes, grades,

announcements, assignments and so on.

- The instructors want to change the nature of access to their lecture notes.
- The students cannot find communication channels after the course conduct.

Publicizing METU-Online Process: takes place to increase the users of METU-Online. This process involves marketing strategies as well. The flowchart of the process is given in Figure 18 in Appendix A.

The relationship among students, instructors, visitors and other organizations/universities with this process are:

- Students mostly want to learn about courses given on METU-Online and look for information about the system and NET-Class. They want to hear about seminars and access to educational materials before registration.
- Visitors may look for information about METU-Online and contact information on the web page. They should feel free to ask questions on the web or via e-mail.
- The instructor may want to get information about the seminars, look for detailed information on the web site or about the system.
- Other organizations/universities may want to learn about tools, features, contact information and the system. They should have a chance to ask questions as well.

The activities with regard to publicizing METU-Online should be as follows:

- sending information about METU-Online to departments of university by postal mail and electronic mail,
- giving seminar about tools and features of METU-Online to instructors,
- giving information about METU-Online on the web site.

The effectiveness of this process is considered to be low by the stakeholders

(See Table 9 in Appendix B).

3.1.6. Stakeholders of METU-Online

To develop a strategy based on Customer Relationship Management, two fundamental tasks such that customer identification and customer differentiation should be covered. Customer identification sub-section includes general description of METU-Online customers and their characteristics. Needs, problems and expectations are in the customer differentiation sub-section. Identifiying customers and defining their problems, needs and expectations are important in order to make an appropriate CRM system design for METU-Online. The data collection methods used in this study are defined in this section as well.

Customer identification: The stakeholders of the system can be divided into external and internal types of users. These users have been identified as shown in Table 2.

Table 2: System users

External users	Internal users
Visitors	Instructors
Special Students	Students
Other universities	Managers of the Institute
Organizations	Course Design Team (Web team)
	Software Engineers
	Graphics Designers
	System Administrators
	Student Affairs Personnel

Students: In 2002 Fall semester, there were 1500 students attending courses on METU-Online. There are also special students. These students are not registered at METU, however, have a special permission to take one or more courses from METU.

To get more information about perception and satisfaction of students about METU-Online, a questionnaire was prepared and applied by the author for 2002-2003 Fall semester. It is called student satisfaction survey (see Appendix C). To increase response ratio, after the student satisfaction survey, the students were allowed to play a computer game on the web site. We have also studied the results of a regularly conducted survey (Online Education Tool Evaluation) by METU-Online at the end of each semester. This survey and its results are shown in Appendix D. Moreover, interviews with eight students were conducted. The students were selected from all grades, since the aim was to hear from different grades. Four students were MS grades, three students were sophomores, and one student was Phd grade. The result of the interview defined the survey's questions. Moreover, the problems stated by students are listed in Table 7 in Appendix B.

The survey results provide the following facts:

- 84% of the students have not taken an online course before. This means, most of the students have not used METU-Online before. Therefore, the students do not know the system and its procedures.
- 47% of the students are sophomore, 22% students are juniors and 10% are MS students. Most students are undergraduates. There is a difference between the MS students and undergraduates. Undergraduates' attitude towards METU-Online is not the same as MS students. This situation cannot be ignored. Undergraduates seem to be less willing to use learning sources effectively (see Appendix D Q2).
- Moreover, 77% of the students are not working and 12% are working full-time. 67% students connect to METU-online mostly from Monday to Fridays, 33% of students on weekends (see Appendix D Q.3).
- 70% of students most often access METU-Online after 4 pm. Only 9% of the students access METU-Online from computer laboratories located in METU. Therefore, with the result of these questions (Appendix D Q4, Q5, Q6), before changing any technical feature of the system, the type of

connection and connection speed should be considered.

- 71% of the students thought that METU-Online was easy to use and 17% of the students had a neutral opinion. The remaining 12% of the students' expectations and understanding of usability issues should be examined. (Appendix D Q8). In Appendix C Q11, 59% of the students defined METU-Online to be easy to use, however, 37% defines their experience on the usability of METU-Online "to some extend". This statement shall also be investigated upon.

Since this study is to apply CRM approaches, defining student characteristics is important in order to recommend solutions for students. These results give answer to the question "Who is my student?".

Instructors: In 2002 Fall semester, 24 instructors delivered 38 courses using METU-Online. To get information from instructors, interviews and usability study were conducted. Interviews are applied to fifteen instructors. These interviews lasted for between twenty minutes and an hour. The questions asked during interviews were;

- How did the instructor hear about METU-Online?
- What were the expectations from the system and METU-Online tools? Was it solved? Did your expectations meet?
- Which problem was the most frequent?
- What are your recommendations?
- Does he/she have special students?

Instructors can be classified as new instructors, experts, and "intermediate level" instructors, who have used METU-Online for 2 or 3 semesters. Moreover, their type of online courses, as semi-online, fully online or online support can also identify instructors. Interviewed instructors were selected with these classifications. For the course types, two courses were fully online, and three courses were semi-online. Other courses used METU-Online for online support. It can also be concluded from the analysis of

instructors that, only three instructors defined themselves as expert users of METU-Online, the rest as new or intermediate levels instructors.

Moreover, large classrooms have 50-700 students. Middle classrooms have 20-49 students. Small classrooms have 7-19 students. During interviews, in 2002 Fall semester, there were 8 instructors with large classrooms, 4 instructors with medium classrooms, 3 instructors with a small classroom. It can be concluded that instructors with large classrooms prefer METU-Online for their courses.

Besides this classification and identification, during the interview, the instructors were asked how they heard about METU-Online. 6 instructors out of 15 instructors, heard about METU-Online personally from Informatics Institute, 5 of them heard via e-mail from Informatics Institute.

In addition to interviews, another data collection method for this study was usability study, which was conducted with six instructors. These instructors were selected with their experience of METU-Online. Two instructors were experts, two were intermediate and two were new instructors. The following tasks were conducted by instructors while they were recorded on the video.

- assigning a homework
- writing announcement
- entering a grade to grade book
- using the search tool
- tracking the students
- using the help tool

First of all, the usability study was conducted to make the instructors talk about METU-Online, and to get their opinions that they did not mention during the interviews. The second aim was to identify general usability problems. However, usability problems in each task and detail solution are not mentioned in this thesis. Only the expectations and problems of

instructors during the camera record have been reflected in this thesis. These expectations and problems have been included with interview results in Table 7 in Appendix B.

Visitors: Visitors are people who wonder about METU-Online and want to get information about. They may be students, instructors, or anyone outside METU. Information about visitors can be obtained from METU-Online web site log files since there is no face-to-face or electronic communication within METU-Online system. The evidence comes from the analysis of web log files. For example, people who visit the METU-Online web site for the first time is about 57.8% of the total. However, there is a decrease in number of visitors for the second time (17%). Most people who visit for the first time do not look back the METU-Online site again. Table 3 shows the number of visitors and number of visits. In this table, a unique visitor can be defined as "visitors counted when someone views a web page for the first time".

Table 3: Visitors by number of visits

Number of Visits	Number of Visitors	% of Total Unique Visitors
1 visit	5322	57.80%
2 visits	1567	17.01%
3 visits	597	6.48%
4 visits	337	3.66%
5 visits	217	2.35%
6 visits	137	1.48%
7 visits	104	1.12%
8 visits	89	0.96%
9 visits	73	0.79%
10 or more visits	764	8.29%

- Most visitors come from Turkey, followed by United States, and United Kingdom. (See Table 4).

Table 4: Most active countries in visiting

	Countries	Visits
1	Turkey	26,529
2	United States	2,393
3	United Kingdom	45
4	Germany	27
5	Arab Emirates, United	22
6	Canada	16

- Average number of visits per day on weekdays is 400 and per weekend is 392. (Table 5).

Table 5: Summary of activity for report periods for visitors

Average Number of Visits per Day on Weekdays (number of unique visitors)	400
Average Number of Hits per Day on Weekdays (number of total HTML pages downloaded)	48,180
Average Number of Visits Per Weekend	392
Average Number of Hits per Weekend	38,972
Most Active Day of the Week	Tuesday
Least Active Day of the Week	Saturday
Most Active Date	December 02, 2002
Number of Hits on Most Active Date	132,659
Least Active Date	February 14, 2003 (*Valentine's Day*)
Number of Hits on Least Active Date	271
Most Active Hour of the Day	15:00-15:59
Least Active Hour of the Day	06:00-06:59

- During registration period of METU, the number of visits increases dramatically. The visitors may be students or people outside METU. The period between 01/19/2003 and 02/02/2003 was semester holiday. The registration began on 02/16/2003. The increases can be seen from the chart below. (See Figure 7).

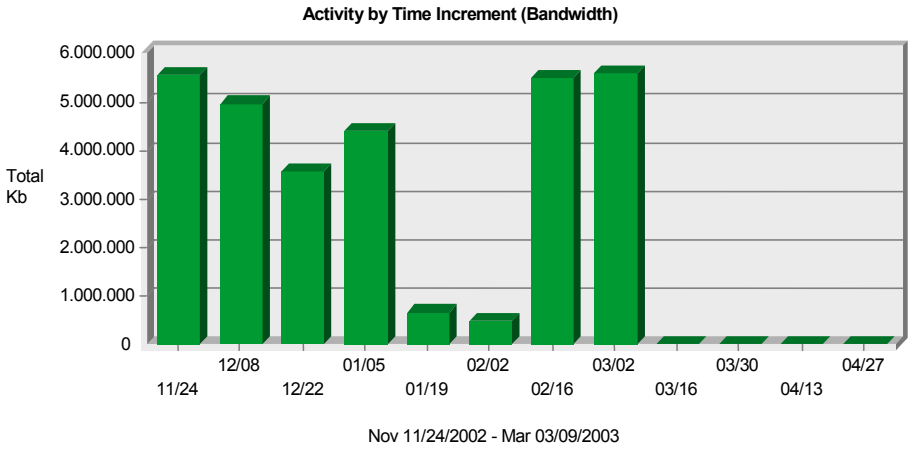

Figure 7: Summary of activity by time increment for visitors

- From web log files, it can be calculated how many visitors viewed one page and how many viewed two pages and so on. 11.9% of total visits are viewing for only one page. This means 11.9% of visitors exit without viewing other pages. 50% of visitors visit 11 pages or more. It can be assumed that 50% of visitors are either students or instructors. Therefore, the system missed 50% of the visitors. (see Figure 8).

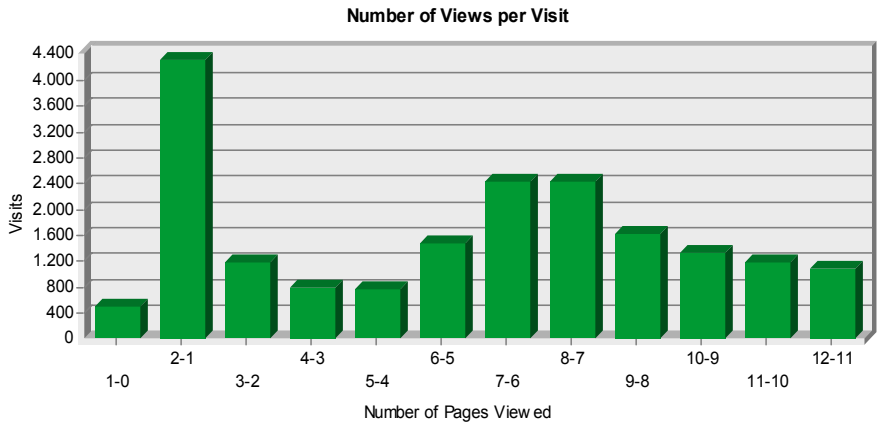

Figure 8: Number of pages viewed per visit

- Another research have revealed that, during the registration period (02/16/2003-02/20/2003), there occured 4360 new visits and 1639 unique visits, which shows that they visited the web page before.
- From 11/24/2002 00:00:00 - 03/09/2003 23:59:59 time period, the visitor's average visit length was about 5.57 minutes.
- There are some visitors who searched in google.com or yahoo.com, found METU-Online, then came directly from these pages. 83 visits out of 36,139 came from google.com, and 35 visits from yahoo.com. 11.16% of the visits searched with "metu online" keyword in google.com, and the same happened with 6.79% in Yahoo. These keywords and phrases showed that only a few number of the visitors are aware of METU-Online.

These results from web log files reveals on which time segments do the visitors use the system more. Moreover, the analysis results showed that there's a sudden drop with the number of second visits of the visitors and average visit length is no more than five minutes. Using this information, we can deduce that visitors may not be grabbing the information on the web page they are looking for.

Customer Differentiation:

In this section, problems and needs of instructors and students are explained in detail resulting from surveys and interviews, In addition to instructors, courses design unit who are also the stakeholders of the system were asked about the problems and expectations about the system. Table 7 in Appendix B is the results of interviews with the stakeholders about METU-Online.

Most problematic area (depicted in Table 7 in Appendix B) was the uploading and writing the lecture notes. Eigth instructors (out of fifteen) stated that they did not know how to write HTML files and found it difficult to upload these files with FTP programs to the system. Students have declared that it takes a long time to load the web pages, since most students access METU-Online from home or work not necessarily having a fast connection. According to course design unit, course materials should be prepared by instructors before web team works with instructors. The reasons for these various problems may be because of lack of communication among different stakeholders, or systems organizational structure.

All problems and expectations are listed within groups in Table 8 in Appendix B in summary. Lecture notes, technical problems, password problems, navigation problems and publicity are first five problems. The problems, needs and expectations, which are grouped together as related to the study based on CRM perspective is seen in Figure 19 in Appendix B. Lack of information for users on the web page, publicity, usability problems, attractiveness of the system, lack of evaluation, responsiveness of METU-Online, lack of information about technical properties are problems points with relation to CRM approach. Recommended design described in Chapter 4 is expected to solve these problems.

In addition to interviews, survey result gives sufficient information about students. These are mentioned below as follows.

- 36% of students thought that NET-Class help pages are effective.

However, 22% of the student did not agree (Appendix D Q10).

- 25% of the students faced with technical errors on METU-Online. Moreover, 22% of the students thought that some server/network errors have occured while they were studying online (Appendix D Q12, Q14).

- Students mostly used lecture notes (45%) and gradebook (5%), however, they had experienced more problems in grade book (21) (Appendix C Q2, Q3).

- When the students have a problem, 70% of the students mostly prefer to ask instructors or friends. 13% of them send e-mail to system administrator and 19% write forums. However, 17% do nothing. This shows that there is a problem with communication channels (Appendix C Q4).

- Most of the students answered Q5 in Appendix C as "communication between instructor and students" and "lecture notes", these two features are main items that need improving.

- 38% of the students stated that METU-Online meets with their expactation and needs. However, 24% of the student defined their opinion as "neutral", and their opinions should be further investigated.

Moreover, there were open-ended questions in both surveys. Lecture notes, communication problems and system problems were mainly covered by students. These problems are shown in detail in Appendix C Q6, Q12 and in Appendix D Q16, Q21.

From these problems and expectations, in order to give recommendations, it is useful to define a Customer Life Cycle since every user has different needs and expectations within different time slices. To realize and differentiate the users of the system, the students and instructors must be defined within each cycle. The problems and expectations can be matched with these stages.

- **Awareness and explorations:** the stage at which the user (instructors, students) becomes aware of the METU-Online.

- **Commitment:** the stage during registration of both students and instructors.
- **Course Conduct:** the stage where the relationship between METU-Online and users are becoming crucial to get loyal instructors and students.
- **After Course Conduct:** the stage where the instructor and students get a final idea about METU-Online and get a total satisfaction or dissatisfaction.

To look over these stages; for instance, the students who are aware of METU-Online courses and system, want to find an introduction level of information. Mostly, students look for sample courses and course list on METU-Online during the registration period. Students' needs can be understood from the web log such that there is an increase during registration period to look for information, sample course and course list.

As seen in Figure 9, the students enter the system firstly in awareness and exploration cycle (numbered with 1). These needs are derived from problems, expectations, results of surveys, interviews and problems in METU-Online core business processes. The needs of students in "Awareness and Exploration" are information about METU-Online, information about NET-Class, specific information about system, information about processes to registration, channels to get information about how to register a course. Then the students are in the commitment phase, course conduct phase and post course conduct phase. Students' needs in each cycle are depicted in Figure 9.

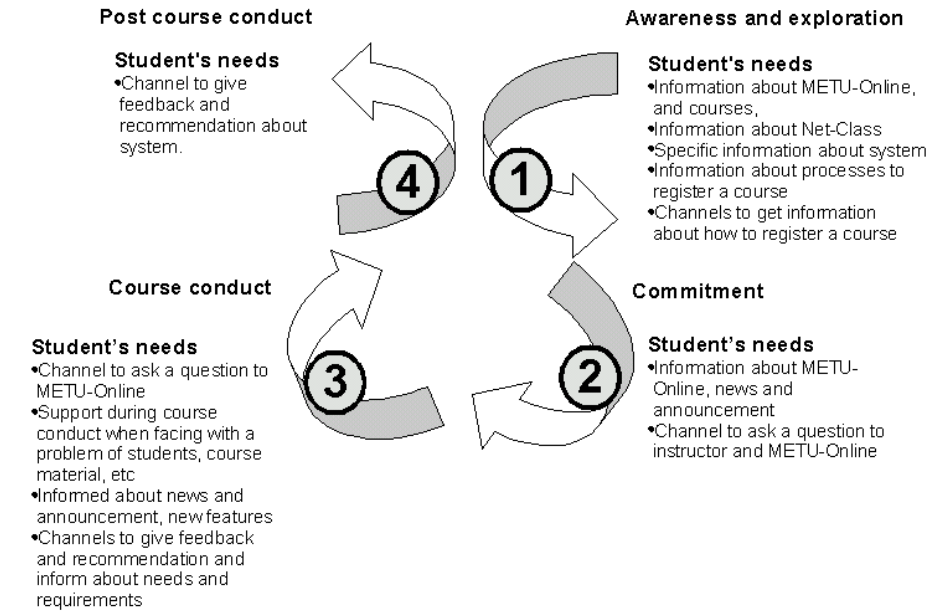

Figure 9: Student life cycle with needs

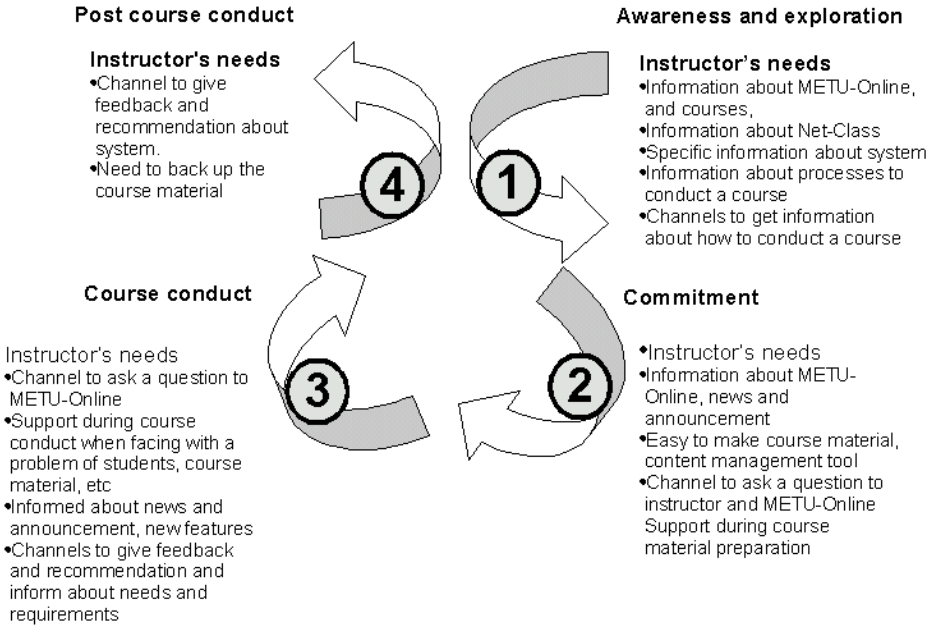

Figure 10: Instructor life cycle with needs

In addition to student life cycle, an instructor life cycle can be drawn including instructors' needs. In the first stage (awareness and explorations), instructors, who want to make their lessons on METU-Online, cannot find information related to these procedures easily. Information needed at each stage is depicted in Figure 10.

3.2. CRM analysis of METU-Online System

The ongoing CRM awareness is based on some small applications. For instance, the communication can be divided into five parts which are instructor-instructor, instructor-METU-Online, instructor-students and students-METU-Online and student-student. The system has only one type of relationship with instructors or students via e-mail. Even in this case, there is a problem that some students do not get their e-mails.

The instructor who has a problem, solves it via e-mail or phone call. However, the problem may be solved by using the information on the web page, too. Users usually waste time by sending e-mail to the instructor and waiting for the answer instead of just looking at the web page, due to lack of information on the web page. The information is not specifically classified for different types of users. This may be a reason for users to send an e-mail to the instructor.

At the end of each semester, in order to get feedback from students, METU-Online provides an online evaluation form. However, the feedback does not help improve METU-Online services, since the analysis of the evaluation forms and the nature of the evaluation forms do not reflect the students' ideas. On the other hand, the instructors cannot see the results of these evaluations to improve their courses. The instructors want to give feedback about their course and the system as well. The information needed by users is not defined; therefore, neither statistics are kept, nor analysis is performed about that information.

As can be seen, current CRM approaches on METU-Online do not include specified procedures, even the existing actions are done in almost an ad-hoc manner.

CHAPTER 4

CRM SYSTEM DESIGN FOR METU-ONLINE

The organizational changes to be implemented in this chapter are derived from some malfuctionalities of business processes and with relation to the units, and due to some problems such as publicity, attractiveness of the system, responsiveness of METU-Online explained in Chapter 3. In addition to the problems, various needs of different users let the system design concentrate on more organizational changes and information flow among units. The system design also points out about gathering feedback from users by different channels due to the the requirements of fresh and new data about users' needs, expectations and problems. The analysis generated from these data, data storing methods, and feedback mechanism are explained in this chapter.

4.1. Recommended Organization Structure For the CRM System

We recommend tree main organizational units for METU-Online system.

1. Informatics Group
2. System Maintenance Unit
3. Pedagogical and Academic Support Unit

These units report to the Management Board. Figure 11 shows the recommended organization structure for METU-Online.

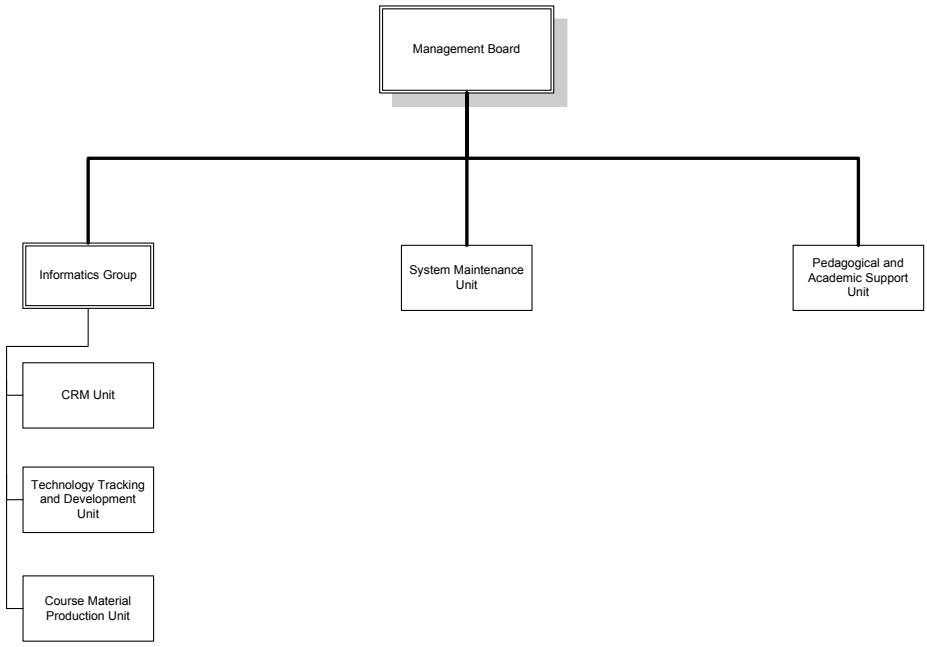

Figure 11: Recommended organizational structure

In this organization structure, METU Computer Center supports the System Maintenance Unit. Moreover, a member of Pedagogical and Academic Support Unit can be from Department of Computer Education and Instructional Technology. Since Informatics Group coordinates all units, it can be seen as the core of the system. Informatics Group includes CRM Unit, Technology Tracking and Development Unit, and Course Material Production Unit. Units and their responsibilities are explained briefly below.

Management Board and responsibilities

- Prepares strategic plan utilizing also the results of the analysis conducted by CRM unit.
- Monitors performance of the system.
- Find resources for growth of METU-Online.

Informatics Group and responsibilities

- Coordinates units such as CRM Unit, Technology Tracking and Development Unit and Course Material Production Unit.
- Responsible from the growth of the METU-Online by extending the usage of METU-Online to other universities, meeting in-service training requirements of other ogranizations, and extending the usage of METU-Online in METU.
- Defines, manages and records the contact persons who are employed outside the METU.
- Monitors, manages and records the activities of sales people or sales teams who are METU-Online staff contacting with other organizations/universities.
- Records the delivery information of instructor, and other organizations/universities.
- Manages, schedules, pays and hires/fires people for its units.
- Arranges appropriate instructors and assistants for the courses.
- Contributes to the Management Board.

CRM Unit and responsibilities

- Supervised by the Informatics Group.
- Coordinates the support to instructor by means of pedagogical, technical or course material production.

- Provides technical and troubleshooting support for students.
- Prepares reports based on usability studies.
- Prepares materials such as manuals for effective use of the system by the instructors and students.
- Integrates communication channels based on instructor, student and visitors needs.
- Analyse distance education market in Turkey and abroad. Identify the scope and customers of other learning management tools and system using in Turkey.
- Investigates the tools and systems, which can be competitors to METU-Online in the long run and investigates courses/programs which meet the students, other organizations/universities' needs.
- Defines the instructors' and students' needs in METU. Collects data from surveys and interviews. In each year, apply interviews to instructors. Conducts satisfaction surveys at the end of each semester. Arranges meetings with METU-Online staff and instructors every term.
- Develops marketing action plans in order to get more customer satisfaction, extend METU-Online and improve effective usage of METU-Online.
- Prepares various campaigns for other organizations/unviersities. Negotiates with these customers about promotional offers such as changing tools and features according to these customers' requirements.
- Tracks feedback analysis about customers' reactions on campaigns, such as promotional offers.
- Prepares proactive campaign activities.
- Prepares analysis about surveys, and reports them to Management Board and Informatics Group.
- Prepares customer (students, instructors, and visitors) profiling

information.

- Prepares and reports evaluation and feedback analysis, then sends the results to instructors as well.
- Performs web log analysis.
- Performs trend analysis.

System Maintenance Unit and responsibilities

- Responsible for daily maintenance of local systems (back-up, minor problem solving).
- Administrates local systems.
- Ensures security of local systems.
- Uses ORCA password database instead of issuing a new password for user in order to login to METU-Online.

Course Material Production Unit and responsibilities

- Responsible for preparing materials for courses on METU-Online.
- Reports any comments and feedback from instructors to CRM unit.

Technology Tracking and Development Unit and responsibilities

- Tracks the latest technology.
- Develops and maintains METU-Online tools.
- Responds instructor requests related to latest technology.
- Reports comments and feedback of instructors to CRM unit.

Pedagogical and Academic Support Unit and responsibilities

- Provides pedagogical support to instructors.
- Prepares training programs for academic staff.
- Reports any comments and feedback of instructors to CRM unit.

4.1.1. Relationships among the units

Relationships among the organizational units are illustrated in Figure 12 in Appendix C. Moreover, general view of the system, including Management Board and all units are depicted roughly in Figure 13 in Appendix C.

The relationship between CRM Unit and Informatics Group is important for the system's survival. As seen in Figure 13, another crucial relationship is between the instructor and CRM unit, since the instructor could not find any units to contact with. Seeing that the instructor may request to make a course online, or to learn any procedures for online courses including semi-online, full online and online support. Moreover, the instructor may ask or request anything during or after course conduct. CRM Unit is interested in all these requirements, demands and wishes from students, instructors and others. Therefore, the CRM Unit is the contact unit of the system with the customers.

For instance, if the instructor wants to make his/her course online, he/she can communicate with CRM unit to learn about procedures, responsibility of instructors and METU-Online. If course material production, pedagogical or technical support is needed, the CRM Unit notifies Informatics Group about requirements and staff request for these supports. Since Informatics Group is responsible from the human resource management, Informatics Group requests about the staff from related unit for the instructors and sends this information to CRM Unit accordingly. After that, CRM Unit may check whether the support activity process continues or a problem is encountered. At the very same time, during these activities, units that give support to instructors, report these problems, needs and requirements to the CRM Unit by sending the reports in electronic format, and the system stores these reports in a database.

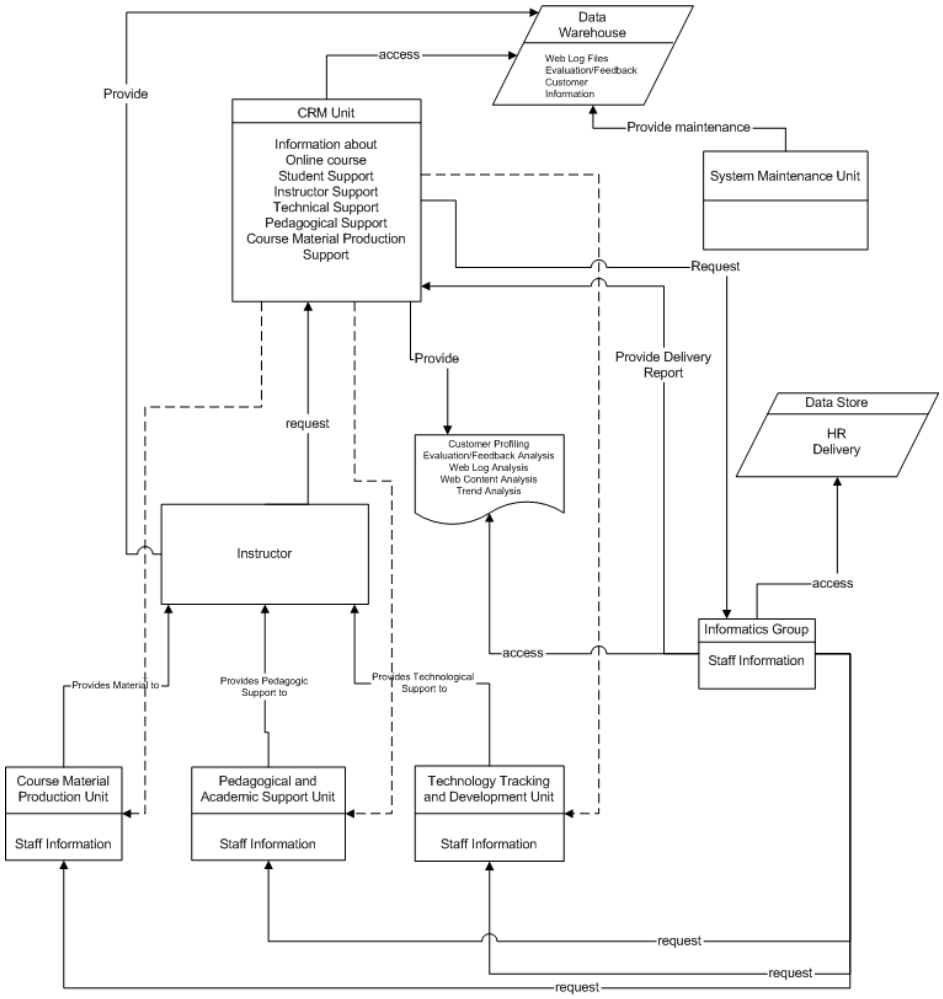

Figure 12: Relationships among units (Instructor's point of view)

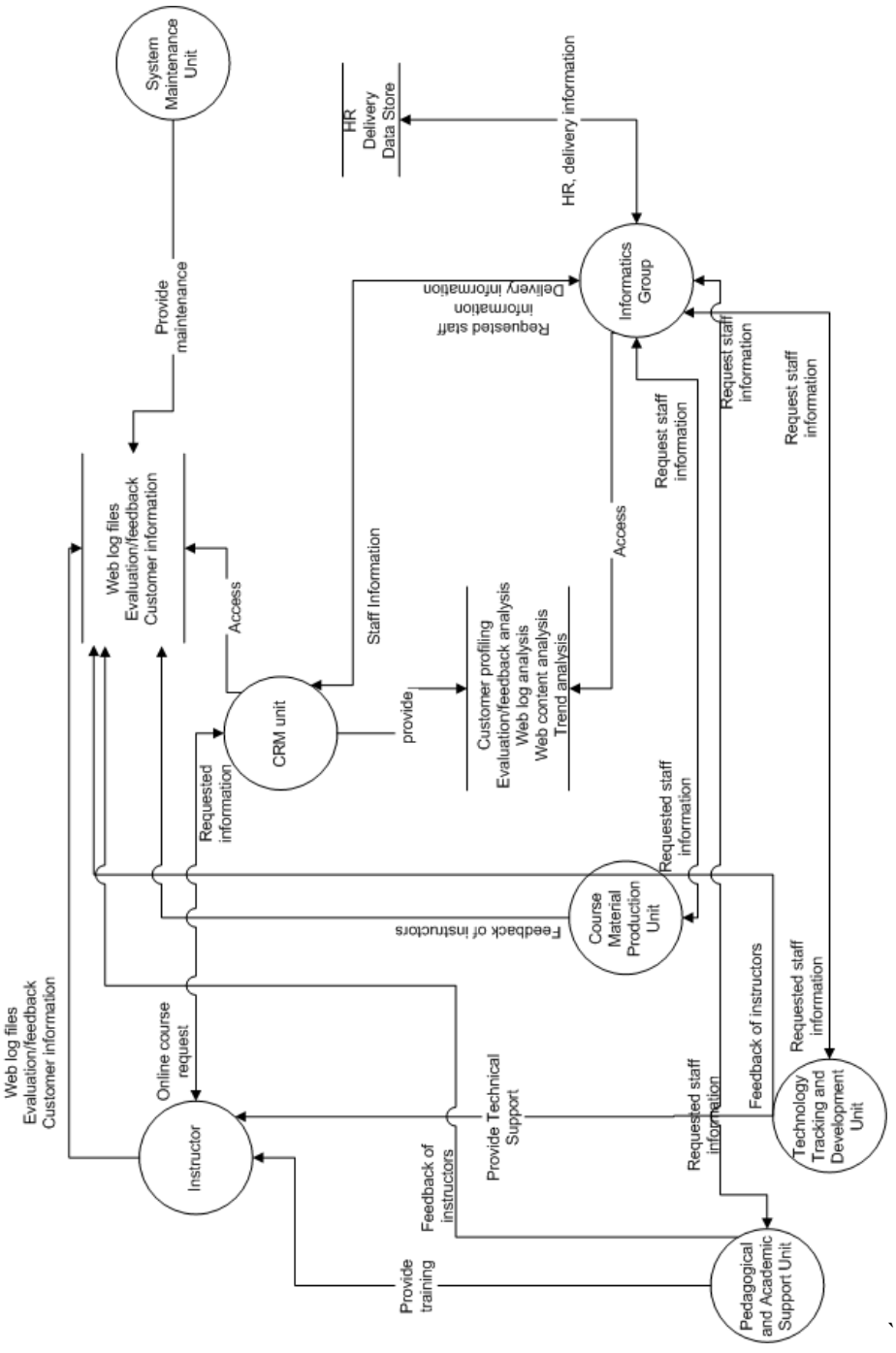

Figure 13: METU-Online data flow diagram

In addition to these relations, there should be regular meetings among units, including the Management Board. Management Board develops a strategic plan by utilizing the results of analysis conducted by CRM Unit. Derived from these strategic plans, units such as Informatics Group, Pedagogical and Academic Support Unit and System Maintenance Unit, develop their own action plans and report it to the Management Board. Since CRM Unit, Course Material Production Unit, and Technology Tracking and Development Unit are under supervision of the Informatics Group, these units develop their action plans with the Informatics Group certainly based on the strategic plan.

4.2. Recommended changes on business processes

The system's core business processes are Student Registration, Instructor Sign-up, Course Conduct, Post Course Conduct, and Publicizing METU-Online. In addition to these processes, METU-Online has some processes that were implemented in an ad-hoc manner such as human resource management, sales and delivery, and marketing.

Some improvements are recommended by considering the problems in these business processes and customer requirements from each business process, Table 6 shows the summary of recommendations from CRM perspective.

Table 6: Recommendations for CRM design in all business processes

Recommendations for CRM system design					
Stakeholder	Student Registration	Instructor Sign-Up	Course Conduct	Post Course Conduct	Publicizing METU-Online
Student	Redesign of web page based on e-quality approach to reflect the students' needs Easy access to sample courses Have a chance to access the course and instructor information on the web page Specification of the registration process and necessary information on the web page		Getting student support from CRM unit Implementing a mechanism to accept ideas and criticisms about the system on the web page	Implementing a mechanism to accept ideas and criticisms about the system on the web page	Redesign of the web page Publishing the seminar information and effective announcement on the web page
Instructor	Accessing the student information from the newly designed web page	Facilitating all the processes and publishing this information on the web page Preparation the course materials by using a content management tool and supporting the instructor from other units	Inform instructors about new tools and features vie web page and e-mail Implementing mechanism to submit recommendations and complaints Support from CRM team Implementing a tool for the backup of the course material	Let the instructor give the recommendations about system and courses Implementing a mechanism for collecting recommendations from students Implementing a tool for course material backup	Redesigning the web page Publishing the seminar information and effective announcement on the web page
Visitor					Redesigning of web page Defining communication channels Communication with CRM team

	Recommendations for CRM system design (cont.)				
	Student Registration	Instructor Sign-up	Course Conduct	Post Course Conduct	Publicizing METU-Online
CRM Unit	Web page usability process Implementing a mechanism for stakeholders to give feedback on the web page Provide a solution with the help of call center Prepare a analysis of web log files Store data in the data warehouse Prepare analysis with the help of the appropriate datamining tool	Implementing a mechanism for stakeholders to give feedback on the web page Getting information from units which are relations to instructors Store data in the data warehouse Prepare analysis with the help of the appropriate datamining tool	Implementing a mechanism for stakeholders to give feedback on the web page Prepare a analysis of web log files Store data in the data warehouse Prepare analysis with the help of the appropriate datamining tool	Implementing a mechanism for stakeholders to give feedback on the web page Store data in the data warehouse Prepare analysis with the help of the appropriate datamining tool	Giving information to the user groups with relations to their characteristics which is defined by the stores data and analysis

Student Registration Process

The suggested modifications are based on the analysis of business processes, surveys, evaluations and interviews with the stakeholders. The recommendations are listed below.

- Student support should be provided by CRM Unit.
- The system should let the students and instructors use ORCA's password to login METU-Online.
- During the registration period, students want to know about the courses, instructors and METU-Online system. The METU-Online web page should include these information based on informativeness.
- The students may need to get information about new courses for the current semester. The METU-Online web page should include course instructor, instructor phone, address, web page, and course information.
- User manuals should be easily accessible and should be upgradable reflecting students' requirements.
- The web page should include daily news and important announcements during registration period.
- The communication channels such as e-mail and web should be available for students in order for them to ask questions.
- Sample courses should be easily accessible by students.

Instructor Sign-up Process

It is predicted that major alterations will occur in Instructor Sign-up Process. CRM Unit should provide instructor support. Other changes can be observed in business processes the instructor is involved in. These are listed below.

*Getting information about METU-Online***:** The instructors can get information from channels such as web, e-mail, forum, phone and direct meeting. The channels can be seen in Figure 14, in the communicational

CRM part.

*Designing course material web pages***:** When the instructors need help about designing a course material, they can use the communication channels to submit their request to CRM unit. The procedure is shown below:

- CRM Unit informs Informatics Group about the request from instructors.
- Informatics Group looks for appropriate staff from Course Material Production Unit, Pedagogical and Academic Support Unit and Technology Tracking and Development Unit, if needed.
- CRM Unit checks support activities from these units whether the process continues, or not, or any problems have occurred.
- Pedagogical and Academic Support Unit may give training about online learning environment, and make the concept design of instructor's courses.
- Instructor may prepare course material with the help of Pedagogical and Academic Support Unit and Course Material Production Unit.
- If there is an additional need about technological support, Technology Tracking and Development Unit provide technological support to instructor.
- Designing the course web pages should be easy and intuitive for instructors with the help of Content Management Tool which is a tool for instructors that lets them generate lecture notes more easily.
- Instructors should also use their ORCA user name and password with METU-Online system. The instructor may also use the tools such as syllabus, course outline, schedules, and so on during collaboration with the team to design course material with the help of the course management tool.

Course Conduct Process

These processes consist of solutions which rise from the problems faced by students and instructors in online learning environments. Main points of the

course conduct are shown below

- During course conduct, the password problems will be vanished since the system uses METU computer center's user databases like ORCA passwords.
- The channels should be defined like web page, e-mail and forum beforehand, therefore the students and the instructors feel free to ask a questions in any of the channels.
- The web page should be designed with the quality standards information, so the instructors or students can get information about news, new features and new tools up-to-date. This information should be sent to users via e-mail as well.
- The system should let the instructors back-up some files such as lecture notes, assignments, and announcements with new added functionality.

Post course conduct process

Instructor is the main actor this process. Based on instructors' needs and expectations, the following solutions are recommended;

- The instructors should make evaluations for students about courses.
- The instructors should get the results of evaluations that are held by METU-Online since CRM Unit sends each result to the METU-Online instructors.
- The instructors should give feedback about courses and utilization of METU-Online to Informatics Institute.
- The instructors should backup Lecture Notes, Grades, Announcements, Assignments, and so on.

Publicizing METU-Online process

Since CRM Unit is responsible for marketing, they develop an action plan of marketing by using results of analyses, such as customer profiling,

evaluation and feedback analysis, web log analysis, web content analysis and trend analysis. Based on action plan, CRM Unit should send information about METU-Online to various departments of university by surface mail and e-mail.

CRM Unit should prepare seminars about available tools and current features of METU-Online for instructors. The system should give enough information on the web site for each type of users on the web pages.

4.2.1. Interaction among customers and METU-Online

There are five basic types of interactions shown below.

- **Instructor-Instructor:** Interaction occurs via the forum of the METU-Online. This communication is crucial since they have a chance then to share their experience of the system and distance learning environment.
- **Instructor-METU-Online:** Web, e-mail, phone, forum and feedback survey are the tools to communicate with the system.
- **Student-Instructor:** The communication is either directly or via electronic channels. The main tool to communicate is the forum and e-mail. Announcements and assignments are also one-way communication tools.
- **Student-Student:** Forum is the main tool for students to communicate with each other.
- **Student-METU-Online:** Forum, e-mail, survey, and web are the main channels for interaction.

Channels depicted in bold face in Communicational CRM in Figure 14 is recommended for future use for virtual universities.

4.3. Recommended CRM Model For METU-Online

The CRM model for METU-Online consists of three parts, namely Communicational CRM, Analytical CRM and Operational CRM. The

effectiveness of the system comes from successful integration of these CRM parts. A general overview of CRM model including all parts is depicted in Figure 14.

4.3.1. Communicational CRM

Communicational CRM involves customer touch points of the system. Web page, forum, survey, e-mail, phone and direct interaction are used during this study (depicted in bold, underline style). However, voice chat, fax, letter and call center can be new touch points of the system.

The channels are used to collect data from instructors, students and others. Communicational CRM defines the interaction among customers. When deciding new communicational channels, the most effective ones should be selected.

4.3.2. Operational CRM

Operational CRM consists of business processes of METU-Online. The core business processes are Student Registration, Instructor Sign-up, Course Conduct, Post Course Conduct and Publicizing METU-Online. These processes are very much in relation with CRM operations. CRM operations are like a connection between channels and the core business processes. In CRM operations, data and information coming from communicational channels are used in core processes to make the system efficient and effective. CRM operations are defined under CRM unit's responsibilities in Section 4.1. Furthermore, human resource, delivery and student affairs are business processes of the METU-Online as well. Student Affairs System affects METU-Online processes and procedures since the rules about registration are derived from the Student Affairs System. Moreover, Student Affairs System is partially interacted with METU-Online data warehouse since the system can check and access student registration data.

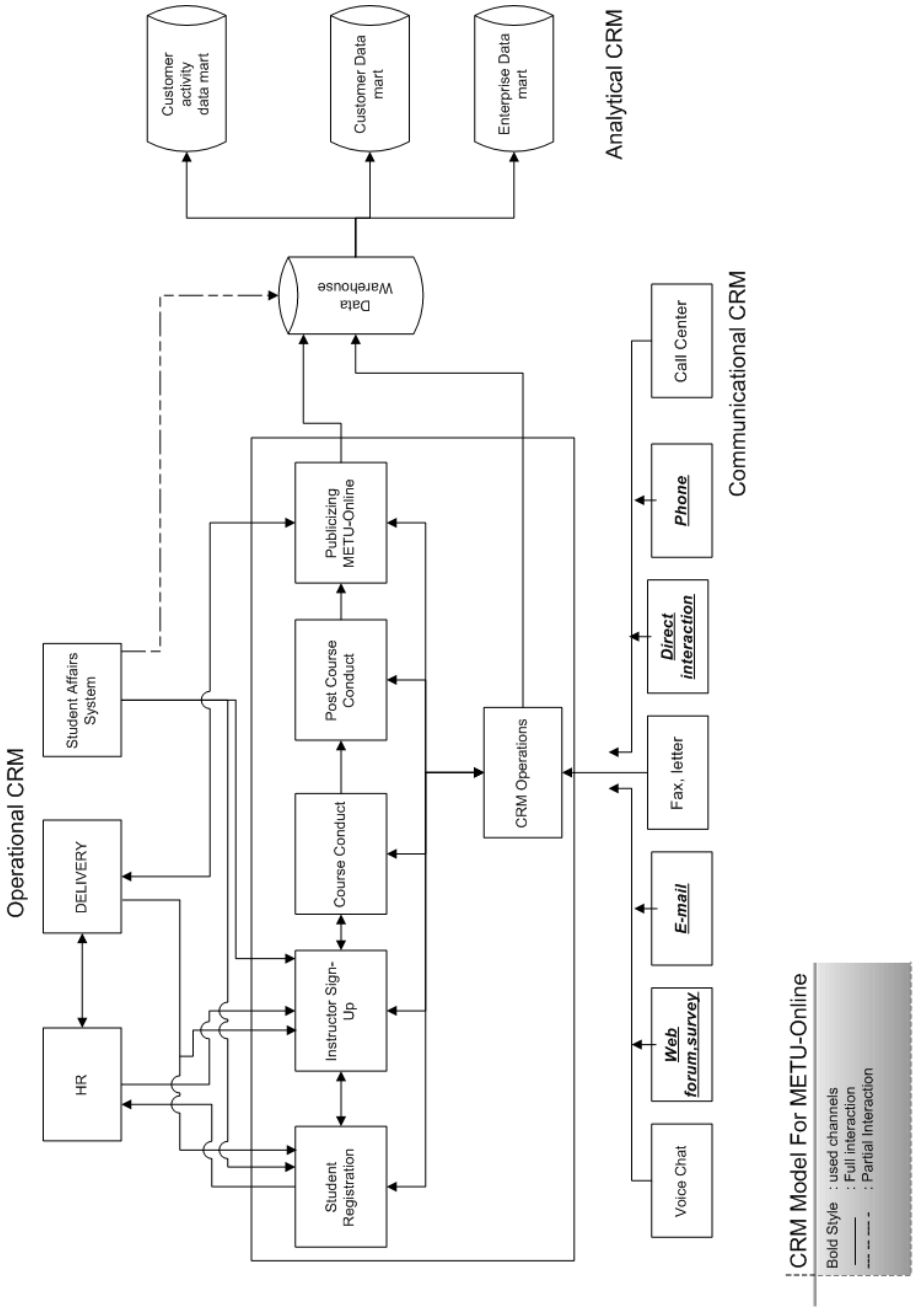

Figure 14: Recommended CRM design for METU-Online

4.3.3. Analytical CRM

Analytical CRM includes strategies and tools to understand the general profile of customers. In Analytical CRM, major points are capturing data from customers electronically, storing, interpreting, analyzing them, and finally reporting this data in an understandable way. Analytical CRM is a must to develop a CRM model for METU-Online. There are three data marts recommended in this system namely as Customer Activity data mart, Customer data mart, and Enterprise data mart.

Enterprise data mart: includes data related human resource, and delivery of METU-Online.

Customer activity data mart: includes data such as web log files, forum, e-mail, survey, feedback and evaluation information.

Web log files give clues about course users' activities such as students and instructors, as well as prospective user's activity such as METU students. Different types of customers from different courses, different classes, and so on, and their activities can be derived from web log files. For instance, we can ask questions like "What percent of Industrial Engineering students use METU-Online with the aim of only looking at the grades?" This will be helpful for METU-Online to understand the reason of using the system. With the help of web log files and using an appropriate datamining algorithm, this kind of information can be easily retrieved.

Moreover, the critical activity for specific types of users, and a specific activity which users' group deal with, can be concluded from web log analysis. These analyses should be conducted at the end of each semester, based on the corresponding semester's web log files. Information about student profile versus student activity can be concluded from these types of analyses that affect METU-Online strategy as well. For instance, with the help of datamining, we can find out answers to the questions like "what type of questions do sophomere students mostly ask?", or CRM unit can find out

the preferences of students during the selection of a communication channel when asking a question about METU-Online. This will be helpful for METU-Online to understand the efficiency of the system. Similarly, it can be found by datamining "What percentage of students who login the system from other universities, look for a specific course information?". From the answers of these types of questions, METU-Online can see the most anticipated courses from external users, and marketing strategies can be developed accordingly.

Moreover, information on the web should be designed based on information quality perspective. The new design is carried out with the help of the usability study as well. Web content analysis shows the result of the information itself and its usage on the web by the students', instructors' and visitors' points of view.

In addition, customer profiling information consists of users' needs, wants, patterns, communication channel that users prefer, behavior and demographic information. These are derived from several sources of data such as web log files, survey, evaluation/feedback, e-mail and from customer data marts as demographic information and additional information.

Keyword and pattern analyses could be applied to forum, survey, e-mail, evaluation and feedback. The problems, expectations, and complaints can be gathered from keyword and pattern search. Evaluation/feedback analysis uses these keyword and pattern results. When the instructor changes, the system may give the new instructor information about the topic mostly seen in e-mail, forum, and feedbacks. With the help of appropriate datamining methods, these hot topics can be found easily.

Customer data mart: Demographic information should be in that data mart. For students, instructors and visitors, there is also additional information required to be stored in that data mart. This information can be obtained from surveys, feedback, and direct interaction, which can be:

For students,

- Type of online courses (fully online, partial online or support)
- The place of internet connection (from home or computer labs, and so on)
- The web page which she/he visits most frequently

These types of information will be useful when matching the type of students and his/her activity. For instance, some students mostly visit science web site. From the datamining, it can be found "which type of courses are preferred by which type of students?" Therefore, METU-Online may arrange new courses for that type of students.

Moreover, information about the types of courses and internet connection can be used in making customer profiling analysis. The web page frequently visited reflects students' behavior and preferences.

For instructors,

- Which universities he/she worked abroad
- His/her research area
- Courses he/she has taught and number of times taught

If the instructor has worked abroad, then he/she might have used another e-learning management system. This way, METU-Online can benefit from this experience.

For visitors,

- The subject to be searched
- Whether he/she found the information on the subject or not
- Whether he/she is satisfied or not
- His/her e-mail address

This information is helpful during the web content analysis. For instance, the CRM unit can find an answer for the question: “Which questions are mostly asked?”. Moreover, the CRM Unit can communicate with the visitor via e-mail, therefore getting an e-mail addresses is critical.

In addition to customer profiling, evaluation/feedback analysis, web log analysis and web content analysis, trend analysis can also be performed based on customer activity data mart and customer data mart. Trend analysis is either marketing or tool effectiveness related. Marketing related analysis affects strategies of METU-Online. Tools and features are developed with the help of tool effectiveness analysis.

Some examples of marketing related trend analysis are shown below.

- What is the percentage of the increase or decrease in the number of instructors, students and courses?
- What is the number of courses, instructors and students in each faculty?
- What is the percentage of students using the METU-Online actively?
- What is the number of visitors using the METU-Online web page for each semester?
- What is the number of students taking one course, two courses or more?

Some examples of tool effectiveness analysis are:

- What is the usage of tools and features for each course, for each faculty and for each semester?
- Which tools are used mostly/not used in which courses? (Defines the users’ needs)
- What is the number of requests from METU-Online to solve a problem by e-mail, web, phone or direct interaction for every 100 students? (This defines the efficiency of system, and this number gives the decrease or increase that can be observed by each year) .

Application of design features

With the approval of Informatics Institute, some design items features have been applied to the system. These are described in the following:

- Information was categorized according to the needs of students, instructors and visitors.
- New announcements and necessary information like manuals, quick guide, and the instructor application were placed on the web page.
- Frequently asked questions were developed by utilizing e-mails and phone calls from users.
- Policies were developed regarding accounts and system maintenance.

In accounts, the METU-Online policies are defined as follows

  - Who can get a METU-Online account?
  - Account generation
  - File manager policies (about disk quota)
  - Data restoration

System maintenance includes scheduled and unscheduled maintanence.

- Users cannot find a place to ask questions/give feedback on the web page. Therefore, with four questions the users can write their opinions about the system. This helps us understand visitors' needs. These are;
  - Enter your e-mail adress.
  - Did you find an answer to your questions? (Yes/No)
  - How long have you been on this web site to find the answer to your questions (1-5 min, 5-10 min, 10-15 min, 20-30 min, more than 30 min).
  - Please write your comments.
- In addition to information related requirements of users, usability issues

were also analyzed. Some tools and features are now more user friendly. For instance, the users are now able to access to the sample courses more easily with new design of the web page.

- Some little changes have been applied to the NET-Class tools such as forum, gradebook, assignment and announcement sections.
- Because of the difficulty in designing and uploading course pages, the Informatics Institute has decided to develop course management tools.
- The necessary infrastructure for a virtual university is currently being developed.

4.4. Implementation issues

In order to implement the recommended CRM design, we suggest to use an appropriate CRM software. This CRM software can be chosen from ones available as well as developed by METU organization. All CRM software has similar properties and cannot be differentiated between each other at the first glance. However, before deciding on a CRM software, some limitations and difficulties should be taken into consideration.

First of all, the organization should prioritize business functional needs and understand the technical properties of CRM software with legacy system of organization, then the business organization should ensure the CRM vendors that address the business' CRM needs and definitions. After analyzing the work flow of the business, the organization should realize how the work flow tools of CRM software can impact the business processes. Moreover, the organization should get knowledge about all CRM vendors.

Generally, all CRM software architecture includes

- **Access layer:** Phone, web, e-mail, forum or survey
- **Routing layer:** Intelligent routing from access layer to CRM application layer

- **CRM application layer:** Sales/sales management application, customer service application, marketing application and other applications
- **Technical infrastructure layer:** N-tier architecture such as business logic and workflow
- **Core functionality layer:** Databases such as customer data mart, customer activity data mart and legacy data mart (Goldenberg, 2003)

There are other constraints apart from those about software about the CRM system design for METU-Online.These are shown below.

- It is hard to make an organizational changeand is also difficult to manage the units. Data flow from customers to CRM unit may not be easily achieved.
- Educating METU-Online staff is imprtant for effectivly implement CRM design. It is important for METU-Online staff to have an information about data collection methods and reports generates from the analysis of these datas.
- It is required to hire new personnel for CRM unit such as business analist, marketing assistance.
- Bureucratic obstacles about changing the organizational structure can be considered.
- Integration of METU-Online databases with other legacy systems such as user accounts in Computer Center and registration in Student Affairs System is difficult.
- There is no need call center now, however, it may be required for the virtual university.

CHAPTER 5

CONCLUSION AND FUTURE WORK

In this thesis, a Customer Relationships Management system is designed and partially implemented for METU-Online. METU-Online, which is a distance education tool, is investigated from a different perspective of CRM and as an e-business. Main reasons in applying CRM to METU-Online are that CRM provides a systematic approach for METU-Online that helps the Informatics Institute become aware of the users' expectations, needs and the needs to improve the system. Therefore, a detailed analysis of METU-Online system is conducted for effective CRM system design.

In the analysis, first we defined the customers (stakeholders) of the system in order to draw a general view of the system and give answer to the questions as "Who is my customer?". Since METU-Online has a virtual university vision, these questions will be a crucial part of the thesis. Students and instructors are the main user types of METU-Online. Other organizations/universities, students affairs, visitors and METU-Online staff are the customers of METU-Online as well. Interviews are applied to students, METU-Online staff and instructors to define the needs, expectations and problems. Moreover, usability studies are conducted to instructors to define their problems that they did not mention during interviews. Web log analysis are conducted since it is the only way to have information about visitors. Results of interviews are depicted in Table 6.

With the help of interviews, core business processes and the problems of

stakeholders within these processes are identified. Investigating business processes helps us to design and improve these processes from the customer perspective. Moreover, customer life cycles are defined for instructors and students to catch the need at different stages. From business processes, needs and expectations, the problems of the system are clarified according to the CRM perspective. These problems are depicted in Figure 19. Problems such as publicity, attractiveness of the system and responsiveness of METU-Online let us change the organizational structure of METU-Online. The recommended organizational structure including units and their responsibilities are explained in Chapter 4 briefly. In addition to organizational changes, operating the system effectively, and storing data from users is important to improve the system continuously. Therefore, a model is described including communicational, operational and analytical CRM for METU-Online. This model explained in Chapter 4 briefly. Moreover, implementing a feedback mechanism is crucial to understand the users' problems and modify the problematic parts of the system. Figure 12 shows the relationship among units and information flow of METU-Online. During the thesis, some changes are implemented to METU-Online to solve the problem as lack of information for users on the web page, usability problems, lack of information about technical properties given in Figure 19. These changes are listed in Chapter 4.

This design affects business processes of METU-Online. Moreover, a cultural change in the organization is expected to occur towards a more customer-centered culture. Furthermore, the new design lets METU-Online manage the relationships between the system and users, and among users.

Moreover, despite of this advantage of the design, there are some obstacles in implementing the system design. Changing organizational structure, and hiring new personnel can be difficult due to the bureaucracy of governmental organizations. Moreover, integrating recommended database with the legacy system such that including user account in Computer Center may be difficult from the perspective of both METU-Online and Computer Center. Buying a

CRM software and customizing for METU-Online has its own obstacles and limitations. One of these obstacles is that it requires a long term and expensive integration. On the other hand, METU-Online can develop this CRM software using its own source, or with an out-sourced team. This way, the importance of a project management, documentation and standardized source code arises. Moreover, continuous improvement, getting data and information from users' can be had to until being a customer-centered organization as well.

This thesis also demonstrates principles and applications of various CRM approaches to distance education. Hence, it can be used as a case study for CRM training. In the future, analytical CRM part of the system needs to be developed further for METU-Online. The recommended changes should be implemented in. Moreover, some channels are depicted in the communicational CRM part in bold face. These recommended channels can be implemented in the system within the system's needs and scope changes in the future. Moreover, there are no or a few of CRM cases implemented. METU-Online can be an interesting case for its different business environment due to its distance education module.

METU-Online has properties of C2B2C e-business environment for their fully or partially online courses, and traditional business for their online support courses. Therefore, this thesis can be a guide for implementation CRM to distance education cases. This study has also implications for distance education. If the recommended database is established, researchers working on distance education can easily access valuable data related to their studies. They can also update the system for their own data needs.

Without analytical CRM, this model would not work. Additionally, the success of CRM projects stems from continuity of the study and system development. Therefore, in the future, system improvement should be pursued. The success of this study can only be measured then by various means such as increase in system users and their satisfactions.

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APPENDICES

A. METU-Online business processes

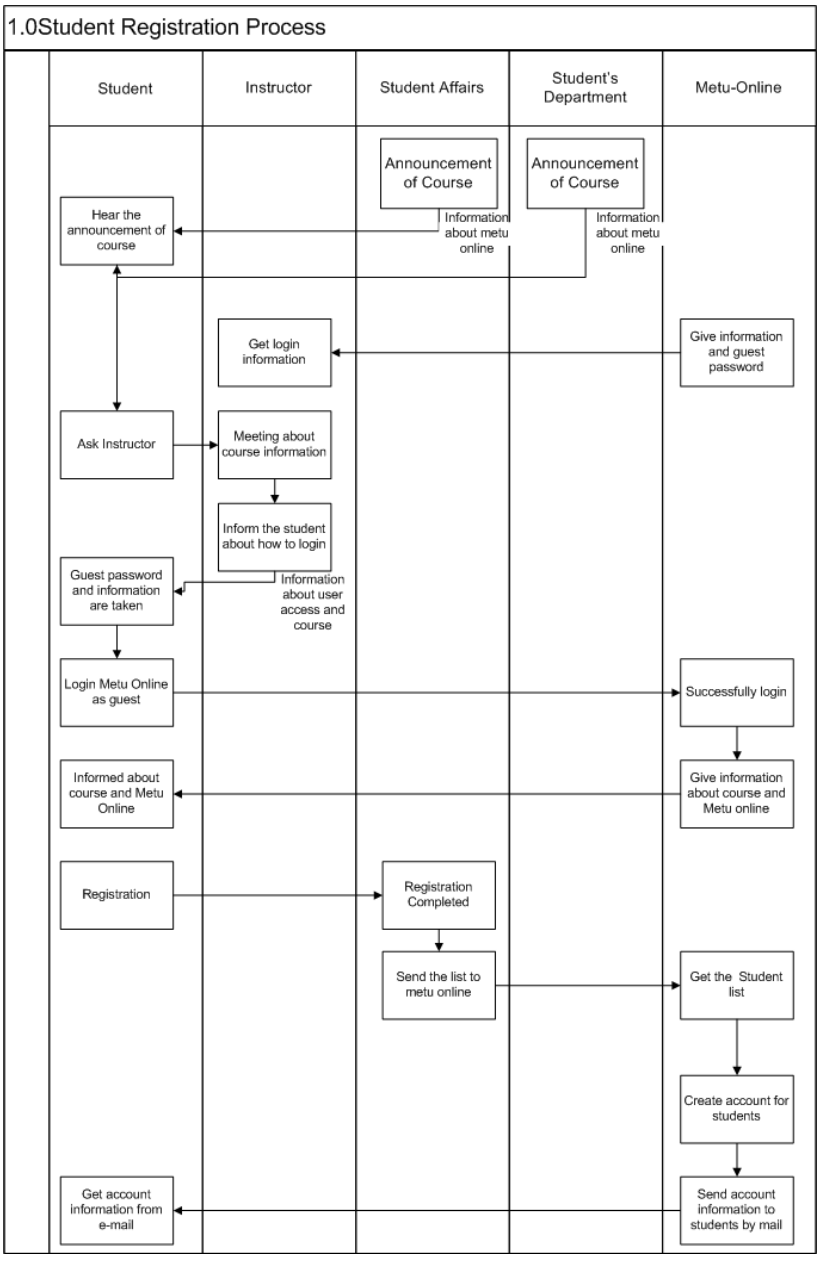

Figure 15: Student registration

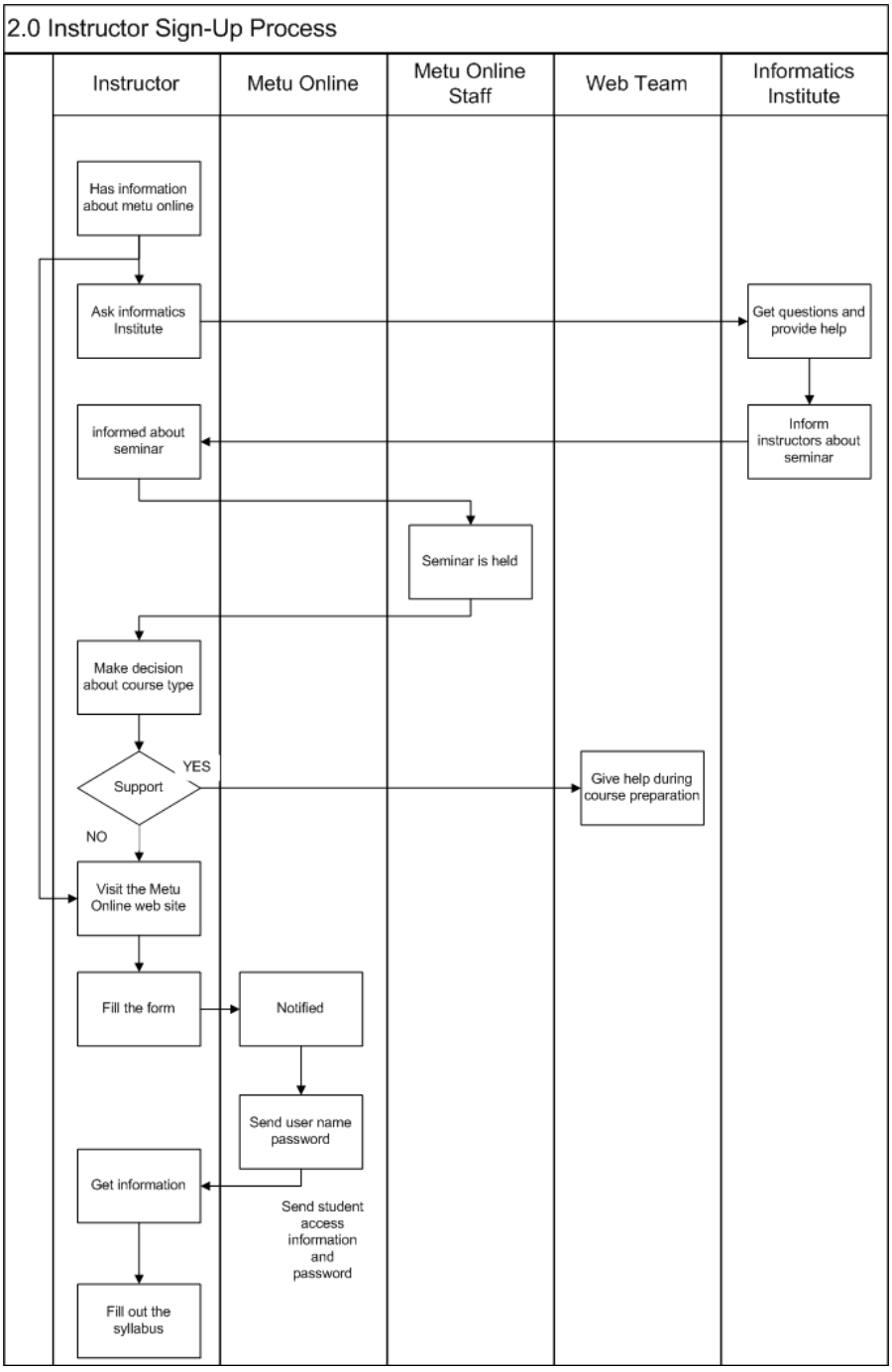

Figure 16: Instructor sign-up

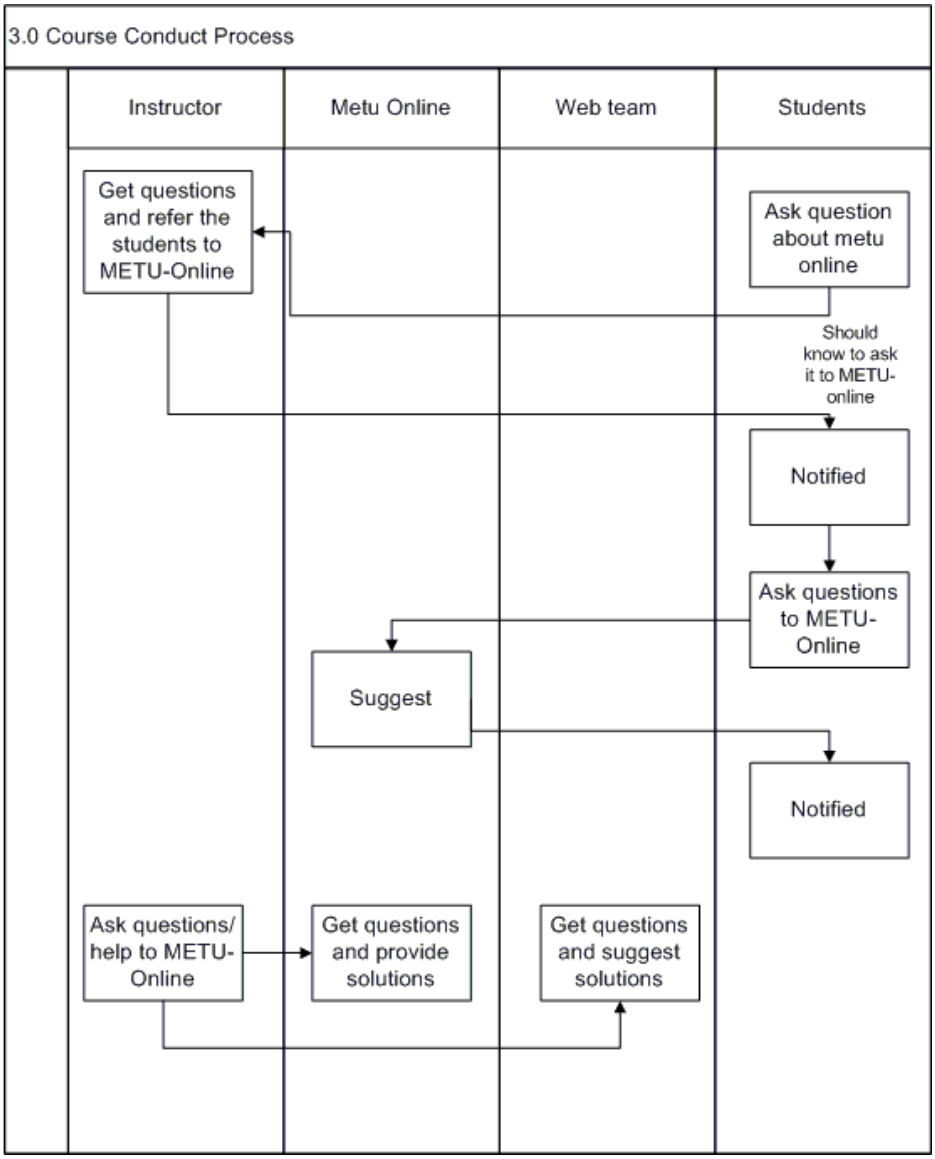

Figure 17: Course conduct

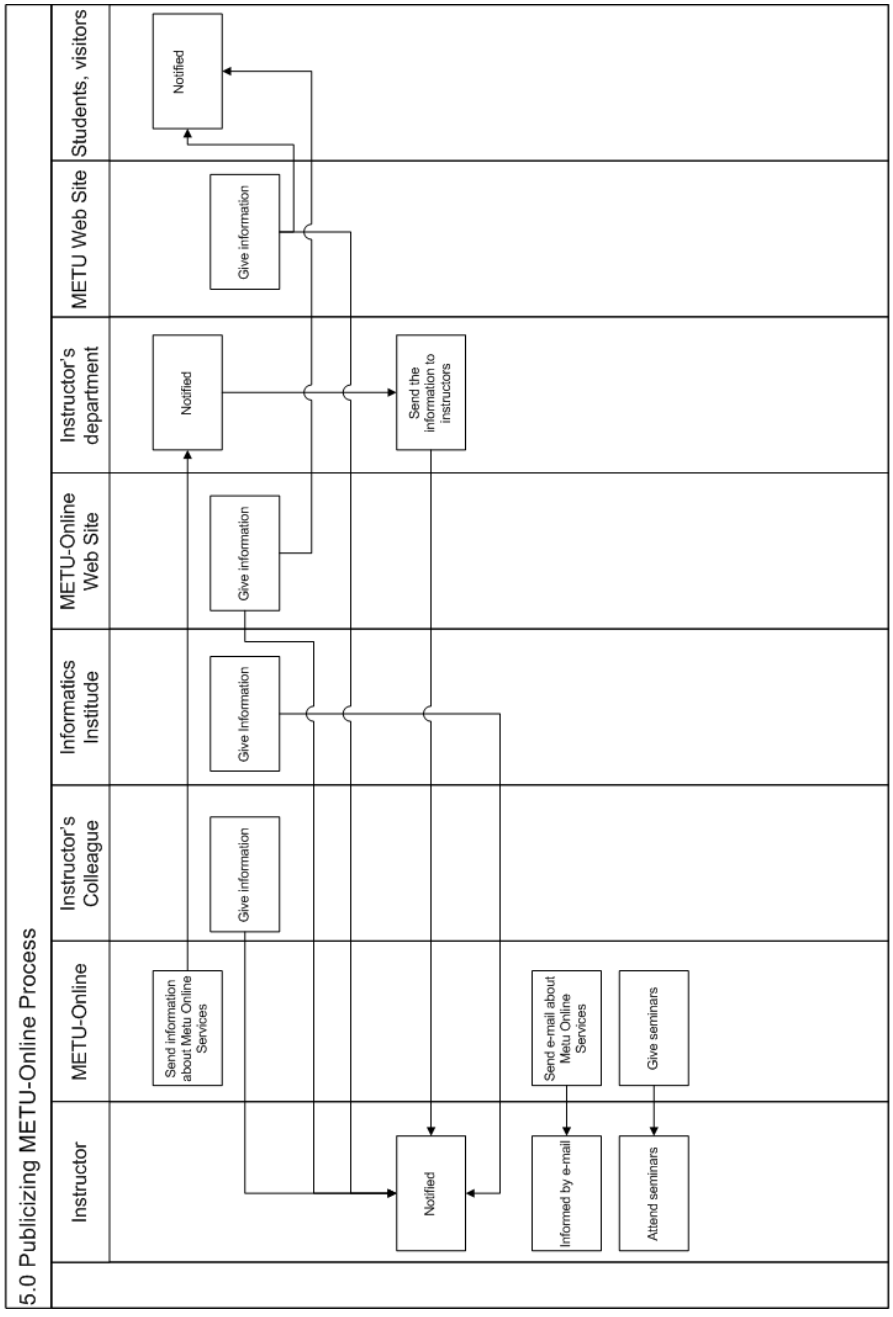

Figure 18: Publicizing METU-Online

B. Stakeholders' expectations

Table 7: Stakeholders' expectations

Who	Subject	Problem Points/Expectation	Suggestion	# of students
Instructor	Uploading and writing lecture notes.	Don't know how to upload the lecture notes and could not find information on the help. Don't know how to write lecture notes in HTML file.	There should be information how to insert the lecture notes and its procedures. This information should be easily reached and the procedures should be clear and easy. Should be like Create lecture and upload lecture on the web, not by using UNIX account. There should be an interface to used the ORCA's account. If the instructor has a problem, the instructor should know what to do, and know where to apply helping procedure may be clearly depicted. Need technical support to change the lecture notes.	8
Students	Lecture Notes	It takes a long time to load web pages.		8
Course Design Team	Lecture Notes	Instructor should prepare materials, course topics, etc before the making course on METU ONLINE.		2

Table 7: Stakeholders' expectations (cont.)

Who	Subject	Problem points/expectations	Suggestion	# of students
Instructor	Technical Problems	Technical problems cause trust problems. Errors and slow system,causes the trust level decrease. When there is an error messages, the instructor thinks that the problem is from him by fault? Technical errors bore the user. When the students press refresh button, the system makes the user begin the system again.	Technical staff may define the problems and make solutions.	7
Students	Technical Problems	Sometimes, pages don't show up properly.		7
Instructor	Navigation Problems	Announcement, assignment, lecture sections are divided. In the system, student tracking, forum and profile are in the same group. Schedule and syllabus are in different parts, this causes navigation problem.	Should be on the same page.	6
Students	Navigation Problems	Too much click in order to reach any portion of the web.		6

Table 7: Stakeholders' expectations (cont.)

Who	About	Problem points / expectations	Suggestion	# of students
Instructor	Publicity	The course needs advertising for other universities. Need information about metuonline via e-mail. It was understood from an e-mail that metuonline a full-online course. The systems convex shape limits its own improvement. The system should improve itself.	There may be advertising and marketing policy for other universities. Sending information via mail channels may be examine again, in the mail, information about grading, e-mail, forum facilities can be mentioned There should be advertising policy and marketing strategies, -Fast feedback -Change the system itself within that feedback -Get the feedback again.	6
Instructor	Accreditation	The procedure is not clear and who is responsible for the accreditation.	The procedure should be defined.	5
Instructor	Lack of Usability of Help Tool	Help is not intuitive enough, the student can easily get lost in the menu. There is an inconsistency in Help and Metuonline general interface. Some buttons such as back, home is faced with in HELP.	Additional effort may given to help menu, usability testing for that help feature may be conducted.	4

Table 7: Stakeholders' expectations (cont.)

Who	Subject	Problem points / expectations	Suggestion	# of students
Instructor	Usability issues of the system	The system is not user-friendly. To reach specific information in the system, the instructor should click on lots of buttons. Cannot attach file to an announcement.	Usability testing can be conducted.	4
Students	Usability issues of the system	Don't know how to use the system.		4
Instructor	Usability problems of Forums	There are two forums; one is for metuonline and the others for lesson. User get confused. In forum, there is a need to create thread. Forum is not easy to use, the students get lost. Some technical problems occur. Reply features is not working properly. It is not possible to attach file in the forum.	First one is called different from the FORUM. The forum logs can be easily monitored.	4

Table 7: Stakeholders' expectations (cont.)

Who	Subject	Problem points / expectations	Suggestion	# of students
Instructor	System is not attractive to instructors	The system makes the instructor job more difficult; the system is not attractive for the instructors. Lots of things to do for the instructor. They try to expand the lesson for more hour than course hour, but the system don't make it easy for the instructors. The instructors always deal with the problem.	Make communication channels to students via METU-Online Some attractive procedures should be conducted. -The instructor can not be deal with the bureaucracy -These process should be done by the secretaries of courses – -Resources: human, technical, managerial help may be given to instructors.	4
Instructor	Unclear and complex grade book	Grade book is complex and lacks enough information about the task. In grade book, the instructor insert the student list one by one. Want to see the some statistical information in grade book.	The instructor may upload an excel file for the grades. Including min, median, max in grade book. The excel sheet for the grade can be changed with the list of grade book.	3

Table 7: Stakeholders' expectations (cont.)

Who	Subject	Problem points / expectations	Suggestion	# of students
Instructor	Lack of information for users on web page	There is not enough or easy way to reach an information for the users or students on the first page of METU-Online. There is not enough information for the specific targets such as, students, instructors, guest and so on.	There is a need for FAQ. There may be a meta information for specific types of users, such as instructors, students, special students and guest The information should be divided according to the audience.	3
Instructor	Online exam and question bank	Exam is not clear, in question bank; the question is sorted by what. Online exam, some item is not clear such as out of and percentage.	In the question bank, the question may be sorted by date and alphabetic. This may be selective option. There should be information on the exam pages.	3
Instructor	Difficulties in writing Formulas	Superscript, subscript and formulas can not be written on METU-Online.	There may be a pop-up menu including formulas, superscripts and subscripts.	2

Table 7: Stakeholders' expectations (cont.)

Who	Subject	Problem points / expectations	Suggestion	# of students
Instructor	Lack of information about sample course	To see the sample course, the procedure is require to click much more link. There is not a demo page available for the course. Therefore, incoming users can not find the meta information about the course.	On the web, 'the sample course is available with this password' should be written. The user should reach the sample course easily. If the instructor wants his lesson be on the web for the demo pages or for some information, such as syllabus, outline, to be seen outside the users, this information should be easily reachable from web.	2
Instructor	Communication problem with METU ONLINE		The Processes should be defined and depicted clearly, and the instructor knows these processes and makes relations with the correct unit. This problem due to the interaction with the technical staff, web team, and the instructor.	2
Instructor	Lack of information about prior lecture	Assignment and announcement are erased at the end of the semester Lecture notes for prior semesters are not reachable.	Information may be sent to instructor before it, The instructor may be copy the ass and announcement tool Information to instructor may be given before the technical staff taking off the lecture notes.	2

Table 7: Stakeholders' expectations (cont.)

Who	Subject	Problem points / expectations	Suggestion	# of students
Instructor	Lack of making evaluation	Can not access the result analysis- of evaluation forms Don't know the evaluation forms,	Periodically, the analysis of evaluation form should be given to instructors.	2
Instructor	Sending e-mail tool	When sending e-mail to students, one copy of e-mail is not sent to instructor.		1
Instructor	Student tracking tool	Student tracking, is not easy understand-bin size? Student tracking has not enough properties.	Instructor should be able to see the tracking as weekly, monthly, There may be added information on the menus in student tracking.	1
Instructor	Search tool	Searching a student is possible for specific courses, not for all course.	There may be a search tool for the whole	
Instructor	Need for synchronized tool	Synchronous communication tools are needed		1

Table 7: Stakeholders' expectations (cont.)

Who	Subject	Problem points / expectations	Suggestion	# of students
Instructor	Need for the library available for the METU-Online.	Need for the library available for the METU-Online.		1
Instructor	Lack of Digital Library	How can we reach the library on METU-Online?	Digital library should be open.	1
Instructor	Need for pre-save tool on announcement, assignment	Before sending the announcement or assignment, there is a need to check it before.	Pre-save tool may be added.	1
Instructor	Inappropriate user auto logout mechanism	After 30 minutes unavailable, the system automatically logs the user off, meanwhile, the written text is gone.	30 minutes may be increased, or the system may inform the 30 minutes time limitations.	1
Instructor	Lack of information about technical properties	Information is not enough about the technical properties of the system, this causes some problem after preparing lecture notes.	Information about servers and the needed lecture notes may be explained in the web.	1

Table 8: Problem points of METU-Online

Problem Points	# of instructors
Lecture notes	8
Technical problems	7
Password problems	6
Navigation problems	6
Publicity	6
Accreditation	5
Lack of usability of help tool	4
Usability problems	4
Forum problems	4
System is not attractive	4
Special students	3
Lack of information for users on web page	3
Online exam and question bank	3
Difficulties in writing formulas	2
Lack of information about sample course	2
Communication problem with METU ONLINE	2
Lack of information about prior Lecture	2
Lack of making evaluation	2
Sending e-mail tool	1
Student tracking tool	1
Need for synchronized tool	1
Need for the library available for the METU ONLINE	1
Lack of digital library	1
Need for pre-save tool on announcement,assignment	1
Inappropriate user auto logout mechanism	1
Lack of information about technical properties	1

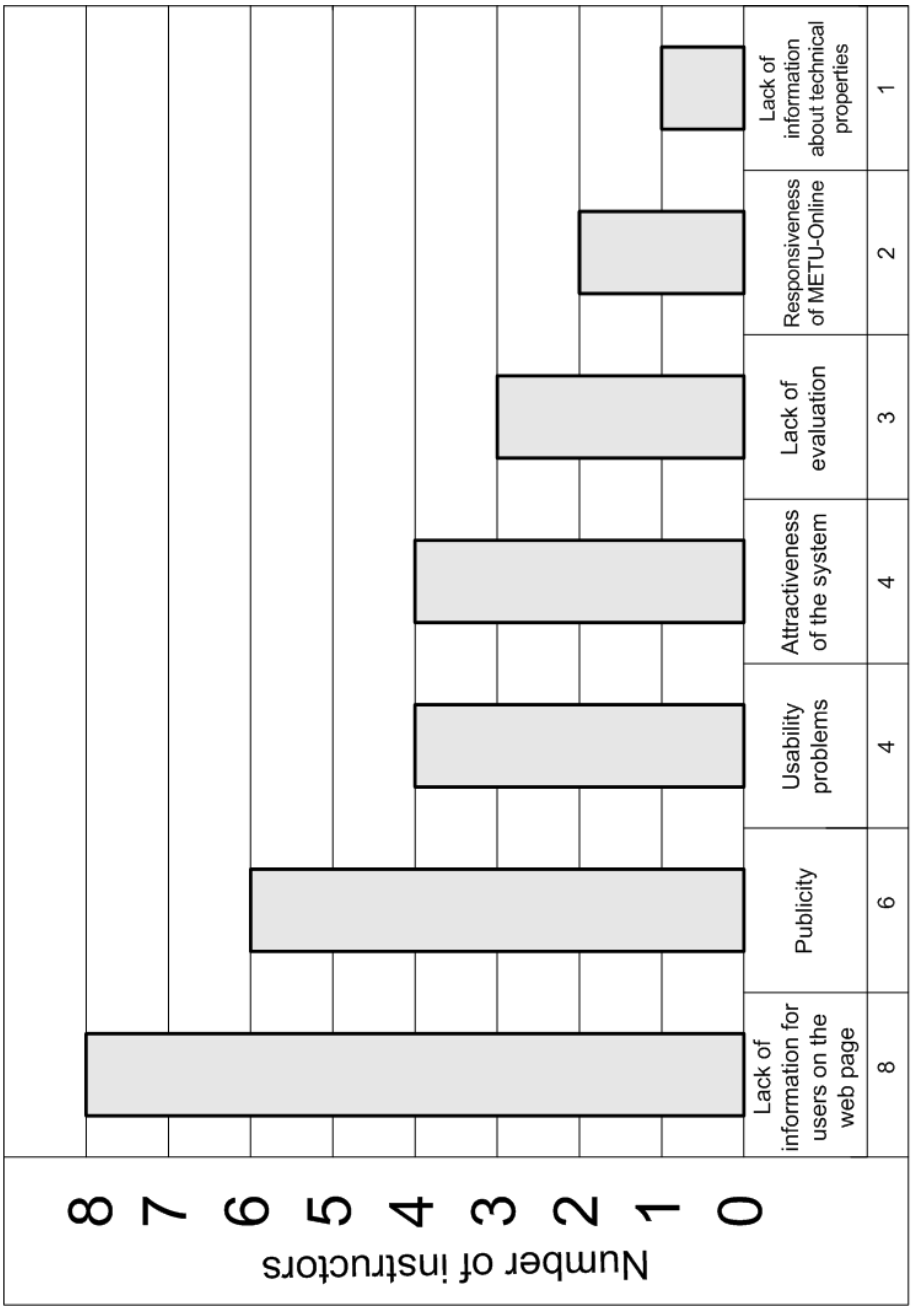

Figure 19: Problem points with relation to CRM

Table 9:Problems with current business processes for stakeholders

Stakeholder	Student Registration	Instructor Sign-Up	Course Conduct	Post Course Conduct	Publicizing METU-Online
Student	Lack of information about Metu-Online, NET-Class and registration process Difficulty with accessing information Problems with accessing sample courses Problems when communicating with instructor Password problems due to lack of information		Lack of authority to address the problems Inefficiency of communication channels	Inefficiency of commmunication channels	Lack of information on web page Lack of seminars and advertisements Lack of educational materials
Instructor	The demand of students for information about the system and registration process	Lack of information during the preparation and presentation of course materials Difficulty and lack of support with course material preparation Filling a new form each semester again Uploading the course material to the system via ftp program	Lack of information about the new features and tools on the system Lack of authority to address problems The inability to backup the course material	Inability to find a channel to give feedback about the course and system The inability to backup the course material	Lack of information on the web page Lack of seminars and advertisements Lack of educational materials
Visitor					Lack of information on the web page Inefficiency of communication channels Lack of authority to address problems

C. METU-ONLINE Student Satisfaction Survey Results for 2002-2003 Fall

This survey was prepared during the course of this thesis study and made available at http://online.metu.edu.tr/online/survey between 8.01.2003 and 28.01.2003.
209 students answered the survey. At the end of the survey, students had a chance to play 3 little games. There were 12 questions, 2 of them were open-ended. The analysis and result are given below.

Q1. What is the type of distance learning courses you are taking?

Partially remote or mixed, with some face-to-face contact with instructors or students.	93	44%
Courses are predominantly taken in class sections; METU ONLINE is used as a supporter.	63	30%
Completely remote, there is no face-to-face contact with instructors or other students.	55	26%

Q2. Which one of the following features do you mostly use during your distance learning experience?

Lecture notes	94	45%
Announcements	50	24%
Assignments	24	11%
Lecture forums	20	10%
Grade book	11	5%
METU Online forums	10	5%

Q3. With which one of the following features do you experience more problems?

Grade book	43	%21
Lecture notes	35	%17
Lecture forums	33	%16
Announcements	31	%15
Assignment	30	%14
METU ONLINE forums	21	%10
Links tool	16	%8

Q4. When you have a problem with your distance-learning environment, which one of the following do you resort to solve this problem?

I ask a friend	90	%31
I ask the Instructor	57	%20
I do nothing	49	%17
I send e-mail to METU ONLINE administrator	38	%13
I write to course forum	31	%11
I write to METU ONLINE forums	22	%8

Q5. Which features should be improved to get a better distance-learning environment?

Communication between instructor and students, forum	114	%38
Lecture notes	106	%35
News pop-up menu	43	%14
Response to queries by METU ONLINE administration	39	%13

Q6. Which feature should be added to get a better communication in this learning environment? (35 students answered this question).

About lecture notes	
We need more detailed and well-prepared lecture notes	4
Lecture notes are hard to load	1
We need the summaries of lecture notes	1

We need text only version of lecture notes	1	
We need printer friendly lecture notes	1	
About communication		
We need problem-solving section on online lesson	4	
Quizzes and important news should be e-mailed	2	
We need feedback and self-evaluation features	2	
Multimedia-video-conf.	1	
Instant message feature, like icq	1	
Chat with METU-Online	1	
Online questions, past exams	1	
Short test to study	1	
Dates of meeting should be informed	1	
FAQ, online support pages	1	
No comment	9	
Enough, fine	4	

Q7. What problems do you encounter during your registration attending to this course?

Don't have any problem.	99	42%
Accessing METU ONLINE feature such as lecture notes, forum, announcement	61	26%
Login problem such as username and password	39	16%
Getting information about courses and METU ONLINE	39	16%

Q8. Overall, how satisfied have you been with your distance learning experience?

Satisfied	94	44%
Somewhat satisfied	83	39%
Very satisfied	17	8%
Very satisfied	12	6%
Very dissatisfied	9	4%

Q9. If you have a problem with METU-Online, which one of the following can be a reason?

Technical problems, errors and warnings	139	51%
Links do not work	52	19%
It takes fairly much time to load the pages	44	16%
Navigation is difficult	36	13%

Q10. Which one of the following can be a problem for you in distance learning environment?

Lack of face-to-face communication	115	%49
Don't have easy access to Internet	64	%27
Don't like sitting on a computer	56	%24

Q11. Is METU-Online easy to use?

Yes	124	59%
To some extend	77	37%
Not much	6	3%
No	2	1%

Q12. If you could change, add or improve any features of METU ONLINE, What would it be? (40 Students answered this questions)

About lecture notes	
Too much detailes in lecture notes	4
Downloadable version	2
Hard to load	1
Instead of downloading, copy .avi file to CD	1
Text only	1

Forum	
Forum is too complicated	2
Forum should be separated for sections	1
System	
System should be more dynamic	4
News and announcement should be sent to e-mail	3
Short quiz should be applied	3
Error, bugs, server problems	2
Communication	
Registration is a problem	1
30 min logout is a problem	1
Announcement should be improved	1
More information about system	1
Links do not work	1
Online quizzes should be developed	1
Color of background	1
No comment	12
Enough, fine	2
Lecture Notes	8

D. Online Education Tool Evaluation 2002-2003 Fall

Available at http://online.metu.edu.tr/online/evaluation between 25/12/2002 and 28/1/2003. 362 students filled the evaluation form. There were 3 parts and totally included 21 questions, 2 of them were open-ended. The analysis and result are given below.

PRELIMINARY INFORMATION

Q1. Have you ever taken an online course before?

No	304	84%
Yes	58	16%

Q2. What is your Grade Level?

2nd grade	170	47%
3rd grade	80	22%
MS	38	10%
4th grade	33	9%
1st grade	31	9%
PhD	10	3%

Q3. Are you working?

Not working	280	77%
Full-time	42	12%
Part-time	40	1%

Q4. Which days of the week do you most often access Online Education Tool?

Monday to friday	241	67%
Weekends	121	33%

Q5. When do you most often access Online Education Tool?

Night (7 pm-midnight)	180	50%
Evening (4 pm-7 pm)	74	20%
Afternoon (noon-4 pm)	73	20%
Morning (9 am- noon)	24	7%
Early morning (midnight-9 am)	11	3%

Q6. From where do you most often access Online Education Tool?

Home	166	46%
Work	163	45%
Student Lab	33	9%

Q7. What has been the average number of hours per week you have spent on the computer?

More than five	194	54%
Three-five	88	24%
One-two	80	22%

PART 1 YOUR NET-Class EXPERIENCE

Q8. NET-Class software was easy to use

Agree	148	41%
Strongly Agree	110	30%
Neutral	64	17%
Disagree	25	6%
Strongly Disagree	12	3%
Not Applicable	3	1%

Q9. Graphics and visuals used were attractive and effective in NET-Class.

Agree	126	36%
Neutral	109	31%
Strongly Agree	56	16%
Disagree	37	10%
Strongly Disagree	20	5%

Q10. Help pages of NET-Class were effective and functional.

Neutral	117	36%
Agree	105	32%
Disagree	45	15%
Not applicaple	37	12%
Strongly Disagree	21	7%

Q11. Software worked properly regardless of the type of your browser, operating system, computer capacity etc.

Agree	116	32%
Neutral	76	21%
Strongly Agree	65	18%
Disagree	58	16%
Strongly Disagree	35	9%
Not Applicable	12	3%

Q12. Software performed without technical errors (crashes, bugs, font problems, java support, etc.).

Disagree	91	25%
Neutral	91	25%
Agree	74	20%
Strongly Disagree	54	15%
Strongly Agree	47	13%
Not Applicable	5	1%

Q13. Help received from the instructor, or teaching assistant, or NET-Class service providers solved your technical problems.

Neutral	102	28%
Agree	87	24%
Not Applicable	67	18%
Strongly Agree	49	13%
Disagree	31	8%
Strongly Disagree	26	7%

Q14. There were no problems in accessing NET-Class due to server/network availability.

Agree	93	25%
Disagree	82	22%
Neutral	80	22%
Strongly Agree	60	15%
Strongly Disagree	44	12%
Not Applicable	3	1%

Q15. There were no problems with the connection speed.

Agree	113	31
Neutral	91	25
Strongly Agree	70	19
Disagree	47	13
Strongly Disagree	34	10
Not Applicable	7	1

Q16. Your Comments On NET-Class (41 students answered this question)

About lecture notes	
Lecture notes should be organized	1
Lecture notes should be open to everyone	1
System problems	
Bugs, errors and connection	7
Online exam	4
System infrastructure and support	3
News and announcement should be sent by e-mail	2
User interface	2
Good	11
No Comment	5
Don't like	1

PART 2 YOUR ONLINE EDUCATION EXPERIENCE EVALUATION

Q17. Online education helped me to use my time more effectively.

Strongly Agree	138	38%
Agree	101	28%
Neutral	85	23%
Disagree	20	5%
Strongly Disagree	16	4%

Q18. The online education meet with my expectations and needs.

Agree	123	38%
Neutral	102	24%
Strongly Agree	72	20%
Disagree	43	11%
Strongly Disagree	18	5%
Not applicable	4	1%

Q19. The online education helped me to understand course materials more easily and offer me opportunities to have more information at my interest areas.

Neutral	124	34%
Agree	109	30%
Strongly Agree	57	15%
Disagree	44	12%
Strongly Disagree	21	5%
Not Applicable	7	2%

Q20. Your overall rating of this online education experience is

4	142	39%
3	110	30%
5, the best	66	18%
2	30	8%
1, the worst	7	2%
Not applicable	7	2%

Q21. Your overall comments on online education (38 students answered this question.

About lecture notes	
Not good enough, exploratory notes	4
We need summaries	1
System	
We need online quizzes	3
There are bugs, errors, connection probs.	3
There are problems with forum	1
Good	12
No comment	4