Developing Web-Based Communication Media for Learning

Widyo Nugroho, Ichwan Suyudi, Fikri Saleh, Taufik Hidayat
Gunadarma University
Jakarta

Abstract—The use of information technology in the area of education plays a major part in today’s learning technology development. Many new revolutionary ways of learning have been invented, thanks to the progress of the information technology. One of them that catches the world’s attention is e-learning technology. The vast growing usage of e-learning has just begun recently, not only educational institutions that are using it, but many companies are also using it to provide trainings for their workforces. The concern of this paper is why e-learning usage is not available to anyone in any part of the world so that each user can interact and share their knowledge each other. Besides, this paper also discusses how web-based communication media for learning can be developed as well as its effectiveness in view of its concept within the framework of e-learning.

Using e-learning which is absolutely dependent on the internet in delivering its content is very plausible to implement the concept of social community e-learning site which emphasizes on user interactions rather than one way static content distribution. Many social community sites have been created today, such as friendster and facebook. The idea here is to combine the flexibility of the social community site with the power of e-learning to deliver new revolutionary ways of learning.

The content itself has to be rich and employs all available media, so that the users can choose what kind of learning materials suitable to their needs. In this case, the content has to be in the form of multimedia. By using multimedia technology which is very rich and convenient, learning aids can be delivered to users attractively. Also, this gives the users new experience in learning.

Index terms—learning, web-based communication media.

I. INTRODUCTION

In the global era, communication has major role in the development of a nation. Communication as one of the collective efforts is demanded to continue and synchronized data, information, and action. In the education system, communication is formulated as a means to develop people that are indicated in the enhancement of knowledge, skills, competence, and individual and collective behavior. The important role of communication in education is strengthened by the implementation of information technology. Communication media has influenced almost every aspects of human life in different ways.

The media development according Ashby (1972:9) has brought two revolutions out of four revolutions in the education field. The first revolution is the time when parents assign other people-teachers-to educate their children. The second revolution is the time when written language is used as a means in the education. The third revolution is the use of printed material as a result of printing machine and printing technique in the education. And the fourth revolution is the widespread use of electronic media in the communication.

The use of ICT specifically computer (including internet) as a supporting tool in teaching-learning process is inavitable, since this tool has characteristics which are interactive and attractive while integrated within networks to allow people in different places to work together. This tool also provides communication facilities that could work synchronically and asynchronously to achieve a learner-oriented learning.

ICT has potential roles to be utilized in the education field. In the Ministry of Education blueprint, it is stated that there are seven functions of ICT. They are: as learning resource, learning aid, learning facility, competence standard, administration system, decision support, and infrastructures.

The recent development of e-learning is focusing on the content delivery rather than user involvement and user interaction with the e-learning system and also with the other users in the learning process. As the first implementation of e-learning, content delivery is the main focus, namely on how learning content can be delivered to users in the internet. This approach has been proven to work well. But the idea of e-learning is more than just content delivery, the way users interact with the content and with the other users becomes the main concern in today’s e-learning development.

The growth of social community networking sites has been high recently after the introduction of friendster and facebook, while the growth of e-learning sites is not as high as those social community sites. The main reason why the development of e-learning sites is still low is that many individuals
still think about content delivery rather than social interaction within the e-learning sites. Social interaction has been proven to be so effective to attract users such as in Facebook which demonstrated its gain of users. So why can’t e-learning employ the same concept such as social community site to enable user interaction within the e-learning sites?

The content of an e-learning site should also be improved, since the majority of e-learning sites use static contents as their presentation files. A more comprehensive content model has to be developed to give users more variety of learning media. By using multimedia content, more diverse selections of learning media can be created and delivered to the masses. Web-based communication media with the multimedia content can be such powerful means of learning for the masses.

II. MODEL, ANALYSIS, DESIGN, AND IMPLEMENTATION

The concept of web-based communication media had to be visualized to obtain a better understanding of the concept, so that a physical model can be built based on the existing conceptual models.

2.1 Main Theory

The main theory that is used here is derived from the profile methodology of the e-learning.

As can be seen from the figure 1 there are several ways of learning methodologies. The models on the left side are the conventional ways of learning, such as face to face learning and directed learning. But the models on the right are the more intuitive learning methodology such as distant learnings and open learnings.

Web-based communication media is value more on the right, which is the more comprehensive approach but did not diminished the right value which is the more traditional approach. The value on the left is emphasizes on the social interaction just like the concept of the web-based communication media, but the value on the left is the main concept of learning itself. The communication on this concept also derived from the time and space dimension of the e-learning.

![Fig 2. E-Learning Time and Space Dimension](image)

This model resembles with the way web-based communication media providing means of communication and interaction to its users. The communication is consisting of two different types of communication, the asynchronized models and synchronized models. The asynchronized models is a model which enables users to communicate without having the other user to participate in the same times, this types of communication can be achieved by using technology such as blogs and wikis or e-mails and forums.

On the other way around, this model is more sophisticated and harder to implement than the asynchronized models. It requires both participants to exchange information in the same time. Synchronized models can be achieved by using technologies such as live chat, video conference, and voice conference.

2.2 Design and Technology Used

The Design of Elearning.gunadarma.ac.id/~cai

Navigation Structure Design

The navigation structures used to design Elearning.gunadarma.ac.id/~cai is non-linear navigation structure, in which the sub-menu made in the non-linear on each page has the same position. There is no master page and slave page.

Next step is making the navigation map. Map navigation is the detail of navigation structures used. The navigation made for the Elearning.gunadarma.ac.id/~cai can be seen in the figure 3.

Page Design

In this stage, the design will show the basic format of Elearning.gunadarma.ac.id that contains home page, video on demand page, articles page, learning
site page, and learning site contact page. The format of the flows is described as follows:

Fig 3. Navigation Structures of Elearning.gunadarma.ac.id/~cai

1. Home Page
This page will show the first appearance of the site. This contains the explanation about the websites, short review of the articles, short review of video on demand, and short review of the courses.

Fig 4. Home Page Design

Figure 4 consists of:
1) Course Menu. This menu contains buttons directed to the subjects of Data Structures and Bahasa Indonesia.
2) Video on Demand Menu. This menu contains buttons directed to the page of Video on Demand containing tutorial videos.
3) Home menu. This menu contains Menu buttons directed to the main page of home page which shows articles about learning sites and contacts.
4) UG Services menu. This menu contains buttons directed to the links in Gunadarma websites, such as studentsite.gunadarma.ac.id, sap.gunadarma.ac.id, v-class.gunadarma.ac.id, etc.
5) The Logo of Elearning.gunadarma.ac.id/~cai
6) About learningsite. This menu contains the learningsite.
7) Brief about the Course. This menu contains brief explanation about the content of a course in Course Menu.
8) Brief about Articles. This menu contains brief explanation about the content of article menu.
9) Brief about Video on Demand. This menu contains brief explanation about video on demand on the video on demand.

2. Page of Course
This page contains the courses listed in the Elearning.gunadarma.ac.id/~cai. The format of this page is as the following:
1) Course Menu, This menu contains buttons directed to the subjects of Data Structures and Bahasa Indonesia
2) Video on Demand Menu. This menu contains buttons directed to the page of Video on Demand containing tutorial videos.
3) Home menu. This menu contains Menu buttons directed to the main page of home page which shows articles about learning sites and contacts.
4) UG Services menu. This menu contains buttons directed to the links in Gunadarma websites, such as studentsite.gunadarma.ac.id sap.gunadarma.ac.id, v-class.gunadarma.ac.id, etc.
5) The Logo of Elearning.gunadarma.ac.id/~cai
6) Introduction. This page contains brief explanation about the course learned
7) Brief about Course, Part 1. This menu contains brief explanation about the first part of the course in the Course Menu.
8) Brief about Course, Part 2. This menu contains brief explanation about the second part of the course in the Course Menu.
9) Brief about Course, Part 3. This menu contains brief explanation about the third part of the course in the Course Menu.
10) Brief about Course, Part 4. This menu contains brief explanation about the fourth part of the course in the Course Menu.

3. Page of Video on Demand
Content of this page is about tutorial videos listed on Elearning.gunadarma.ac.id/~cai. The format of the page of Video on demand is as the following:
1) Course Menu, This menu contains buttons directed to the subjects of Data Structures and Bahasa Indonesia.
2) Video on Demand Menu. This menu contains buttons directed to the page of Video on Demand containing tutorial videos.
3) Home menu. This menu contains Menu buttons directed to the main page of home page which shows articles about learning sites and contacts.
4) UG Services menu. This menu contains buttons directed to the links in Gunadarma websites, such as studentsite.gunadarma.ac.id, sap.gunadarma.ac.id, v-class.gunadarma.ac.id, etc.
5) The Logo of Elearning.gunadarma.ac.id/~cai.
6) About learningsite. This menu contains about the elearning site.

4. Page of Articles
This page explains about the content of learningsite.gunadarma.ac.id. This page contains:

1) Course Menu, This menu contains buttons directed to the subjects of Data Structures and Bahasa Indonesia.
2) Video on Demand Menu. This menu contains buttons directed to the page of Video on Demand containing tutorial videos.
3) Home menu. This menu contains Menu buttons directed to the main page of home page which shows articles about learning sites and contacts.
4) UG Services menu. This menu contains buttons directed to the links in Gunadarma websites, such as studentsite.gunadarma.ac.id, sap.gunadarma.ac.id, v-class.gunadarma.ac.id, etc.
5) The Logo of Elearning.gunadarma.ac.id/~cai.
6) Article 1. This button contains about the first article.
7) Article 2. This button contains about the second article.
8) Article 3. This button contains about the third article.

5. Page of Learning Site.
This page explains about the content of learningsite.gunadarma.ac.id. This page contains:

1) Course Menu, This menu contains buttons directed to the subjects of Data Structures and Bahasa Indonesia.
2) Video on Demand Menu. This menu contains buttons directed to the page of Video on Demand containing tutorial videos.
3) Home menu. This menu contains Menu buttons directed to the main page of home page which shows articles about learning sites and contacts.
4) UG Services menu. This menu contains buttons directed to the links in Gunadarma websites, such as studentsite.gunadarma.ac.id, sap.gunadarma.ac.id, v-class.gunadarma.ac.id, etc.
5) The Logo of Elearning.gunadarma.ac.id/~cai.
6) About learning site. This menu contains about the elearning site.

2.3 Early Physical Model
An early physical model was built using ASP.NET 3.5 for sites and Adobe Flash for multimedia content. The early model only consists of several functions described earlier in the conceptual model, the difference lies in the absence of wiki engine and synchronous interaction, whereas other functions were implemented flawlessly.
The early physical model is tested to a group of college students, using questionnaires to examine site effectiveness where the site has already underwent a rigorous compatibility testing and debugging. The result of the early physical model testing will be described briefly in chapter 3.

2.4 Research Methodology
The subjects of the research are the students of Gunadarma University. The research instruments are questionnaires with Likert scale measurement, with five scales (1 to 5) namely worst, bad, neutral, good, and best. The aspects of measurement are: quality and compatibility, visual quality, content delivery, and user interaction. Data were obtained from the questionnaires to be analyzed by using descriptive
statistical tests.

2.5 Data Analysis

The test is done to approximately 40 students that randomly picked from Gunadarma University. As listed in Table 1, responses for site quality and compatibility are quite good. Each variable has values range between 3.23 to 4.13 which are within the scale good and best. Here KK is the label for the indicated variables.

<table>
<thead>
<tr>
<th>TABLE I</th>
<th>Students response on the quality and compatibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>Minimum</td>
</tr>
<tr>
<td>KK1</td>
<td>3</td>
</tr>
<tr>
<td>KK2</td>
<td>2</td>
</tr>
<tr>
<td>KK3</td>
<td>2</td>
</tr>
<tr>
<td>KK4</td>
<td>2</td>
</tr>
<tr>
<td>KK5</td>
<td>2</td>
</tr>
<tr>
<td>KK6</td>
<td>2</td>
</tr>
<tr>
<td>KK7</td>
<td>3</td>
</tr>
<tr>
<td>KK8</td>
<td>3</td>
</tr>
<tr>
<td>KK9</td>
<td>3</td>
</tr>
<tr>
<td>KK10</td>
<td>3</td>
</tr>
<tr>
<td>KK11</td>
<td>2</td>
</tr>
<tr>
<td>KK12</td>
<td>2</td>
</tr>
<tr>
<td>KK13</td>
<td>2</td>
</tr>
<tr>
<td>KK14</td>
<td>2</td>
</tr>
</tbody>
</table>

Visual quality of the sites appears in Table 2, the result is outstanding with values ranging from 3.53 to 4.00, which are within the scale best. The boosting factor for this variable is the use of multimedia content possessing better visualization for learning content rather than ordinary documentary. The use of web interface also helped. KT is the label for the indicated variables.

Content delivery is described in Table 3. The result shows that it is very good where the majority of students responded with values ranging from 3.67 to 4.20 within the scale 1 to 5. This achievement was due to the usage of Adobe Flash multimedia application for learning content which give the user more interactivity with the content. PM is the label for the indicated variables.

User interaction is described in Table 4. The result shows that it is surprisingly very good with the majority of students responded with values ranging from 3.63 to 4.17 within the scale of 1 to 5, thanks to the concept of social community interaction within the site and the use of multimedia content. IP is the label for the indicated variables.

<table>
<thead>
<tr>
<th>TABLE II</th>
<th>Students response on the quality and compatibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>Minimum</td>
</tr>
<tr>
<td>KT</td>
<td>2</td>
</tr>
<tr>
<td>KT</td>
<td>2</td>
</tr>
<tr>
<td>KT</td>
<td>2</td>
</tr>
<tr>
<td>KT</td>
<td>3</td>
</tr>
<tr>
<td>KT</td>
<td>2</td>
</tr>
<tr>
<td>KT</td>
<td>2</td>
</tr>
<tr>
<td>KT</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE III</th>
<th>Students response on the visual quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>Minimum</td>
</tr>
<tr>
<td>PM</td>
<td>2</td>
</tr>
<tr>
<td>PM</td>
<td>3</td>
</tr>
<tr>
<td>PM</td>
<td>2</td>
</tr>
<tr>
<td>PM</td>
<td>2</td>
</tr>
<tr>
<td>PM</td>
<td>2</td>
</tr>
<tr>
<td>PM</td>
<td>2</td>
</tr>
<tr>
<td>PM</td>
<td>2</td>
</tr>
<tr>
<td>PM</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE IV</th>
<th>Students response on the visual quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>Minimum</td>
</tr>
<tr>
<td>IP1</td>
<td>3</td>
</tr>
<tr>
<td>IP2</td>
<td>2</td>
</tr>
<tr>
<td>IP3</td>
<td>3</td>
</tr>
<tr>
<td>IP4</td>
<td>2</td>
</tr>
<tr>
<td>IP5</td>
<td>3</td>
</tr>
<tr>
<td>IP6</td>
<td>3</td>
</tr>
<tr>
<td>IP7</td>
<td>3</td>
</tr>
<tr>
<td>IP8</td>
<td>3</td>
</tr>
<tr>
<td>IP9</td>
<td>3</td>
</tr>
<tr>
<td>IP10</td>
<td>3</td>
</tr>
<tr>
<td>IP11</td>
<td>2</td>
</tr>
<tr>
<td>IP12</td>
<td>3</td>
</tr>
</tbody>
</table>

III. RESULT

The results of this study show that web-based communication media concept can be used as guidelines for those who want to build such sites. The concept itself is proven to be hard to achieve in real world. However, it is possible to build such site by using the existing technology, many Content Management Systems already shows that's such a
concept can be made to reality with ease. But the concept of web-based communication media had several advantages and constraints. The advantages for this concept are

Available to All: By using the power of internet websites it is accessible to all over the world as long as one is connected to the Internet and no matter what device one uses.

Platform Flexibility: A website is accessible no matter what operating system or device is employed because web has open standard and cross platform compatible.

Powerful Means of Learning: By harnessing the power of the Internet, the concept of social community based e-learning will evolve as an alternative learning method.

Diversity in Content: By using multimedia technology, users can choose any kind of learning media suitable to their needs.

Better User Interaction: By using social community site for e-learning, users can interact with each other on the site.

Better Knowledge Sharing: Social community implementation also gives advantages for much better knowledge sharing than conventional content delivery.

Despite of all this advantages and despite the research that was done with the early physical models indicated good, there are several constraints in the realization of the concept.

Technology Diversity: Vast number of internet and web technologies can give the developer many selection tools but also development challenges.

Browser Incompatibility: This is proven to be a major problem of website. Incompatibility between the browsers has proven to be devastating.

Improper Content Material: Very large numbers of users submitting and sharing their knowledge within the sites can be troublesome to filter proper user content.

User Management: Management of user within the site where the user can share their knowledge and communicate each other is a challenging task. Many problems will occur and even more problems will come up as the number of users grows.

Development Challenges: The development of this concept is not an easy process, because it deals with many technologies and diverse fields of study, information technology, communication, and education technology. It requires joint forces to develop the concept.

IV. DISCUSSION AND CONCLUSION

This concept of a web-based communication media needs further researches or even tests, so that the concept can evolve as actual implementations based concept and can be used effectively as alternative ways of learning. The conceptual model is suitable for implementing the theoretical concepts in view of good feed back of the early physical model provided by the students. But it is still based on a rather insufficient sample of early physical model and conceptual models. Further research and development of an implementable ideal physical model is required to gain more actual benefits and to know more of the challenges for the concept so that the know-how of the concept has to be developed can be well improved.

REFERENCES


