ABSTRACT

Information Resource Center (IRC) in UTP has a huge collection of videos, including textbooks' tutorial videos. These videos are attached with the textbooks but for the security reasons, all the videos stored in CDs are placed in the shelves at Ground Floor, IRC. The number is huge, plus the indexing number of the CDs makes it difficult for student to locate and view the CDs. The CDs are also vulnerable to any damage and if there is any, the files may be damaged, corrupted and lost. UTP-Play is a website project which mainly aggregates this collection of videos under one site. It also gives the easier access for students to view the tutorial videos and most importantly, UTP-Play acts as a backup driver for these video; helping to preserve the video collection.

Several methods have been conducted in order to finish the project and of some them involving questionnaires and verbal interviews. The result from the questionnaire is used for the development of the project. Currently, UTP-Play is in its prototyping phase and by the time this dissertation is written, the website still going through several refining. In the future, UTP-Play is expected to have all collection of textbooks' tutorial videos in UTP.

Chapter 1

Introduction

1.1 Project background

Information Resource Center (IRC) is another name for library in Universiti Teknologi PETRONAS (UTP). IRC contains a huge number of books, ranging from academic to light reading. One of its collection; including textbooks, comprising of all subjects taught in UTP for different kinds of programs. For example, a textbook entitled Differential Equation for engineering students. The textbook has a number of editions, with updated syllabus and IRC stored all the versions or editions of this textbook into its collection. Like any other textbooks or reference books, each of these books has its own Compact Disc (CD) for video tutorial lessons. To prevent these CDs from being stolen or misused, IRC management have been putting these CDs under one section at the Ground Floor. Here, all of those CDs are stored in the shelves and to find these CDs, one has to know the index number of the textbooks. The index number of the textbook can locate the textbook of its position in IRC. For example, Environmental Science textbook 6th edition's index number begins with ES; so to search this textbook, one must find the shelves with label ES on it. Same thing goes to the CDs, but the CD shelves do not have index number labels on them. The index number is attached on the CD case. This can be difficult for a student to search these CDs if they do not know the index number.

Apart from that, CDs are vulnerable. What it means by vulnerable is that if there is damage on the CD physically, it will affect the files in the CD which in this case, the videos. This may harm the contents and if the CDs cannot be recovered, plus no backup files, the videos will be damaged, corrupted and lost.

1.2 Problem Statement

1.2.1 Problem identification

Assuming a student who wants to view a video tutorial about a particular subject in CD, there are several problems with the current process whereby the student needs to go through before he or she can study through video tutorials. Among them are:

1. **Huge number of collection**

   In IRC, calculating only textbooks, there are still a lot of textbooks in the shelves. This also means that the CDs for video tutorials are in a massive number too. For instance, for Chemical Engineering subjects, if we take out subjects from general engineering and humanities subjects, the total subjects/courses to be taken by a Chemical Engineering student is 27 subjects/courses. All textbooks relating to these 27 courses are in the collection and most of the textbooks have more than one edition. For example, course named Separation Process has more than two versions/editions of its textbooks. A student must know which edition is the lecturer using and by using that information, the student then can search for the textbook CD in the IRC. Then at the IRC the student needs to know the index number of the textbook and in order to do that, they need to search the location of the textbook in the library first. After finding the right index number, then the student can finally locate the CD. Also need to remember; same book with different versions/editions have two different index numbers.

2. **Accessibility**

   As stated before, the tutorial videos are contained in the CDs. These CDs are stored in the CD shelves at Ground Floor, IRC. For a student who does not now the existence of these videos, it will be difficult for them to

access these videos. Also, of all the CDs stored there, we can say not all CDs are functioning properly. For instance, while trying to view the CD for Java Programming, the CD cannot be read because the surface is scratched. The same thing also happened when trying to access Physical Chemistry's CD; the CD cannot be read because the system requirement is out of date. These showed that not all CDs are accessible and the indexing of the CDs based on textbooks' index number is not helping the student to easy access these videos.

3. **No backup files**

CDs are one of the storage devices for files, especially for videos. This is because the videos are easier to access through CD rather than, let say, video tape. Moreover, people are using CD player instead of VHS player nowadays. From this point we can say that using CD to store videos is more practical than using video tapes. Despite of the advantages, there is also one huge weakness of this data storage device; CDs are prone to be damaged easily by only one scratch. It is true. CDs are vulnerable. Only one scratch is needed to make the CD useless. Relating to the project, if these CDs are damaged or broken, the video files in the CDs are exposed to danger. Worst case scenario is the files may be damaged; means that we can access the CD but the video resolution is broken; corrupted or lost. With no backup of these video files, the loss of these videos is a great loss to the University.

1.2.2 Significance of the project

The significance of the project is derived from the issues addressed earlier. Among them are:

1. Aggregation of videos. The website aggregates the videos for a better browse of a particular subject/course.

2. Ease of access. The aggregation of these videos into one site will make it easier to access.

3. Data backup. This site will provide the backup data for these videos so that the videos will be preserved for future use.

1.3 Objectives and Scope of Study

1.3.1 Objectives

1. To aggregate these textbooks' tutorial videos into one site.
2. Ease of access for students to study via video tutorials from the textbooks.
3. Providing backup files for these videos.

1.3.2 Scope of Study and Limitations

For the scope of study of this project, UTP has taken into the scope. The main target of users for this website is UTP students who are having difficulties to understand a particular subject/course. For UTP students, there are mainly three categories of students. First is Foundation students, which refers to the students who are going through their foundation year in UTP. Second category of student is Undergraduate Students. These are students who are going through the Undergraduate Studies for degree in engineering or technology. The third category of students is Postgraduate students. These are students who have finished their degree study and continue their study in Master or PhD. Most of them are usually a Graduate Assistant; which mainly involve in teaching tutorials and lab

sessions in UTP. Since most of the students in UTP are consist of Undergraduate students, the videos in UTP-Play mainly cater for subject/course for Undergraduate students. Subjects/courses for Foundation and Postgraduate students will be added but for the prototyping phase, UTP-Play will cater the needs for Undergraduate students.

The website will be made public for UTP students but unfortunately not for users from outside UTP. Upon completion of this project, the website will be uploaded into UTP local server to make it private only for UTP student.

1.4 Relevancy of the project

In determining the relevancy and justification of the project, one must understand and analyze how the project will impact the target users and also the relevancy of technology used to pursue this project. Therefore, one must realize the impact of this project can give to UTP students. The impact of this project is taken into account when analyzing the relevancy of this project. Among them are:

1. Promote video/multimedia learning among UTP students. Video learning is one the most effective learning tool and it is not fully applied in UTP as for now.
2. Enhance student's understanding in a particular subject/course.

1.5 Feasibility of the project

The time allocated to finish the project plus research is given for four months. The research is mainly consists of series of questionnaires and analyzing what kind of tutorial videos are available in the IRC. In analyzing videos in the IRC, the textbooks' title is a crucial part in order to locate the videos. Next is developing the project. The developing of the project includes putting up videos to server and setup the website. The project prototype is finished within the timeframe given.

Chapter 2

Literature Review

2.1 Saving Our Digital Heritage

The digital era is upon us. We must preserve all of the important information so that it will not be lost in the future. Preserving these digital files has always been a concern to Information Management personnel. This is because the age of digital info is at its height and how to preserve them is a big challenge nowadays.

One said that advocacy is the important factor in choosing which method is the best to preserve digital files. Technologies are changing rapidly these days and everyday there will be a new product in the market. The only difference between these products is the functionalities and price. One product can be highly efficient, and also pricey. A product also can be cheap but efficient. That is why advocacy is an important thing in choosing the best methods for digital file preservation because it is up to them to choose which one is the best.

To save these digital files, policies also must be made. There are so many articles in digital formats nowadays and one issue concerns everyone: should we save the digital files or just only the hyperlink? There are various ways to preserve digital files, one of them are:

1. Print out the materials and stored it. This is a good idea to preserve the digital files but it will consume space and time to preserve these files and if the original document in the original sites changed, it will challenge the authenticity of the printed materials.

2. ASCII format. To use ASCII format to store these digital files are a brilliant suggestion but that only applies to Western-charactered files.

For other articles, such as in Chinese Language, the preserving process seems to be difficult.

3. Preserve all the software and hardware. This is a good solution whereby preserving the information in them. But it is difficult to keep them work for long time because with the new technologies, the compatibility with the old ones seems to be challenging.

Holistically here are many ways to save digital files. One must be taught of these methods and let him/her chooses which one is the best method.

2.2 Preserving local news

Preservation of local news is an important task because through news, we will learn a lot about history. Preserving traditional news media can be tricky. This is because:

1. Film reels decay.
2. Old photos bleached/damaged.
3. Constant changing in media storage medium requires the old storage mediums destroyed.

One has suggested that using current storage medium, all the news in the world can be stored in compact discs (CDs). Unfortunately, to store all these news, a petabyte size of CDs must be required and this seems to be impossible to fulfill.

In order to preserve local news media, there are several methods:

1. Capturing the news. Capturing the news including capturing the broadcasted news, online news and stored them. Between simple newspaper and online newspaper, both can be captured but the context in the online newspaper is less than simple newspaper.

2. Storage requirement for preserving local news is large. If we managed to preserve 4% of all news media in the world today, we will need a total of 10^6 GB and this is equivalent to 1000 times of one terabyte storage medium.

Medium	Annual storage requirements per outlet	Outlets	Total
Newspaper	353 GB	50	1.2×10^5 GB
Radio	250 GB	40	1.0×10^5 GB
Television (100%)	730,000 GB	40	2.8×10^7 GB
Television (4%)	33,000 GB	40	1.0×10^6 GB

Figure 2.2 (a): Storage requirements for each news media.

3. Selection. This involves the selection of news to be preserved. We must bear in mind that not all news can be saved because there is so many news in the world that need to be saved, and for that reason we only choose what needs to be saved for future use. As for today, news media changes and selection criteria of local news preservation need to be constantly evaluated.

Central management	$500K
Central data coordination	$500K
Software development	$500K
Five regional data centers ($300K each)	$1,500K

Figure 2.2 (b): Rough budget for a set of news collection center.

We cannot save all the news media in the world, but we can select which one needs to be preserved in order to make it last longer because of its rich context. Selection can be hard, that is why we must carefully choose and select.

Chapter 3

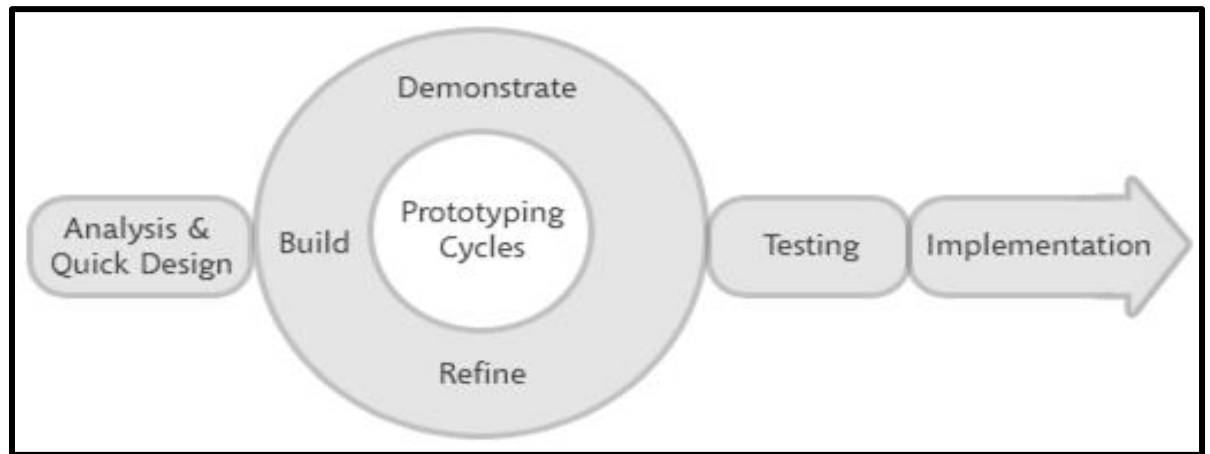## Methodology

3.1 Research methodology

Figure 3.1: Rapid Application Development (RAD) methodology.

The methodology used to conduct the research of this project is Rapid Application Development (RAD) methodology. This methodology is chosen due to short time of project analysis required, involving questionnaires and video research. Most of the time, the project development is emphasized on the prototyping phase as it needs to be refined again and again to meet user's demands. The project is on the prototyping phase where it still in need of more refining towards the implementation of the website in UTP local server. The project needs to go through testing phase again and again to ensure its functionalities working well. The methodology helps the site to develop and refine faster as both of this process occur in the prototyping phase. This will ensure that the website is ready by the time it is implemented in the real local server.

1. Analysis & quick design phase

During this phase, research is conducted to determine what criteria needs to be scrutinized in order to establish an understanding on the basic requirements of the system, what functionalities are required, and what data is required to determine these factors. The research is done and a design for the website takes place. The website design includes the layout of the site; which deals with the functionalities of the layouts. A research is done to determine which frame size is the best for video streaming, especially in UTP.

2. Prototyping cycle/phase

This phase deals with the developing of the project and mostly preparing the project for the implementation phase. During this phase, the website is being built. UTP-Play website is built on HTML5 platform which offers more interactive user-experience compared to its predecessor. It is easier to edit the page with simpler tags in the coding part. Besides that, HTML5 can run on any web browser available today which makes it easier to access compared to other websites in UTP server, such as UTP Student Portal which can only run on Internet Explorer. The videos are uploaded to the site after the page layouts are finished, but before loading the videos, they must be converted into Flash Video (.flv) format because it is easier to render this type of video files on the website rather than using 3GPP Multimedia File (.3gp), Audio Video Interleave File (.avi), or MPEG Video File (.mpg, .mpeg). Furthermore, there is also a Shockwave Flash (.swf) attached to the site which makes it more compatible with .flv type of videos. The frame size of the video player is also taken into consideration. The frame size of the video is determined using benchmarking of video frame size and in this case the benchmark video frame size is a YouTube standard video player frame size, which is 560 x 315 pixels. The relevancy of using YouTube video player frame size as the benchmark is that in UTP, there is no problem streaming videos from

YouTube and given a smaller frame size by UTP-Play, to stream these videos should be no problem in UTP local server. In this phase, the prototype will go through several changes, responding to the user needs before it will be moved to the testing phase.

3. Testing phase

In this phase, the prototype will be tested by the actual users, which are UTP students. A feedback will be taken from the users and if there are any changes in the functionality or contents in the site, the prototype will go through refining process again, and will be tested again and again until the end needs of the users are met.

4. Implementation phase

This is the final phase of the project development. After all feedbacks have been taken into account and several refining on the site, the website finally will be uploaded into a real server; UTP local server. Follow-ups need to be done constantly to make sure the site caters the needs of UTP students.

3.2 Sample testing

There is still several issues need to be done with the prototype but for the sample testing, a number of videos are put into the site and these videos are played. Using the right format and frame size, the videos can be played without any errors. The video player also pops up easily without any errors.
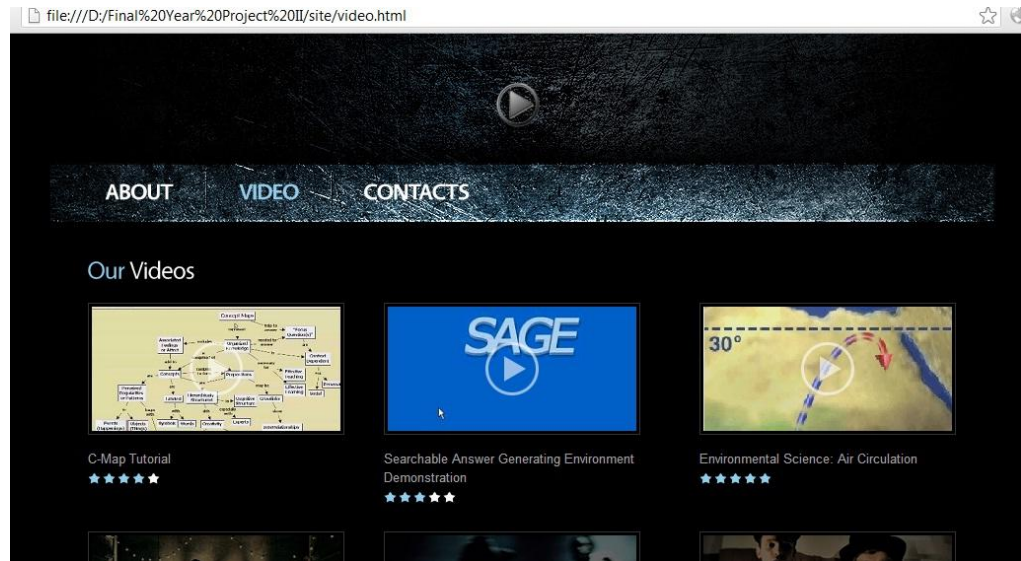
Figure 3.2 (a): UTP-Play; the page for videos' viewing (Prototype 1)
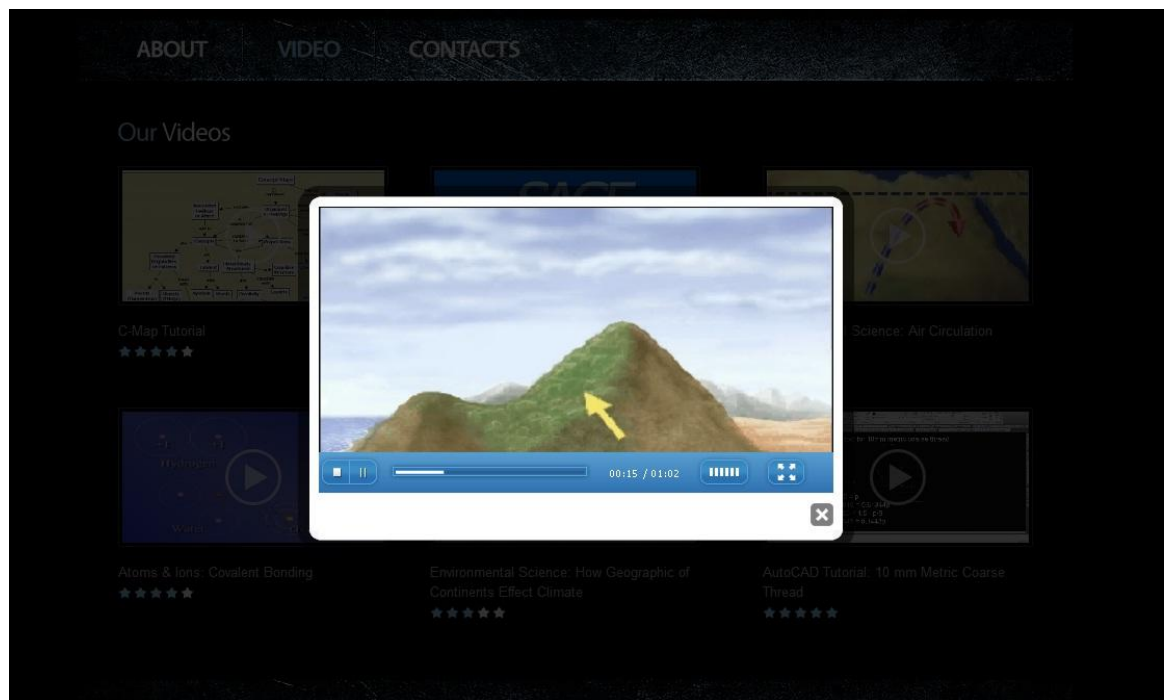

Figure 3.2 (b): Playing the videos (Prototype 1).

3.3 Tools and equipment used

To develop this project, several tools and equipment are used. Among them are:

1. **Video Converter**

   Video converter software is a crucial tool to build this project. This will enable the videos from various formats to be converted into one, uniform format; Flash Video format.

2. **Adobe Dreamweaver**

   Adobe Dreamweaver is a web development tool to build a website and in this case, Adobe Dreamweaver CS5 is used as it is easier to develop and edit the site, plus it also can support HTML5.

3. **Hardware**

   For hardware tools, a simple laptop would be sufficed to develop this project. It does not involve a heavy usage of processing unit, which makes it easier to develop. A testing server is also used to upload the site and test the streaming of the videos from a real server.

3.4 Gantt chart

Final Year Project 2

No.	Progress/Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Progress Report				√										
2	Pre-EDX								√						
3	Project Research	√	√	√	√	√	√	√							
4	Dissertation											√			
5	Viva												√		
6	Final Dissertation														√

Chapter 4

Result and Discussion

4.1 Data gathering and analysis

To decide which textbook should be put into the prototype, a questionnaire has been made and delivered. The result of this questionnaire will determine which tutorial videos to be put in the prototype. There are also several verbal questionnaires given to the students, lecturers and IRC staff ranging from the feasibility of the project, the design of the project, the indexing of the CDs and other issues. A non-verbal, online questionnaire is passed to the students and the questions are simply as stated below:

Figure 4.1: A sample of online questionnaire for the project.

From the response, it is showed that 100% students encouraging the use of video tutorial for their study. For the toughest subject ever attended in University, there are several subjects/courses in the list, but to put one subject/course tutorial videos in the site, the subject/course is chosen based on the highest rank in the survey. Below is the highest vote for the most difficult subject/course ever attended in UTP:

Program	Name of subject/course
Mechanical Engineering	Computer-Aided Engineering (CAD)
Chemical Engineering	Thermodynamics
Electrical Engineering	Digital Signal Processing
Petroleum Engineering	Geochemistry
Petroleum Geosciences	Well Logging and Formation Evaluation
Civil Engineering	Structural Analysis
Information Technology	Object-Oriented Programming
Information Systems	Advanced Database Systems

Table 4.1: Results from the questionnaire Figure 4.1

From this response, it is decided that these 8 subjects/courses' video tutorials will be put into the site for the prototyping phase. From this, a search for these videos is made and these videos which contain a helpful tutorial are converted into Flash Video format in order to prepare them to be uploaded into the site. There are other subjects/courses that get a high vote and one of these subjects/courses is Differential Equation. According to the survey, most of the engineering students vote this subject/course as the toughest course they ever attended in UTP but as this subject/course is the General Engineering subject, it is not taken into account. But in the future, this subject/course's video tutorials will be put in the site.

4.2 Prototype

Home Page

Throughout the project development phase, the prototype is built and refined for several times. The final version of the project is yet to be revealed but the initial prototype works exactly like what has expected from the analysis and designing phase. UTP-Play website, in its initial version is a simple video streaming site but what makes it special from others is that the video contents in this site are primarily taken from the textbooks. From the homepage, users will be shown a snapshot of videos contained in the site by showing a slideshow of several video snapshots. Not all videos are being snapshot for this purpose. The main purpose of the image slideshow is to give the users preview of the videos in UTP-Play. Also at the homepage users can view the video, but only the videos that are categorized as 'Latest Video'. To view all the videos, users must go to the video page.
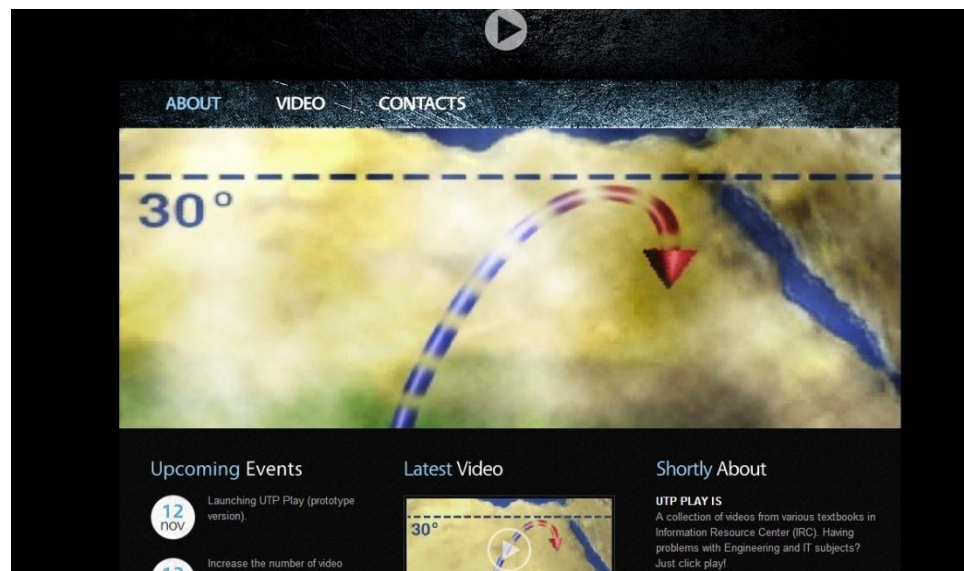

Figure 4.2 (a): UTP-Play homepage

4.2.2 Video Page

Video page is the tricky part of the website. The first task is to aggregate these videos into the page, and then play these videos. For the initial prototype, because the videos are still in small numbers, all the videos are put in the Video page. The videos then are labeled with the name of the subject/course. To view the video, users can simply click the play icon the video snapshot and the video requested will be played on a player frame size 495 x 275 pixels. To quit the player, users can click the exit button labeled 'X' or just click anywhere but the video player panel padding.
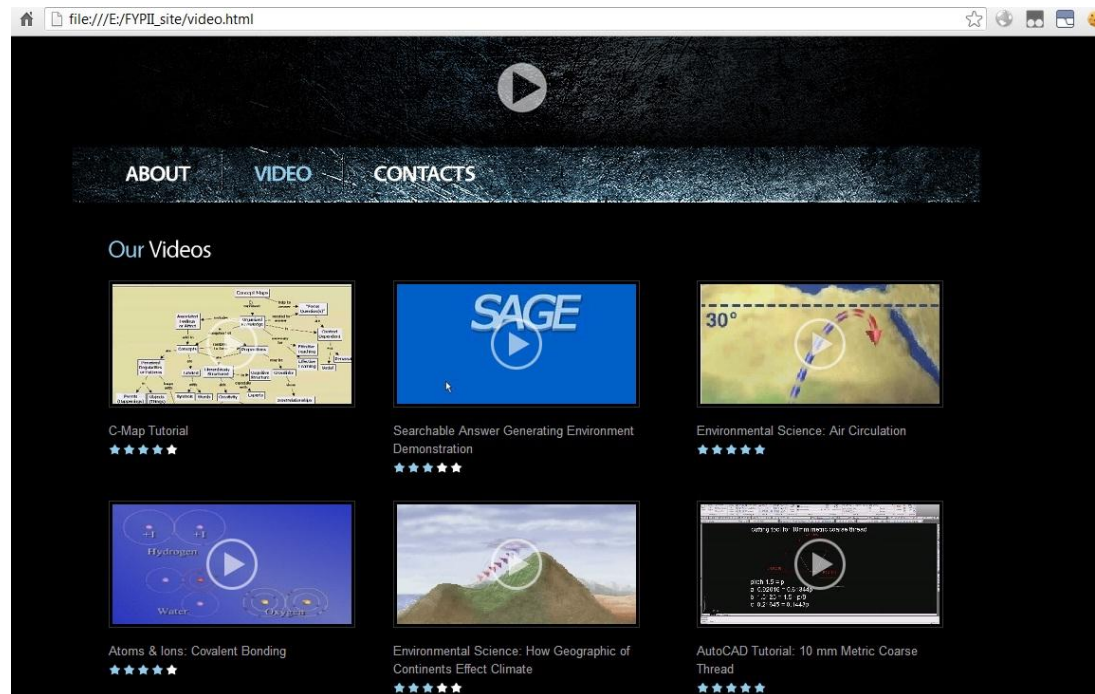

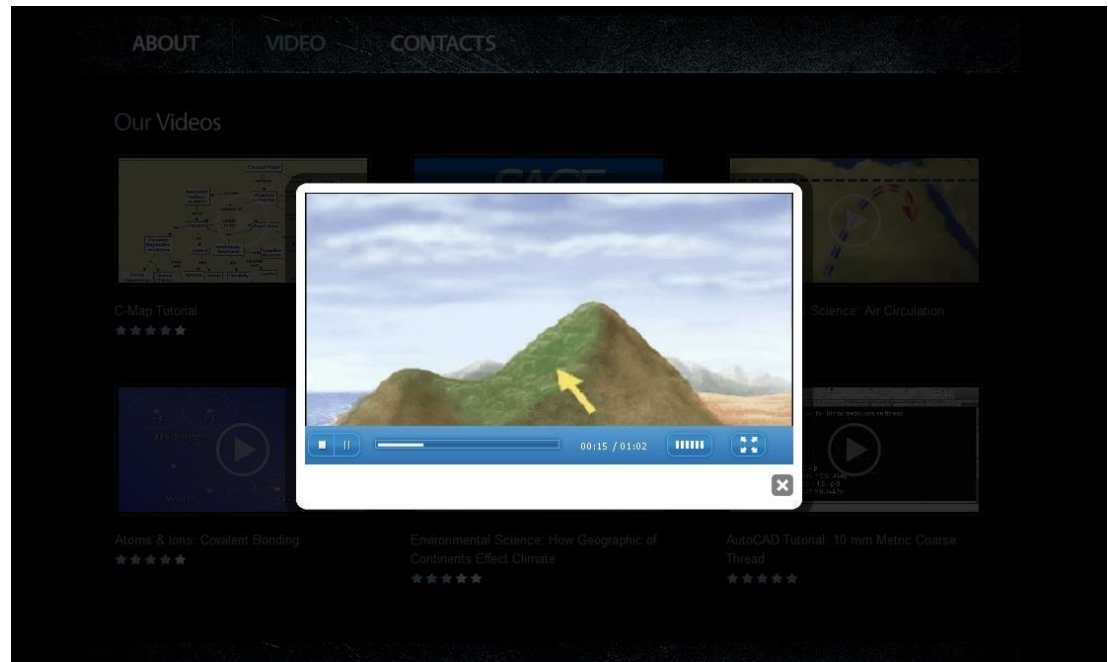Figure 4.2 (b): UTP-Play, the video page (Prototype 1)

Figure 4.2(c): UTP-Play, playing the video on the website

The first prototype of UTP Play is about aggregation of the videos. For the second phase prototype, the developing part emphasized on the segregation of the videos. Changes have been made on the video page and the videos are segregated according to textbooks' title. The reason of the segregation is that students are prone to search the textbooks' title rather than searching the courses because there are some books that are used by different Program of Studies; for example a textbook entitled Environmental Science. It is used by all engineering students regardless which engineering programs they are in. for the second prototype, students first must search the textbooks' title, and then they will be directed to the textbooks' page. From there then they can view the videos.
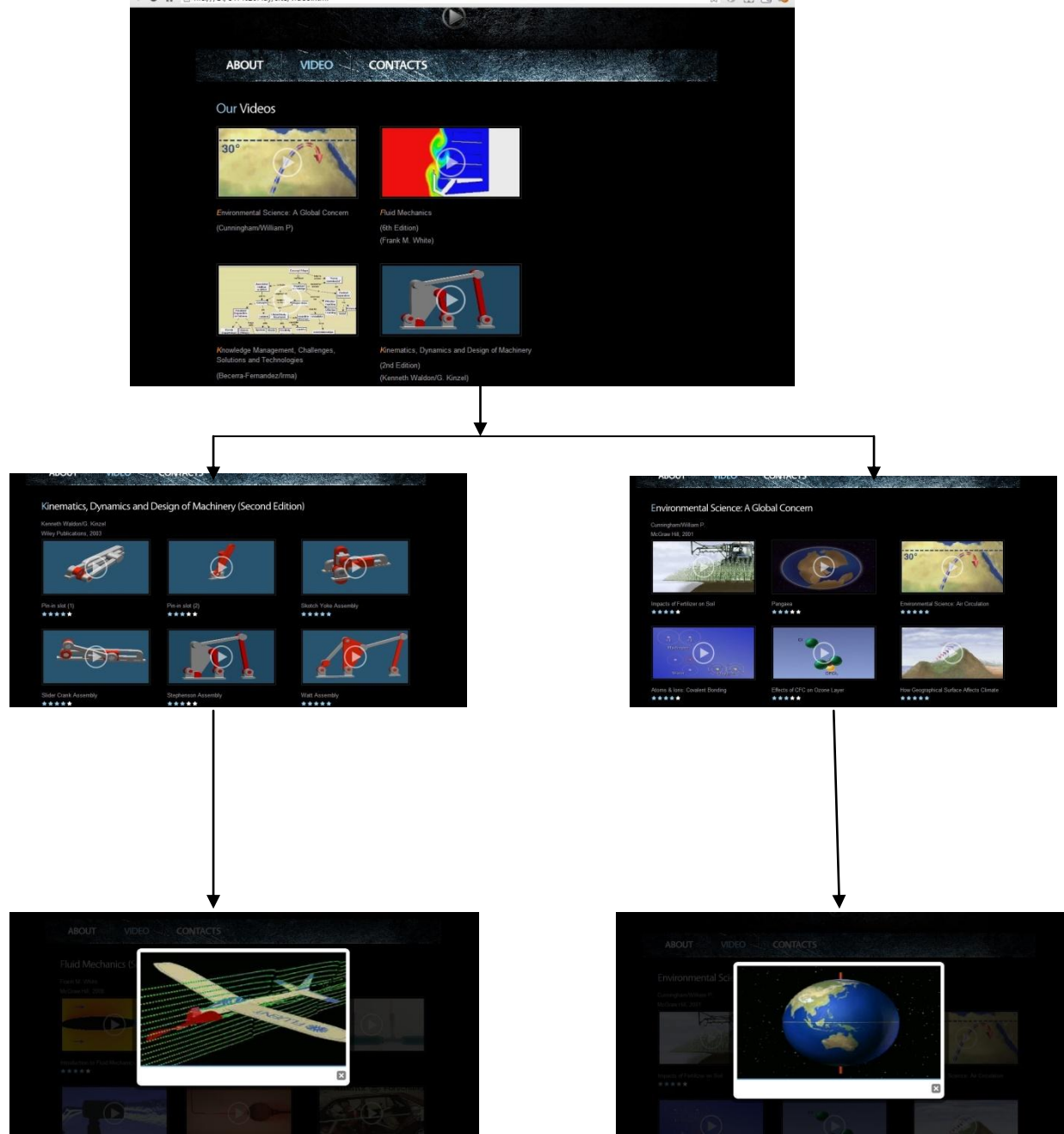
Figure 4.2 (d): Walkthrough: UTP Play, video page (Prototype 2).

4.2.3 Contact/Feedback page

In prototyping phase, constant refining needs to be done to ensure the site run by user's requests. In order to fulfill that, a contact page is created. This page is made to collect feedbacks from users so that in the future UTP-Play will be able to cater needs for UTP students. The website prohibits the users from uploading their videos so if any request on videos that are not available in UTP-Play, users can fill the form and users can feel free to suggest any tutorial videos to be uploaded on the site, given that the student must give the textbook title, edition and author's name to make it easier to search in the IRC.
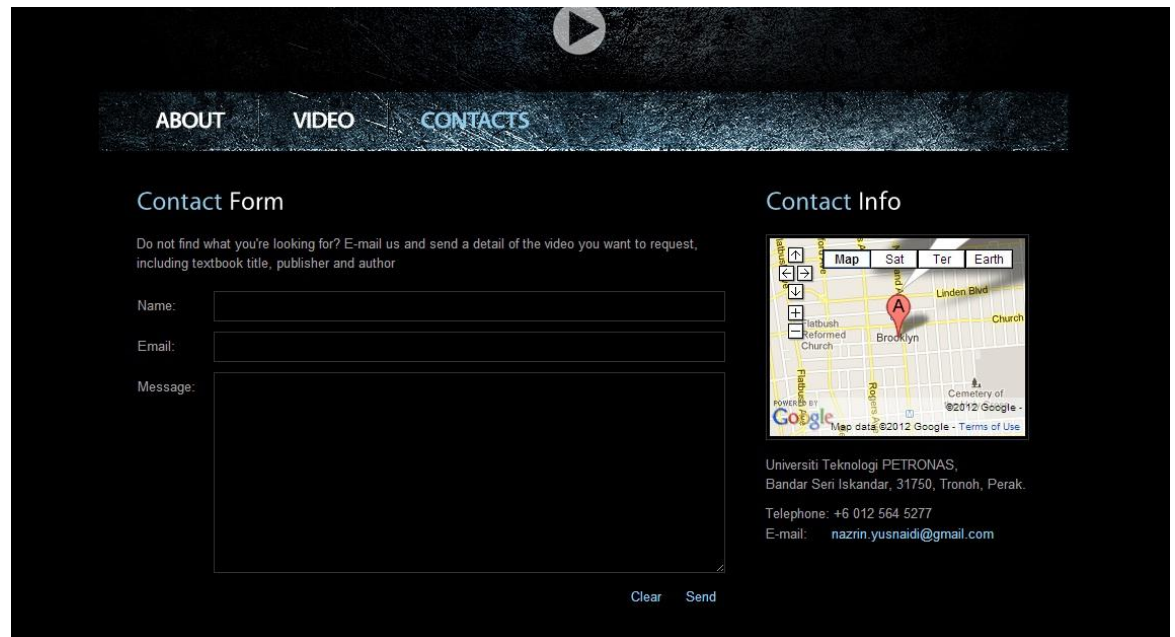

Figure 4.2 (d): UTP-Play, contact/feedback page.

4.3 Discussion

The initial prototype of UTP-Play emphasize on its primary function; to aggregate textbooks' tutorial videos in one site. The number of videos may still be in small number in the initial prototype, but basically UTP-Play still fulfill its primary function. Data gathered in the questionnaire Figure 4.1 and Table 4.1 will be used for further refining of the website.

In the next stage of refining this website, the videos will be segregated into programs. At this stage, more videos will be uploaded thus enable the segregation of the videos. For the initial prototype, the webpage will not be able to attract many users because the only users who will be using these initial prototype users who are the test subject for testing phase. After several tests and refining, then UTP-Play will move into its UTP-Play BETA phase, where the site is uploaded to a testing server using UTP server and from that, feedbacks will still be collected from the users. Towards the final phase of this project, UTP-Play will be more interactive that the initial prototype.

Chapter 5

Conclusions and Recommendations

5.1 Conclusion

The objectives which are stated in the Chapter 1 are:

1. To aggregate these textbooks' tutorial videos into one site.
2. Ease of access for students to study via video tutorials from the textbooks.
3. Providing backup files for these videos.

To develop the project, there must be a collection of videos and these videos cannot be taken from someplace else; they have to be taken from IRC and the textbooks' CDs. These videos then are converted into Flash Video format and at the same time, the webpage layouts for UTP-Play are being built. Upon the completion of the layouts, the tutorial videos are then attached into the site into folders. The reason of using folder view instead of database view is that it is easier to manage video files in folders rather than using SQL database; and this is only for the prototyping phase. After putting these video files in the folders in the server, the video files are then tested in UTP-Play and the result is beyond expectation. The website provides a user-friendly layout, especially for video playing purposes. It is also easier to just click and play at the same time rather than directed to the page of a particular video itself before one's can play the video. By looking at these and the objectives, it is said that the prototype version of UTP-Play fulfills its objectives.

5.2 Suggested for future work expansion and continuation

These are several undertakings that should be taken into consideration when continuing this project:

1. All textbooks should be listed in UTP-Play.
2. More interactive page; users' comments in each video; pop up comment boxes.
3. User's rating on the videos: list the videos which have the highest rate for the ease of access.

Due to time restrain and lack of technological expertise, these features are not feasible to be put in the project within the given period. By looking at the primary objective which is to aggregate the videos, UTP-Play should consists of all textbooks in UTP but this may require a larger size of server as it may involve more than 100 videos and to store all those videos, it is not feasible to put it in UTP local server, or maybe in the future they will add more space in the server to store these videos.

In the future, UTP-Play must also have user comments in each video. This will enable discussion and knowledge sharing among students on a particular subject. Student A may have a good opinion and Student B has another opinion. If both opinions can be discussed at the same site, more or less it will promote a new learning culture in UTP.

UTP-Play also must have a user rating's features some time in the future. This is important because by using this feature, it will enable another feature; for example 'Suggested Videos'. This 'Suggested Videos' features can be taken from user ratings' data and manipulate the data for the highest video rating; and it will be put in the 'Suggested Videos' section.

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