CERTIFICATION OF APPROVAL

Introduction to Petroleum Industry Courseware

by

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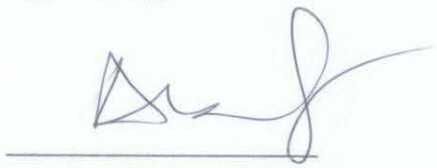
Approved by,



(Abdullah Sani Abdul Rahman)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
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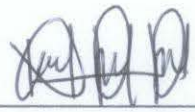
CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.



NADHIRAH ABDUL RAHMAN

ABSTRACT

The main objective of creating an introduction to petroleum industry courseware is to gain primary student interest (specifically for those who live in rural areas) in petroleum industry and provide them with the basic concept regarding the industry through interactive courseware.

Research has been done and most of student in rural areas do not have high goal in terms of ambition and also towards their future. Since they are our future generation, at least by creating this courseware, it may give them different perspective regarding their future. Hence the main problem statement is lack of student interest and also lack of information regarding oil and gas industry among primary student, mainly who live in rural area.

The scope of study will covers on how oil is made, the usage of petroleum, cost of oil production, oil price determination (focus on supply and demand), alternative energy and also oil crisis.

Waterfall methodology has been used in this project. Starting from planning, design, testing, implementation and maintain.

With the help of interactive courseware, the student in rural area interest can be raised, and they may commit to work in oil industry in future, and if they work in Oil Company, they'll work with interest and give their full commitment.

As a conclusion, with the help of interactive courseware for student in rural area, their interest in gaining knowledge about oil industry can be raised and they may commit to work in oil industry in future, plus if they work in Oil Company, they'll work with interest and give their full commitment.

ACKNOWLEDGEMENTS

This Final Year Project would not be complete without the guidance from my supervisor, Abdullah Sani Abd Rahman. Thank you for your time and opinions.

Special thanks also dedicated to my ex-office mates who help me in the study and research part. Not forgotten all my friends who involve direct or indirectly by teaching and helping me throughout the development of the courseware.

I would also like to give my gratitude to both of my parents and my brothers who always support me in whatever I do.

Last but not least, I would like to give my highest gratitude and thanks to God for giving me a chance for me to live and further my study. May whatever knowledge I have gained may get bless from Him. Insya'alaah.

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INTRODUCTION

Background of Study

The background of study mainly will be on how oil is made, the usage of petroleum, cost of oil production, oil price determination (focus on supply and demand), alternative energy and also oil crisis.

Problem Statement

Research has been done and most of student in rural areas do not have high goal in terms of ambition and also towards their future. Since they are our future generation, at least by creating this courseware, may give them different perspective regarding their future. Hence the main problem statement is lack of student interest and also lack of information regarding oil and gas industry among primary student, mainly who live in rural area.

Objective & Scope of Study

The main objective of creating an introduction to petroleum industry courseware is to gain primary student interest in petroleum industry and provide them with the basic concept regarding the industry through interactive courseware. However, the courseware wills only covers on essential part in oil industry.

Conclusion

As a conclusion, with the help of interactive courseware, the student in rural area interest can be raised and they may commit to work in oil industry in future, in addition to, if they work in Oil Company, they'll work with interest and give their full commitment.

LITIRATURE REVIEW

How oil is made

Basically, petroleum came from crude oil, which was made of plankton from plants and animals over millions of years ago. Usually this plankton would form oil in about 150 millions years; if the sea bed is not disturbed. When the plankton dies, they'll fall to the bottom of the sea. Then this plankton is trapped under layers of sand and mud. After some periods, this plankton got buried deeper and deeper. The deeper the layer of sand and mud, the more heat and pressure will be. This pressure and heat gradually turned the mud into rock and the dead animals and plants into oil and gas. The oils are trapped in between the pores of the rock. After that, the oil can be drilled once the engineers detected the reservoir.

The usage of petroleum

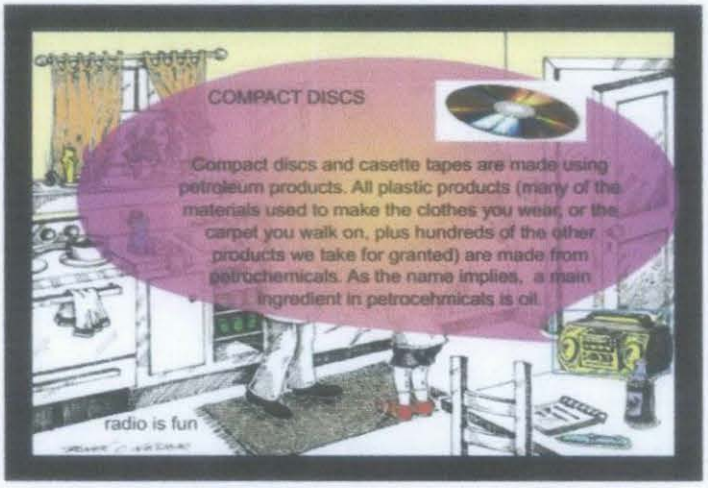
Almost everything is this world is made from petroleum. From shampoo, hand lotion, nail polish, cosmetics, tooth paste, tooth brush, movie film, wax, plastic, paints, agriculture pesticides, tyres, bandages, vitamins, pen ink, curtains, detergent, plant fertilizer and almost everything that we use today. Car petrol is also one of the main usages of petroleum. In additional, this petroleum is also used to be the main source of energy to produce other energy source such as electricity.

However, the courseware will only focus on certain usage of petroleum. There will be a page that contains a lot of petroleum uses in one specific place; for example, in the kitchen.

Picture 1.0 The usage of petroleum in the kitchen items

When the user click at any coloured picture and there will be pop-up information of the usage of petroleum.

In this case, if the users click on the radio picture, there is a pop-up info explaining the usage of petroleum for the compact disc.



Picture 1.1 Pop-up information on how the petroleum is related towards the specific item.

Same will goes to other coloured picture of:

Bandages

The pop-up info of bandages:

The plastic of the bandage is made from oil. Also, the non-stick pad that covers the wound is man-made cloth which is manufactured from petrochemicals. The medical industry relies heavily on oil-based products to improve much of their equipment and medicine.

Plastic Bottle

The pop-up info of plastic bottle:

You will probably be surprised to know that a plastic bottle is made from the same petrochemical as the fiber we call polyester! All plastic products, many of the materials used to make the clothes you wear, or the carpet you walk on, plus hundreds of the other products we take for granted, are made from petrochemicals. As the name implies, a main ingredient in petrochemicals is oil.

Vitamins

The pop-up info of vitamins:

Some medicines, such as penicillin, are made by organisms, but most are manufactured from chemicals, and many of these are made from petroleum products. Acetylsalicylic acid, or ASA, is the active ingredient in many of the well-known, over-the-counter pain relievers. ASA is manufactured from petrochemicals. One of the first uses of oil, dating back thousands of years, was as medicine. Other early uses included illumination and as a boat resin to help keep ships sea-worthy.

Pen Ink

The pop-up info of pen ink:

The colour of most pen ink is the result of dyes. These dyes are made from petrochemicals.

Canned Goods

The pop-up info of canned goods:

Food additives are yet another petrochemical. Many of these additives increase the shelf-life of canned food. This keeps the food fresh longer, and allows more people throughout the world to eat healthy.

Camera Film

The pop-up info of camera film:

Ethylene is one of the by products of distilling oil. (Distilling simply means heating. Since oil is made of various substances, these substances will boil off at different temperatures as oil is heated). It can be made softer and used for film and garbage bags, or harder to make milk crates.

Sneakers

The pop-up info of sneakers:

Synthetic shoes are made from a petroleum product. Many rubber soles are also made from petroleum. Natural rubber becomes sticky when hot and stiff when cold, but man-made rubber stays much more flexible. Car tires are made from synthetic rubber, which makes them much safer to drive on. Today, the demand for synthetic rubber is four-times greater than for natural rubber.

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Curtains

The pop-up info of curtains :

Through refining, petroleum can be turned into many types of petrochemicals. One of these is synthetic (man-made) fibers, which can be woven into curtains and carpets. Man-made fibers are often wrinkle-free, so they look better. Many also do not absorb water, so mold and mildew are much less of a nuisance.

Candle

The pop-up info of candle:

A candle is made from wax. Wax is a raw petroleum product. It is used to make candles, milk cartons and polishes.

Detergent

The pop-up info of detergent:

Detergents are substances that act as cleansing agents when mixed with water. There are two main types of detergents: soapy and soap less. Most soap less detergent is made from oil products. The soap less detergents includes powders and liquids used to wash clothes and dishes in a dishwasher. Some are made using petrochemicals, while others are made using alcohols and ethylene oxide that are petrochemical products

Flower / Plant Fertilizer

The pop-up info of flower/plant fertilizer :

Fertilizers increase crop yields, as well as make the plants in your windowsill look nice. Some of the chemicals in this fertilizer came from petroleum products.Pesticides are among the many chemicals that may be used to protect crops. Much like fertilizers, oil is an important ingredient in many pesticides. Some people think that our food production would only be half of what it is today if pesticides were not used. Without the use of pesticides, food would cost much more than at present, and many people would have to pay more to eat nutritious meals.

Cost of Oil Production

Oil Reserves and Its Characteristic.

From a courseware of introduction to petroleum industry, the user can know where the oil reserve is and how much they can produce oil for each reserve. The countries which have oil reserve that will be included in the courseware include how much percentage for each continent.

All of the oil reserve reservoir have different characteristic. Each characteristic will give different output (total oil production rate). So to know how much the oil production rate that each reservoir can produce, a few factors are included such as

1. The size of the reservoir / oil column
2. Reservoir thickness

3. Stock tank oil initial in place, STOIIP
4. Gas initial in place, GIIP
5. The permeability of gas, oil and aquifer
6. The porosity
7. Current reservoir pressure
8. API value
9. Aquifer strength
10. How much additional pressure can be injected to produce more oil production
11. EOR used for improving the total oil production.

This characteristic will be as the input for the calculation later on in the courseware.

Along with, EOR consist of three methods; primary, secondary and tertiary method. The primary method might use liquid and rock expansion (up to 5% of expected oil recovery efficiencies), solution gas drive (up to 20% of expected oil recovery efficiencies), gas cap expansion (up to 30% of expected oil recovery efficiencies), gravity drainage (up to 40% of expected oil recovery efficiencies) or water influx up to (up to 60% of expected oil recovery efficiencies).

While for second method of EOR, it may use gas re-injection or water flooding where the result might go to 70% of expected oil recovery efficiencies.

And the last method is the tertiary method, it use thermal, miscible or chemical. But this tertiary method won't be included in the courseware due to its complicated correlations and calculation. This is because the main objective of creating this courseware is to give awareness and gain interest in student regarding oil industry.

Upstream Life Cycle

Before going into further study on the reservoir characteristic itself, the other aspect to produce oil also have to be considered, at least from upstream point of view. Basically the oil and gas project life cycle consist of 5 stages.

1. Exploration
2. Appraisal
3. Development

4. Operations
5. Abandonment

During exploration stage, firstly a company (Oil and Gas Company) needs to seek permission in one form or another from the host country. Once it's approved by the host company, they can perform some work to identify location for drilling wells; this activity comprises geological and geophysical (G&G) work that enables technical teams to identify accumulation and sanction a drilling program. The most important thing in this stage is the process of shooting and interpreting seismic surveys. This surveys objective is to produce acoustic image of the subsurface and create accurate geological picture of the area below the ground. Usually, from that images, they can decide where and how deep to drill a well. Here, the main objective for drilling engineers is to maximize the profitability of drilling investment. This can be done by employing the best process to drill a quality well at a lower cost. To achieve this goal, drilling engineers have to work closely with geologist and geophysicist among others to properly plan for drilling and avoids unnecessary costs. If this exploration stage manages to prove an accumulation capable of producing hydrocarbons (oil) at economic rates, then they can continue in the next stage, which is the appraisal stage. Else, if exploration wells fail to prove the existence of accumulations capable of producing oil or gas at economic levels, then the wells are plugged and abandoned.

The second stage is the appraisal stage. They will only pass this stage when they have a reasonably high level of confidence that volumes of oil and/or gas generated by subsurface technical models are somewhat proven and waiting to be extracted. This is because a typical oil and gas accumulations usually span large areas and a well drilled in a specific location only proves the existence of hydrocarbons in one section of that accumulation. The exact size of a field remains subject to a more detailed program that will assist engineers in sizing proper facilities that can be produce the majority of the proven hydrocarbons in the field over a given period. This appraisal stage represents one of the main reasons why companies perform/ need this stage. In certain countries where companies explore for gas and intend to sell this resource to a host government, part of the conditions is to sign a Gas Sales Agreement (GSA) that can prove the size, the shape and expected rates that a gas accumulation can produce over time.

The third stage will be the development stage. Assuming that a company drills a series of wells and finds an attractive resource to justify development, a project team starts planning in detail for a field development. The product is the Field Development Plan (FDP), which serves the basis for design, engineering and planning for how the field will be developed. This document represents an integral study that dictates the specifications for subsurface and surface facilities as well as the general operational guidelines that support approval for development. Once the FDP is approved and sanctioned, surface and subsurface development team set out to produce detailed designs for facilities, procure the required materials and then fabricate and install the facilities to enable a company to extract and produce hydrocarbons. This development phase is characterized by the most significant level of cash outflow throughout the entire project and with no production just yet. This phase also comprises a relatively high degree of activity sets among various teams and usually calls for careful planning and management.

Then, the fourth stage is the operation phase. This phase begin when all the facilities capable of producing hydrocarbons are in place, operations engineers can produce the first quantities of commercial hydrocarbons from a project. This moment commonly referred to as 'first oil', it marks an important turning point as hydrocarbons are produced, sold and cash start flowing from a project. This newly generated cash is used to pay back the previous stage in investment in exploration, appraisal and development. Once the production and operations begin, oil is produced from well - either with natural reservoir pressure or any other kind of pressure (it can be gas injection, water injection or other artificial pressure). They'll use additional pressure in case where the reservoir pressure is not sufficient enough to send the oil on surface.

Nowadays oil and gas represent global commodities priced based on their demand in a global marketplace. Furthermore, oil and gas price change on a daily basis and even if maintain the production at certain level, changes in oil and gas price will interact with quantities produced to generate slightly variable oil and gas revenues on a periodical basis.

Next, productions from a development usually have three kinds of phases which is ramp-up, plateau and decline.

Ramp-up stage is the stage where wells are progressively brought on stream. The production increases usually at a somewhat steady rate until it reaches an anticipated level of production.

The next stage is the plateau stage. The plateau stage is the period where it is characterized by the maintenance of a stable production rate. This plateau period usually depends on a series of variables including the type of hydrocarbon produced, the pressure in the reservoir, the size of the reservoir and also the number of wells drilled.

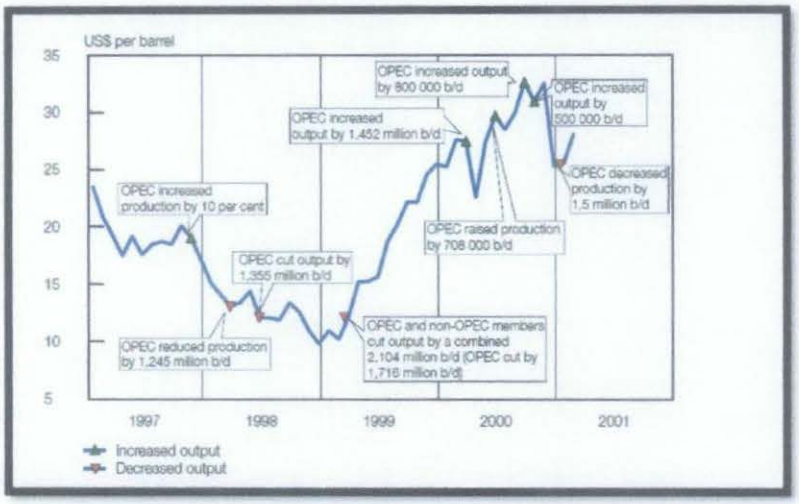
Then the decline phase. In this decline phase, it is the phase where the field productions declines mainly as a result of a drop in pressure in the reservoir because there are fewer hydrocarbons left in the field.

The last stage will be the abandonment stage. This abandonment stage, also kwon as the decommissioning stage, it is a stage when companies spend money to dismantle and dispose of old facilities usually to comply with environmental regulations. The majority of exploration and production companies across the world will contract a special company to carry out this effort. This company will plug wells and bring down facilities in an environmentally friendly and efficient manner. The main characteristic of this stage include huge capital outlays and no production. Wise planning indicates the need for making decommissioning provisions way ahead of the actual abandonment.

When all of the factors of how many expected oil can be produced are known, then the user can calculate roughly how many barrels of oil can be produced.

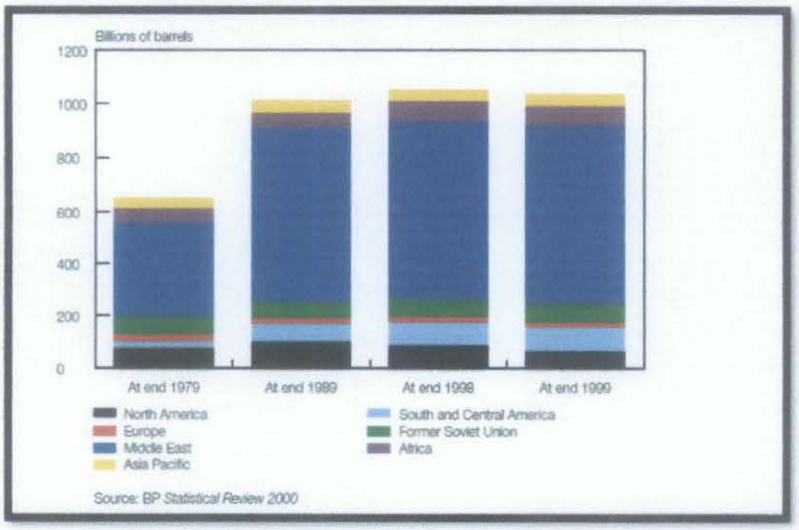
Oil price determination

Oil price mainly are controlled by Organization of the Petroleum Exporting Countries (OPEC). However, the decision is also based on supply and demand of oil.



Graph 1.1 – oil supply changes and developments in the price of crude oil

The graph above shows oil supply changes and developments in the price of crude oil which determine by the OPEC. The OPEC decision is based on geological, political and also the economic factors. The supply changes really going to impact on the oil prices changes. This is because; the main reason of oil price changes is based on two conditions. It is the supply and the demand of oil. So, the courseware will link to the OPEC websites and other websites; for the user to refer too.



Graph 1.2 – proved oil reserved in few countries.

The graph above shows proved oil reserves in North America, Europe, Middle East, Asia Pacific, South and Central America, Former Soviet Union and Africa. This statistic plays an important role in determining changes in oil price. This is due to the role of speculators. Once, there's time when the speculators said that the world is running out of oil reserve, and it really does affect in increasing of oil price, dramatically.

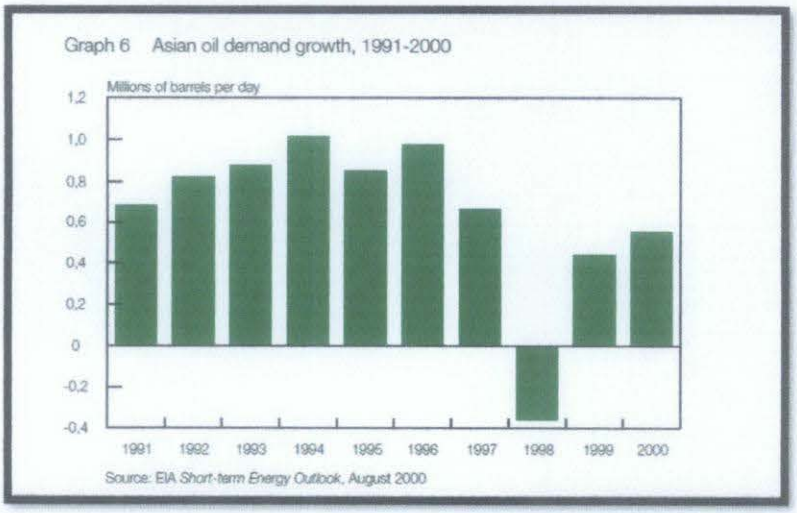
Millions of barrels per day

	1974	1997	1998	1999	2000
North America	19,8	22,7	23,1	23,9	24,1
Western Europe	14,6	15,0	15,3	15,1	15,1
Pacific	6,3	9,0	8,4	8,6	8,6
Total OECD	**40,7**	**46,7**	**46,8**	**47,6**	**47,8**
Former Soviet Union	6,7	3,8	3,7	3,5	3,5
Europe	1,0	0,8	0,8	0,7	0,8
China	1,2	4,2	4,2	4,5	4,8
Other Asia	1,8	6,7	6,8	7,1	7,2
Latin America	2,7	4,7	4,8	4,8	4,8
Middle East	1,4	4,0	4,2	4,3	4,4
Africa	1,0	2,3	2,3	2,3	2,4
Total non-OECD	**15,7**	**26,5**	**26,7**	**27,2**	**27,8**
Total world demand	**56,4**	**73,1**	**73,5**	**74,8**	**75,6**

Source: International Energy Agency *Monthly Oil Market Report* (January 2001)

Table 1.0 – world oil demand in millions of barrels per day.

The table above shows world oil demand in millions of barrels per day. The statistic shows an increasing of demand each year. Based on economic theory, supposedly when the demand is higher, the price will increase. However, since the price is controlled by OPEC, the fluctuation of oil price is quite stable. The price also depends on the current spot market or forward market.



Graph 1.3 – Asian oil demand growth

The graph above represents Asian oil demand growth from the year of 1991 to 2000. There's obvious declining in demand in the year 1998. This is due to economic downturn where most of the business went down and bankrupt. At the same time, the values of money in Asian country are undervalued and depreciate. Some blame the speculators, Soros for the downturn, however it's relate with political, economical and geographical factors too.

Oil crisis

Does war in Afghanistan and Iraq is one of the oil politic agenda? "...actually US spends over $87bil conducting war in Iraq, United Nations estimates that for less than half of that amount could provide clean water, adequate diets, sanitation services & basic education to every person on the planet"... said by John Perkins, one of the economic hitman. They know that they have spent so much money on 'war thing', what other factors can make them decide to do war if not because of politic.

Then why people can buy a 1 litre of mineral water with the price RM1.60 (referring to Malaysia) without complaining, but people will keep on complaining when the price of oil is more than RM1.00 a litre. Logically, the cost of production of oil is much higher compared to the cost of production of mineral water. This seems to be like a small issue, but somehow, this happen due to people mind set and also political factor. Why the oil industries have so much power and why the petrodollars are so important to the national economy.

Some politicians give more oil subsidiaries to the country because they want to win during election. But if too much of subsidiaries in oil, other industries might have lower percentage for its own subsidiaries. Maybe education cost will be cut down or maybe health and safety subsidiaries will have lower percentage, or it can be any other industries who might suffer. This is what we call as opportunity cost, we only can choose one thing and forgone the other thing.

But, let say if government does not give subsidiaries much on oil. Then most of the business will complain and increase their price of product. Their main excuse and reason will be because they have to pay extra for their logistics and transportation.

Once the price is increase, workers will demand for higher salary and wages, inflation will happened, value of currency will depreciate in value, investor don't have a strong believe in that country and make them not to invest. A lot of thing might happen direct or indirectly because of this oil price changes, even for a slightly increase or changes.

Seems oil and gas industry plays important role in country that have the reserves of this 'black gold', what is the benefit the country can get? If we analyse and think deeply, actually the oil and gas or any other energy sources is only beneficial to the wealthy people. There's a study said 80% of energy (including oil) is used by only 20% of those wealthy people. For example, people who live in village or sub-urban place, one single house can survive with only one light bulb and one fan. They use bicycle as their transportation for daily usage, or maybe some of them use cheap car with no or low horse power. Yet they will do car pool if they want to go to somewhere if it is quite far. Besides, they also prefer to use public transport. This does not include with the poor country like Africa, India or any other poor country. They don't even have the necessities and facilities to use. This is extremely contradicted with the wealthy people lifestyle. The wealthy people stay is super big mansion complete with air-condition, swimming pool, chandelier, hot water and countless transport to use. And above, type of transport that they use is the one with good quality and high horse power, which consume more oil / gas. Then why do we really need to really take port in this kind of business? At the end, it'll only benefits to those who have everything in their life that are greed and have high taste and desire.

This so called as first class people in society, they already passed the first two stages in Maslow Hierarchy. They have water to drink and use, food to eat, shelter to stay, enough sleep for rest and also safety and security about their future life (especially in terms of money). So supposedly we need to think and considered about those who is not even pass the first stage of this hierarchy. Economy actually is about balance of life. So maybe something can be adjusted to make a fair decision regarding this oil business.

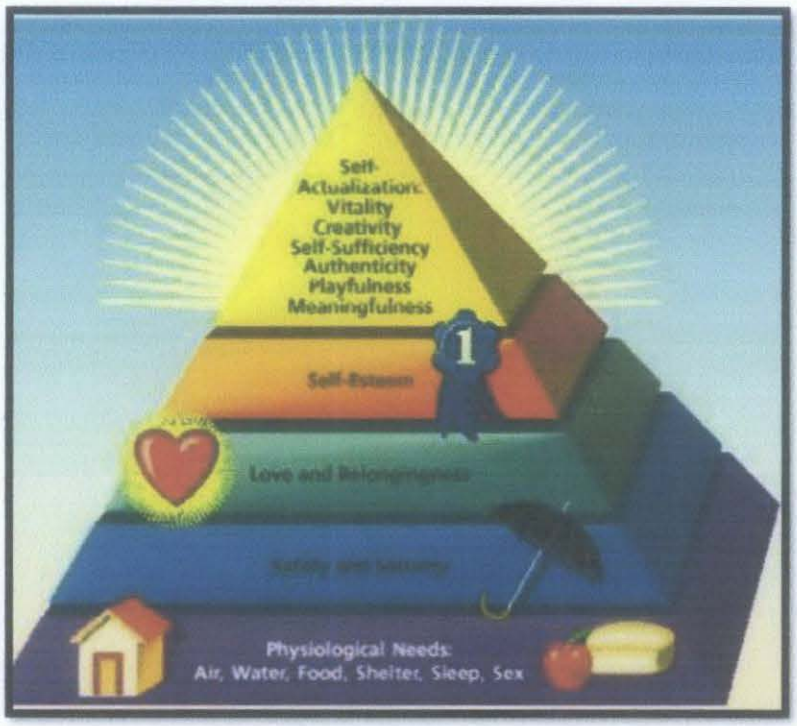


Diagram 1.0 Diagram of Maslow Hierarchy

One of the case study, one of typical country such as Ecuador, " there are some economic-political fold have been brought to. For example, for every $100 of crude oil taken out of Ecuadorian rainforest, the oil companies receive $75. Of the remaining $25, three quarters must go to paying off the foreign dept. Then the remain balance will cover military and other government expenses – which leaves more or less about $2.50 for health, education and programs aimed at helping the poor. As a conclusion, out of $100, less then $3 will go to those people who really need most. Those Ecuadorians whose lives have been so adversely impacted by the drilling, the pipelines and who are dying from lack of food and potable water. On the other hand, …over half the people in the world survive on less than two dollars per day, which is roughly the same amount they receive in the early 1970s…" As said by John Perkins, the author of 'confession of economic hit man'.

Picture 2.0 3F crisis; the hunger of the people

The next study will cover on "3 F" crisis. How fuel, food and financial market are related to each other. Oil is one of fuel that cannot re-new and it'll finish one day. However, at what year does this oil will finish? Then if there's no more oil reserve, how can we survive? Some businesses tend to use other alternatives of energy sources. For example, there's electronic and hybrid car, synthetic plastic etc. But for some cases, oil is the only their main resource to continue their business. Or in other case, even though electric car have been invented and created, but it takes time to change people's mind to buy those new kind of car. Same goes to other field. They might substitute oil to other resource, but it really takes long time to change completely.

As a result of insufficient amount of oil, a few years back, some of the scientist has created biodiesel. This biodiesel are made from corn and sugarcane. The issue of this biodiesel is, the food to support human needs is not adequate enough. The land is limited and population is getting bigger and bigger, day by day. Instead of making this food (corn) as a fuel, better make it as food for human.

Then how this food and fuel will leads to financial crisis?

"The impact of surging oil and food prices is being felt globally but is most acute for import-dependent poor and middle-income countries confronted by balance of payments problems, higher inflation, and worsening poverty..." an International Monetary Fund (IMF) study warns. IMF also warns that the jump in oil and food prices has pushed some developing countries to the "tipping point," putting

governments in a difficult position of balancing the interests of the poor and economic growth. The G8 finance ministers also noted in their joint statement that elevated commodity prices, especially those of oil and food, pose a serious challenge to stable growth worldwide. The world is also grappling with an emerging food crisis as prices of rice and other agriculture products rise. Even not all people blame biodiesel as a reason of increasing price of agriculture food, but the relationship is there. Less agriculture product will lead to lower supply of food and high demand. At the end of the day, there'll be some people who's going to suffer of not getting enough the foods.

RESEARCH METHODOLOGY

The methodology used in developing the courseware is waterfall methodology. The development of the courseware requires the fulfilment of each phase before proceeding to the next phase.

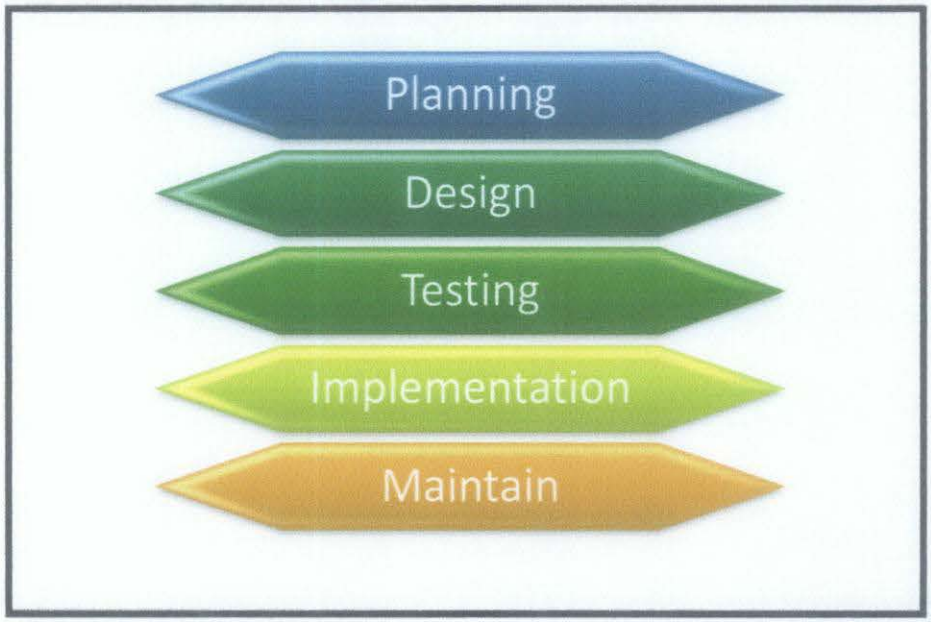


Diagram 1.1 Waterfall methodology

Planning

The courseware is created to gain primary student interest in petroleum industry and provide them with the basic concept regarding the industry through interactive courseware.

Research has been done and most of student in rural areas do not have high goal in terms of ambition and also towards their future. Since they are our future generation, at least by creating this courseware, may give them different perspective regarding their future.

With the help of interactive courseware, the student in rural area interest can be raised, and they may commit to work in oil industry in future, and if they work in Oil Company, they'll work with interest and give their full commitment.

Design

Designing a prototype of the courseware is to minimize the uncertainty of technical issues such as the run-time issues and the users 'see' functionality. The design phase also plays an important role to determine whether users' mental models are compatible with the designer's conceptual models.

Testing

The courseware will be test by primary school children and get their feedback. The target end users for the testing phase will be for the student in urban area and also in rural area.

Implementation

The design is implemented into coding. For this courseware, Flash CS4 is being used as a platform. This is due to the ability of Flash CS4 which have animated picture, video, audio, panoramic view, integration of HTML and HTML5 content and other interactive overlays. On the hand, Flash Player is supported on Android, HP webOS and Google TV today. BlackBerry Tablet OS; upcoming versions of Windows Phone, Samsung SmartTVs and others which expected to support Flash Player in future.

Maintain

The courseware is modifiable; can add more features in future.

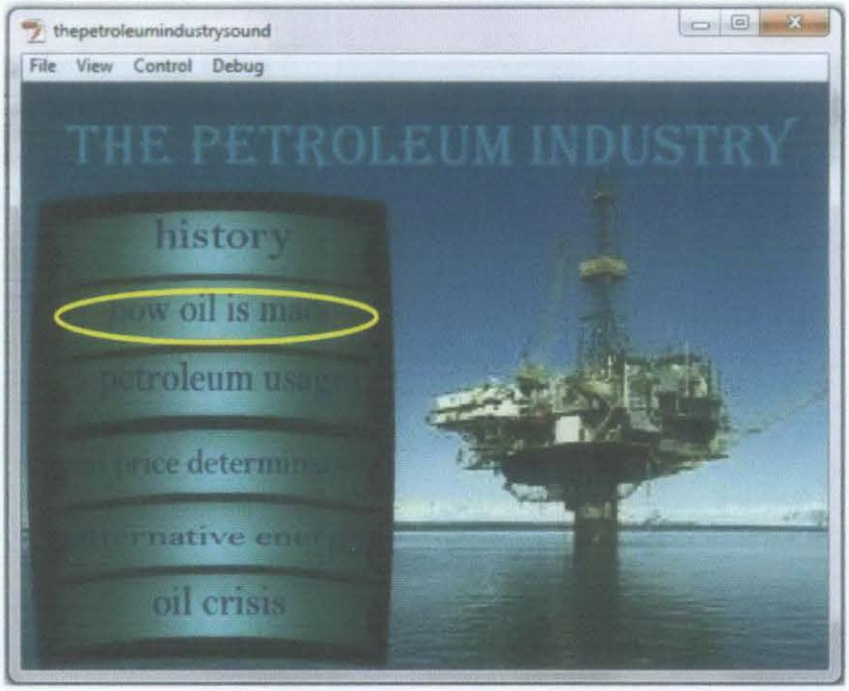
Grantt Chart

Activities	Week													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Planning														
Research														
design prototype														
progress report submission														
testing the prototype														
modifying prototype														
pre-edx														
maintain the prototype														
Dissertation														
Viva														
final dissertation submission														

Table 1.1 Grantt-Chart

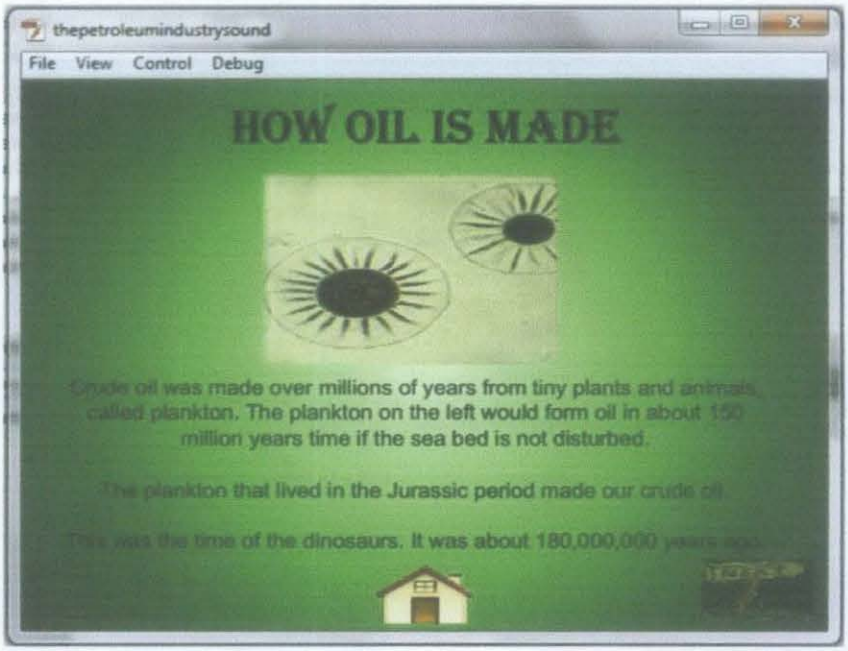
RESULT AND DISCUSSION

The prototype



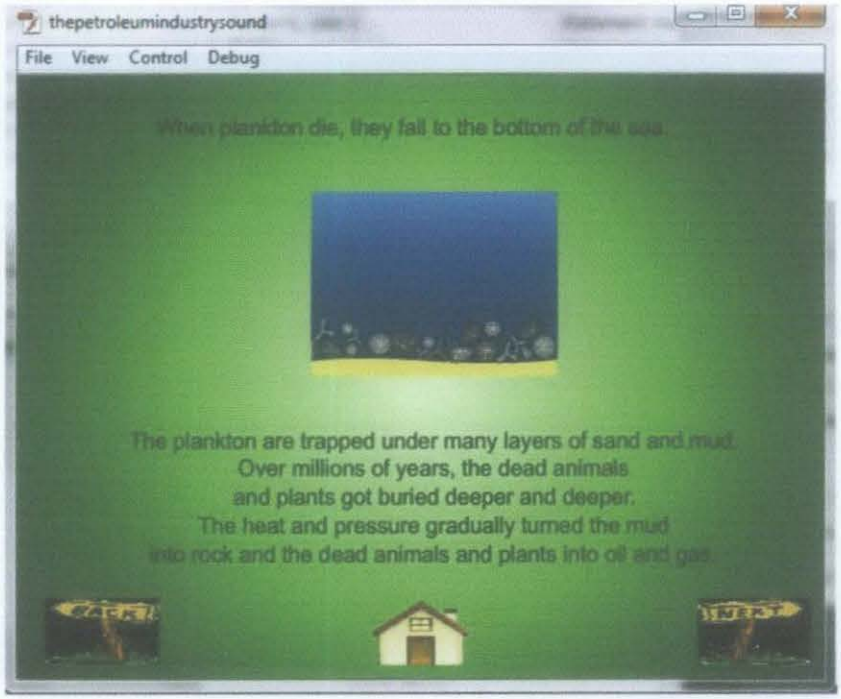
Picture 3.0 The first page of the courseware.

If the users click on 'how oil is made button', then the page will link to the how oil is made main page:

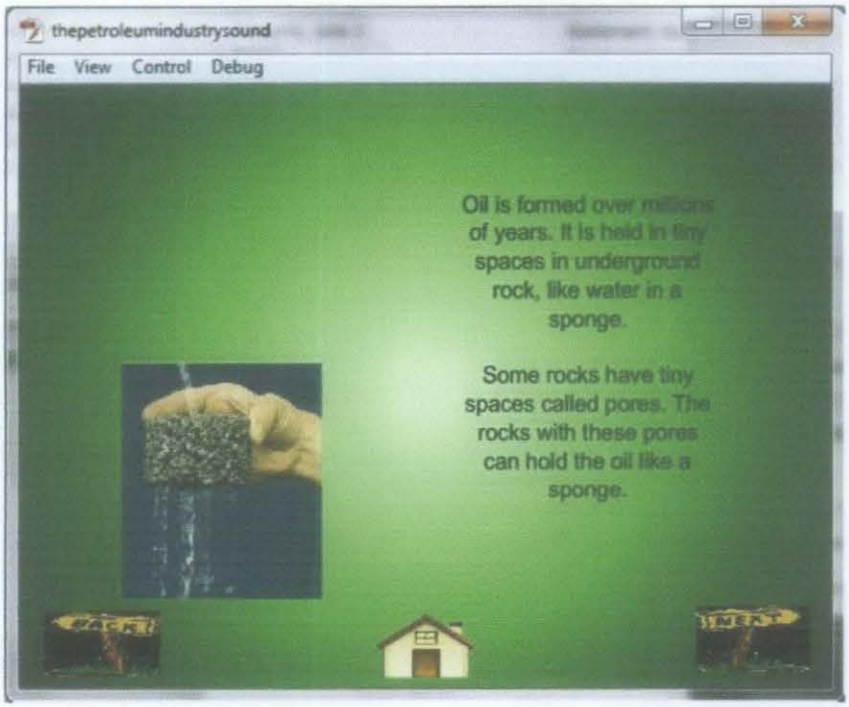


Picture 3.1 The explanation of how oil is made; with the picture moving right and left.

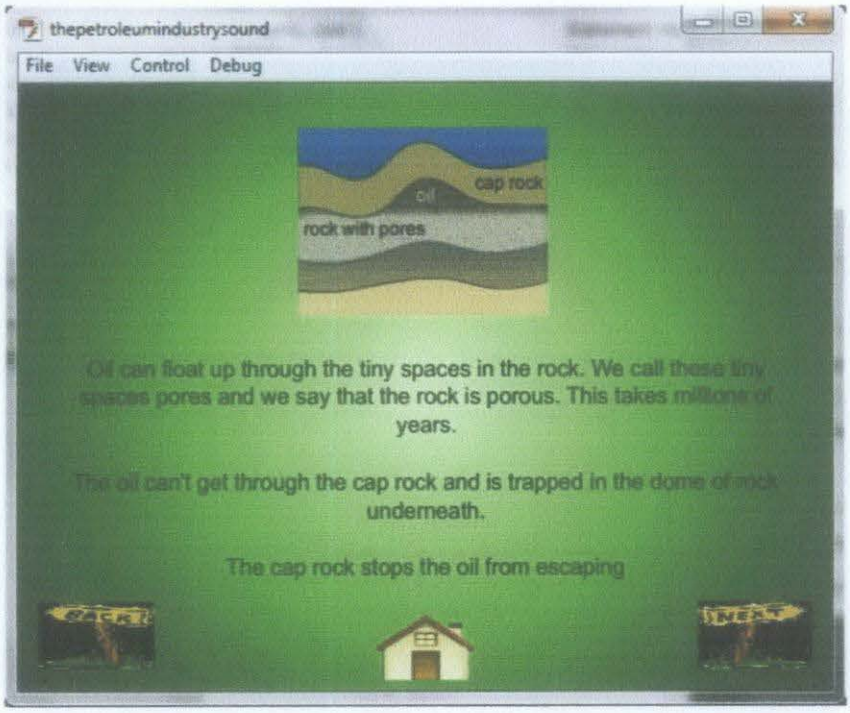
If the users click on the next button, it'll link to this page:



Picture 3.2 The explanations; with picture in the middle moving right and left



Picture 3.3 The explanations; with the picture in the left is moving ups and downs

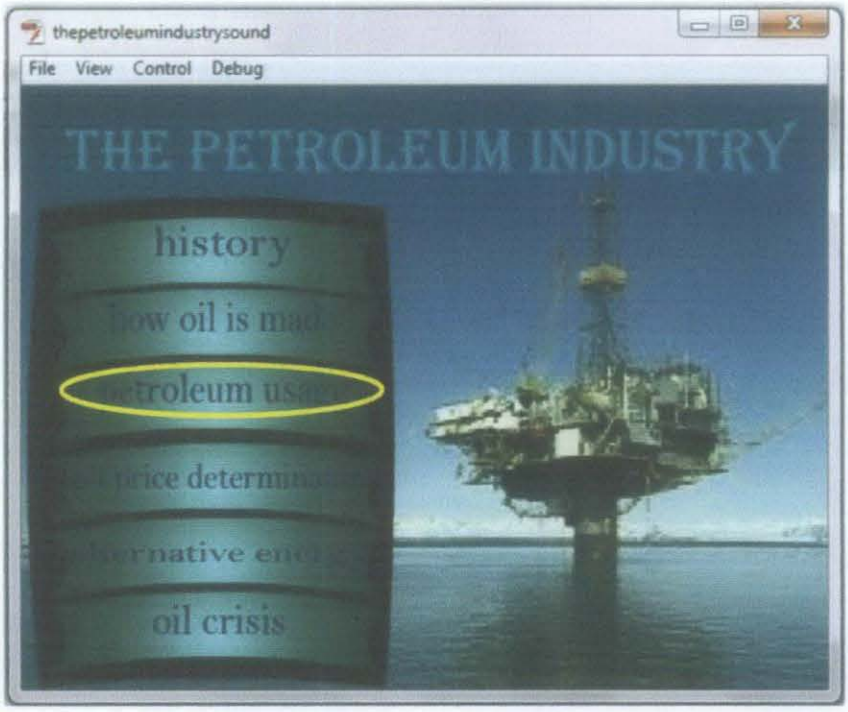


Picture 3.4 The explanations; with the picture in the middle is moving right and left

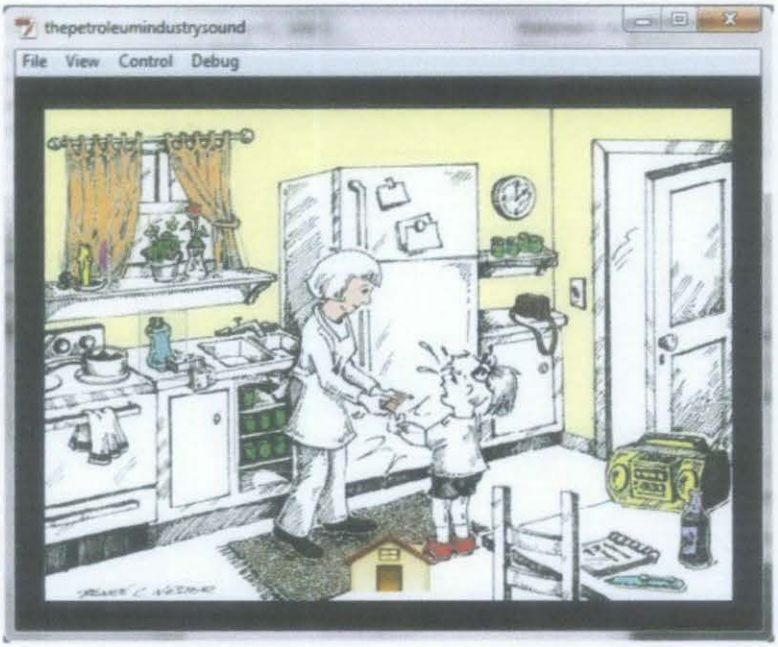
Picture 3.5. The explanations; with the picture in the middle rotates 180^0.

If users choose to click 'back' button; the user will view the previous page. If users click 'home' button, then he'll go back to the main page.

If the users click on 'petroleum usage' button at home page, then it will link to main page of petroleum usage

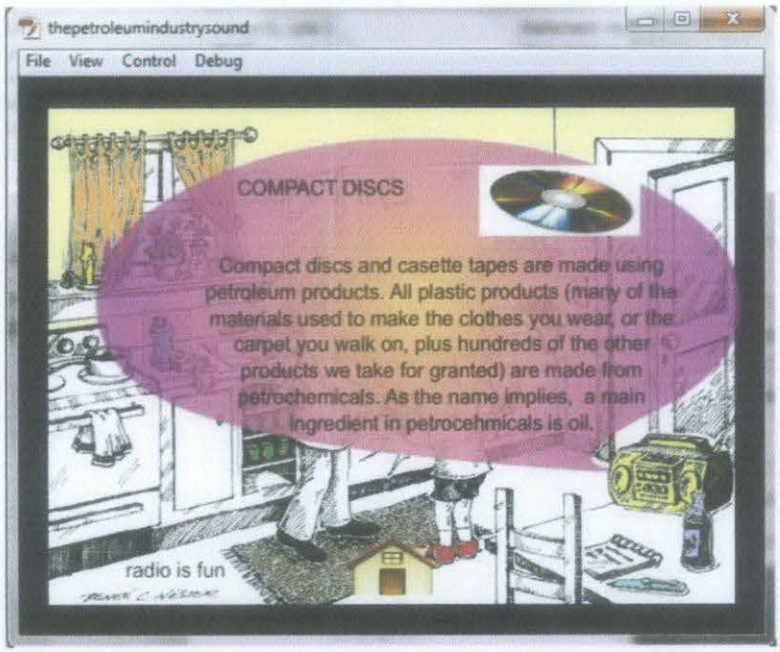


Picture 3.6 Back to main page



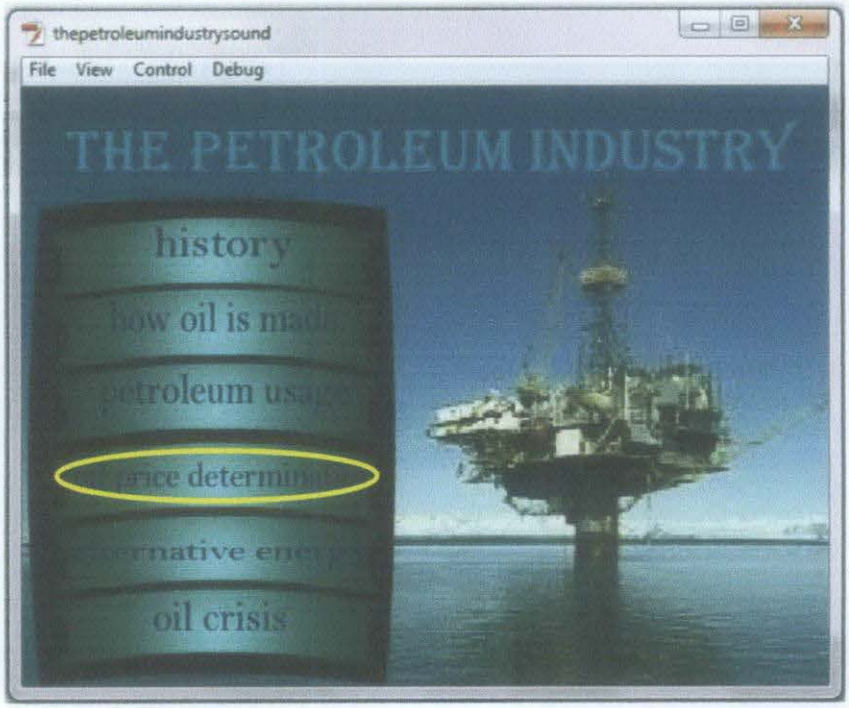
Picture 3.7 Main page of petroleum usage

Each coloured items contains petroleum substance, for example, if the users click on radio picture, a popup will pop out and give some basic information regarding the compact discs; which contains petroleum substance.



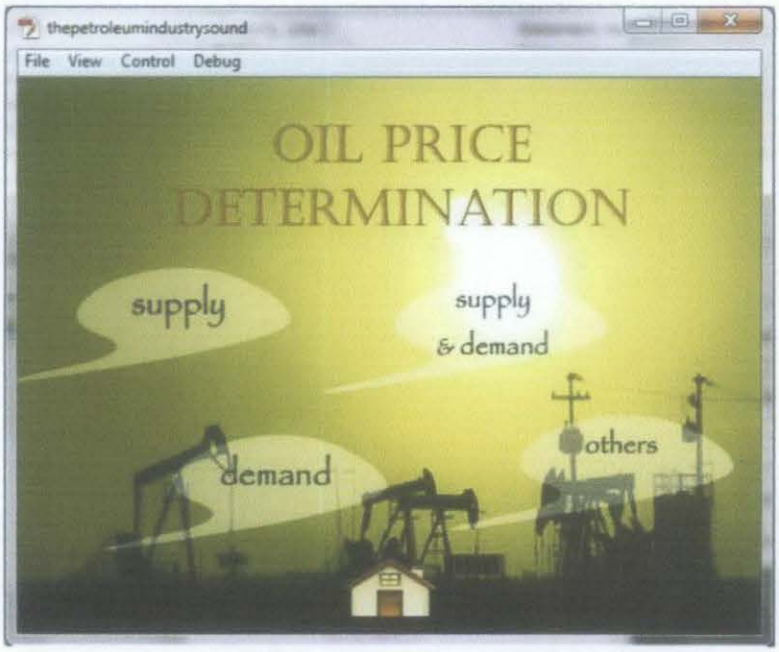
Picture 3.8 Explanations of petroleum usage for each item.

Then, users may click on 'home' button and proceed to the main page back.



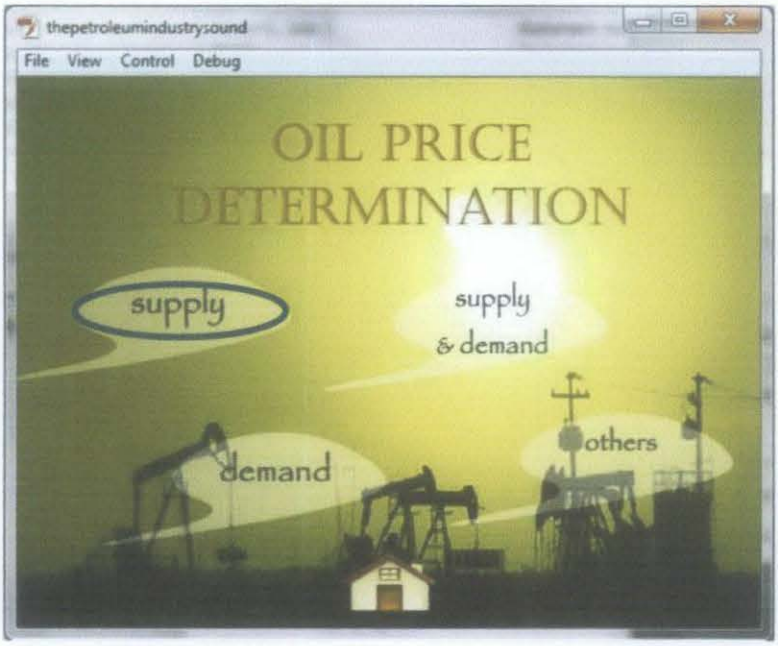
Picture 3.9 Back to main page

If the users choose oil price determination, it will link to oil price determination main page.



Picture 3.10 Main page of oil price determination

Users have choice either supply, demand, supply and demand or others related factors which contribute to the oil price determination.



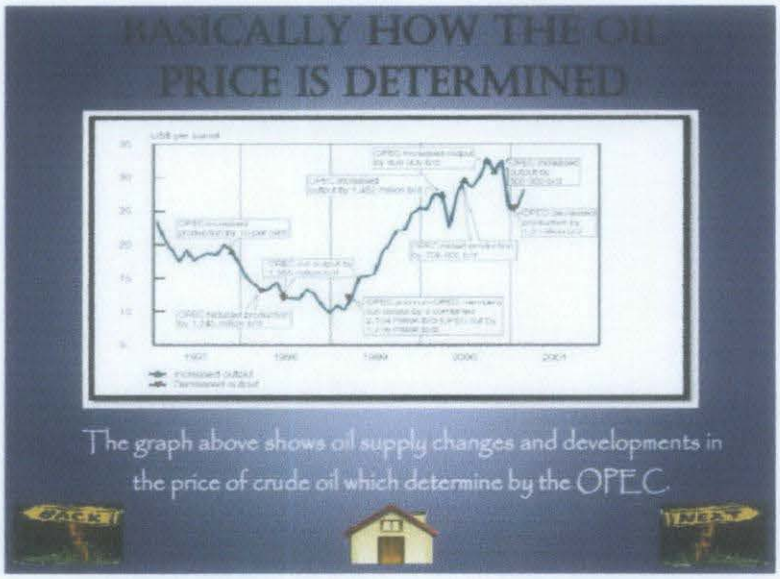
Picture 3.11 Users may choose either 'supply', 'demand', 'supply and demand' or 'other' perspective.

If the users click on 'supply button', the page of oil supply will come out.

When the user click on each continent, a popup of the info will tell the user, how much percentage of oil each continent have.

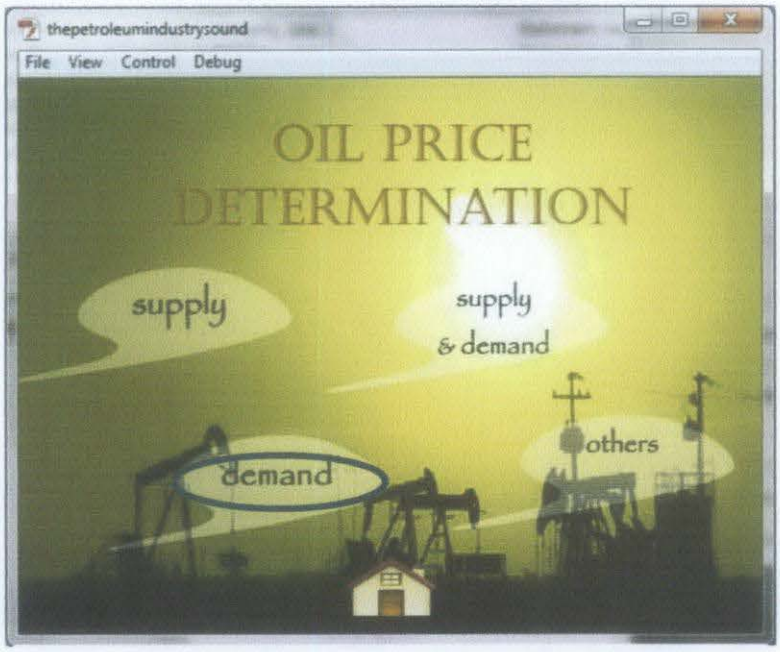
Picture 3.12 The supply of oil in each continent

Then the user can click on 'back' button to go to the main page of 'oil price determination' page or 'next' button to proceed how oil supply may influence the oil price determination.



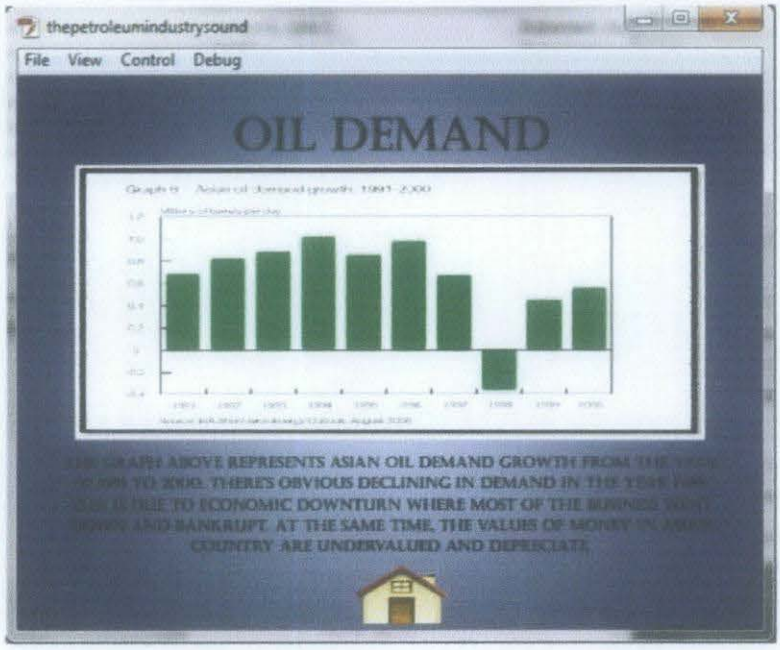
Picture 3.13 Example of how oil supply changes and developments in the price of crude oil, which determine by the OPEC.

If the users want to know how demand might determine the oil price, they just have to click on 'demand' button.

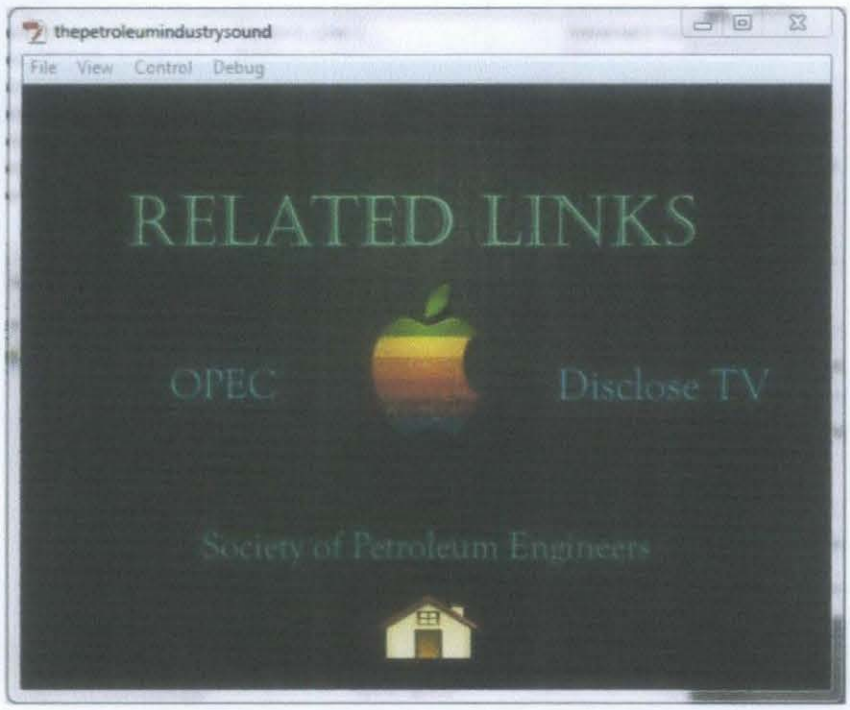


Picture 3.14 Main page of oil price determination

If the users click on 'demand button', the page of oil demand will come out.



Picture 3.15 Some explanation regarding oil demands



Picture 3.16 Page to link to other websites for further information

Findings

The prototype of the courseware was tested by 60 primary students and 71% of them (43 students) interested to learn more and another 25% (15 students) is not interested and another 3% (2 students) do not give any responds.

The main reason why the courseware is not interested is because the courseware only provides limited scope of knowledge and still in testing phase (not totally complete).

However, if the courseware is done in complete edition, there is a market to penetrate because at least more than half of contestant is satisfied with the courseware. Plus some of them give a feedback stated that it'll be much fun if the school syllabus is taught by using interactive courseware. It's easier to understand, more fun to read and study, and eager to know more in depth about the subject.

DISCUSSION

The courseware seems to be quite complicated to the end user. Since the target user age is between 10 to 12 years old, the courseware should not include the high level sub-topic such as oil price determination and oil crisis. However, the sub-topic of the history of oil, how oil is made, petroleum usage and alternative energy should be maintained.

On the other hand, to build and create a courseware, the developer should know how to deliver the idea to end user. For example, if the target user is primary student in rural area ages 10 to 12, then the courseware of an introduction to Petroleum Industry really need a teacher to guide them. Along with, the teacher must know the industry well, so when the student asks them, the teachers are able to answer them.

Even though at first, the main idea of creating the courseware is just to go and approach the student one by one, but it is not sufficient because why should a person waste their time to go approach one by one if they can just distribute the courseware and many people can use at one time. In real world, a smart people convert their ideas and effort into cash and money, they won't waste it for free. Same goes to this software.

Another important lesson from building this courseware is, it is always not about what developer know or think but is always about what the end user or customer wants and needs.

CONCLUSION AND RECOMMENDATION

As a conclusion, at the end of the project, an introduction to petroleum industry courseware is developed. However, the courseware will only focus on how oil is made, the usage of petroleum, oil price determination and oil crisis. On the other hand, the courseware can add more features in future.

However, the end product does match and relevant to the main objective which is to gain primary student interest in petroleum industry and provide them with the basic concept regarding the industry through interactive courseware.

As for recommendation, the courseware should re-design by using a simpler vocabulary since the end user is primary student aged 10 to 12 years old. Plus, some theory should be implemented in the courseware such as 'human-computer interaction' and the how student in rural area re-act towards the courseware by themselves.

As for the courseware, the background music and rhythm should be monotone; to make sure it won't distract the users from focusing while they were playing.

On the other hand, the courseware involved interaction between student and technology; it involves cognitions, the processes and the limitation of users. As for the courseware developer, we should expect what users can and cannot do. If the task seems to be difficult to understand by the end user, then there should be a clear instruction start from the beginning.

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