KNOWLEDGE CONSTRUCTION USING WEB-BASED CONSTRUCTIVIST APPROACH: A CRITICAL EVALUATION OF STUDENTS' PERFORMANCE

By

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Abstract

Although web technology is widely used in today's classrooms, educationists are still unsure of its capacity to generate meaningful learning. As the numbers of web-based learning (WBL) materials keep increasing tremendously, more students will rely on such resources in their learning process. A WBL that applies a constructivist approach offers an alternative as it allows the users to explore the environment based on a given problem.

This study investigates the effectiveness of two learning approaches in a WBL environment (constructivist and objectivist) on the achievemnt of students in terms of their knowledge level, retention and motiation with different cognitive style (field independent, FI and field dependent, FD). Two verson of a WBL material (constructivist and objectivist) were developed for this purpose. A 2x2 quasi-experiment pre-test, post-test design was utilized. The sample for this study comprised a total of 141 form four students from two secondary schools in Malaysia.

The findings revealed that: (i) the FI students performed significantly better than the FD students after learning through the web learning based on constructivist approach. (ii) there were no significant different between the FI students and the FD student after learning through the web learning based on objectivist approach (iii) the FI students who learned through the web learning based on constructivist approach performed significantly better than the FI studetns who learned through the web learning based on objectivist approach. (iv) there were no significant differences for the FD students after learning using both approaches. (v) there were no significant difference on students' retention and motivation towards web learning.

These findings suggest that the constructivist approach has the potential to be an effective learning approachj in a web environment. Other than that, to ensure the web based instruction effectiveness, cognititve style differences is among the factors that should be considered and applied in the said learning material environment.

Declaration

I declare that this thesis is my own work and it has not been previously submitted, either by me or by anyone else, for a degree or diploma at any educational institute, school or university. To the best of my knowledge, this thesis does not contain any previously published work, except where another person's work used has been cited and included in the list of references.

Mohd Hafiz Yusoff

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1. Conferences

M.H.Yusoff, C.Phillips, "Knowledge construction using web-based constructivist approach: A case study in Malaysia," in *International Conference on E-learning, Plymouth University, UK,* April. 2010.

M.H.Yusoff, C.Phillips, "Knowledge construction using web-based constructivist approach: A critical evaluation of students' performance," in *Regional Conference on Knowledge Integration in ICT, Kuala Lumpur, Malaysia,* June. 2010.

2. Journal

M.H.Yusoff, C.Phillips, "Knowledge construction using web-based constructivist approach: A critical evaluation of students' performance," submitted to *Malaysian Journal of Information & Communication Technology (MyJICT),* July 2010.

Contents

Chapter 1

Introduction

1.0 Introduction

Today's rapidly evolving Internet technology is highly admired for its capabilities and sophistication. The Internet has changed the lifestyles of communities and societies in many aspects, which are educational, economical, political, social and others. The evolution and sophistication of Internet technology has shaped this society into one which competes with one other to master knowledge. Society no longer considers learning as a means for only passing examinations, or just for gaining employment.

In education, the Internet has also changed the conventional teaching method to one based on web-based learning. Web-based learning, also known as online learning or online education, is quickly changing the face of higher education, because it attracts students of all ages [1]. In 2006, almost 3.5 million students (20 percent) were taking one or more online courses in the United States [2]. Universities, continuing education institutions and commercial organizations are turning to online learning for valid reasons.

In [3] the researchers assert that "For maximum effectiveness, training and learning opportunities must go to the students and arrive just-in-time. For these and other reasons, demographics and competition no longer allow instructors or trainers to

insist on 'my place at my pace'. Totally online web-based courses offer benefits for learners and trainers/instructors alike".

Nevertheless, the effectiveness of a web-based learning largely depends on the ability of the students using it, and its compatibility with their level of thinking. Therefore, the content compilation factor of educational websites, the combination of learning theories and attractive displays are important factors in ensuring maximum effects on students.

Among the subjects which should use websites as their foundation in teaching and learning is the Business Management course. In Malaysia, the government, under the responsibilities of the Education Ministry, does in fact have a clear vision to cultivate entrepreneurship and management culture amongst students nationwide. By giving the students early education on management and the basics of entrepreneurship during their school years, its hope is to be able to produce more independent human resources, and to reduce dependency on public and private sectors for employment.

For the aforementioned reasons, courses involving entrepreneurship and business basics have been introduced, beginning at the school level. Among the objectives of the Business Management course is to shape the personalities of generations of Malaysian, with entrepreneurial spirit, high ethical values, creativity, innovation and inventiveness/productivity. However, the educating and learning of Business Management in schools is difficult, as it is still seen as a boring subject, and is not very popular among students. The existing educational websites are also more focused on the tutorial approach.

This combination of factors influenced the students not to choose this subject as their subject. The overall result of the examination also indicated that the performance given for this subject was only average.

In most schools, the Business Management course is still considered a boring subject, and is not popular among students. By using web-based learning, the interest and achievement in the subject is expected to be increased. Many researchers, such as [1], [2] and [3], found that learning through the web is more effective and can increase student interest compared with the traditional method.

In this research, the Business Management subject was chosen as the study subject. The selection of students from the Business Management course was on the assumption that they possessed an equal skill in using computers and educational websites. The differences in the two approaches (constructivist and objectivist) for developing educational websites were evaluated using the 2x2 quasi-experiment method, which has been explained in detail in chapter 3.

Considering that this research is using an empirical research technique, the research questions (section 1.3) and research hypothesis (section 1.4) were determined as subject matters. To see the outcome of the effectiveness of the usage of these two types of websites, a student achievement level test called a "knowledge test" was conducted as a measurement tool for students involved in this study. Processes for the overall study are explained in detail in chapter 3.

1.1 Problem Statements

Amongst the teaching goals of Business Management is to develop the student's potential, specifically in entrepreneurship activities, thoughts, administration, presentation of ideas, self expression and problem solving. Subsequently, it is expected that, through the Business Management course, Malaysian entrepreneurs who are able to compete globally will be born, specifically in producing creative, innovative and inventive/productive managers.

However, students' achievements in the Business Management field at the SPM (GCE O Level) level are still low, especially in the problem solving section, which requires thinking skills. Low levels of knowledge in management theories affected the overall achievement in Business Management subjects, specifically in Paper 2, where students are required to solve case study problems.

According to the SPM (GCE O Level) 2006 Performance Report [34] issued by the Malaysian Examination Board for Business Management subjects, overall, the majority of the candidates scored at medium and low levels. Among the factors causing the candidates to score low is that most of them were not able to apply the management theories and administration principles.

Besides that, for mediocre and weak candidates, it was found that their creativity, as well as their perception ability, is at a low level. On the other hand, candidates categorised in the excellent group are found to be able to successfully produce the best solutions for certain problems, to fully apply the management knowledge, as well as being efficient in keeping up-to-date with current issues.

Based on the discussions I had with a few Business Management teachers who are involved as main coaches, and are experienced in running courses for Business Management teachers and involved as SPM (GCE O Level) paper examiners, it was found that students are having problems in answering Paper 2, which is the problem solving part (case study).

In teaching, most of the information given by teachers or centring on teachers are mainly in management theories and principles. Most of the lesson syllabus taught is memorised as preparation for examination. A majority of teachers use the drill method, which involves giving the students various objective exercises (multiple choice) as preparation for the Paper 1 examination at the SPM (GCE O Level) level.

For example, through the researcher's discussion with a few teachers at a secondary school, it was found that the drill method was the main strategy used to improve the said subject's performance. This kind of teaching method surely will not assist in nurturing the student's thinking, and is not an effective method in the effort of improving the quality of students' achievements in the said subject. In using teaching materials, teachers will normally use teaching aids prepared by themselves, textbooks, slides, videos and OHP transparencies [4]. Nevertheless, some Business Management teachers do recommended certain reference books on the market to be used as reading materials.

The teaching materials usage mentioned above is naturally more teacher-focused, where the teachers will convey and explain the contents of the said materials. It does not give many opportunities to the students to be actively involved in building their

knowledge constructively. Due to the factors mentioned above, it is very important for teachers to start developing teaching methods which are more suitable for producing a more meaningful learning.

To that purpose, the development of a website which uses this constructivist approach can pioneer and accelerate a better change in the learning and teaching technique, to produce high order thinking among students. Therefore, learning through websites is expected to be able to improve the achievements and motivation among students in the said subject, because learning in a web environment will give the opportunity for learning focusing on students through the constructivist approach.

In general, there are at least two terms usually used in web-based learning; web-based instruction (WBI) and educational web sites (EWS). Web-based instruction is a web-based learning using existing websites for educational purposes. Different from normal websites, the educational web sites are sites which display information for the purpose of teaching and learning.

The majority of content on educational websites is based on the determined syllabus and curriculum, with interactive elements. Even though there have been many educational web sites developed, the majority of teaching and learning on the web sites developed in Malaysia is based on the objectivist approach, or more specifically, the "tutorial method". Generally, each activity on the tutorial website begins with a brief on the goals to be achieved and a step-by-step tutorial, followed by exercises and reinforcement.

Similarly, software designed based on the web sites for smart schools is generally developed based on the tutorial method. A research conducted by [5] found that most of the web site software provided to smart schools is based on information display; only a few facilities are in the form of observation and exploration, as suggested by constructivist teaching. From an interactivity aspect, most of them are focused on multiple choice questions and simple activities. From a cognitive process aspect, the majority of them are more into information retrieval and re-memorising.

The content in the said courseware which involved problem solving, decision making and thinking abilities is too minimal. In other words, the courseware used in smart schools does not emphasise constructivist and scientific thinking, as suggested by the Ministry of Education in Malaysia itself. The tutorial method is found to be more focused on the information transfer process, where students will undergo a step-by-step lesson and try to memorise the lesson content conveyed by the said website.

The constructivist approach is one of the teaching and learning methods which is very suitable for improving students' thinking, especially in Business Management. In this globalisation era, amongst the main requirements of the Business Management field is the effort to conduct a form of effective teaching and learning among students, especially in the upper secondary forms, in order to produce students who are able to think on a high level, as well as being able to form critical and creative ideas which can compete in the international market in the future.

To realise this hope, a paradigm shift from teaching based on the traditional approach to a new approach, which is more dynamic and meaningful, is required. This

includes the need to review a number of perceptions and practices in Business Management teaching and learning.

Among them are issues related to technology application, as well as teaching design based on the most recent theories and models, which emphasise producing meaningful learning. Even though technology has been used in teaching and learning, it has yet to be confirmed whether or not it is able to improve a student's thinking. In fact, it may cause students to become more passive and uncreative. This is because the technology changes only take place on the outside, but the approach is still the old approach [6].

Research conducted found that, among the main problems in learning in schools, is the student's failure to connect what they learn in school with what is happening outside of the school [7]. This is what happened on the Business Management course, which is often considered as a subject only for examination purposes, and does not give any benefits in daily life.

Constructivist learning which is based on the constructivism paradigm will focus on how to produce a form of learning which is meaningful among students [8]. For example, in Business Management learning, students were asked to give reasons why certain solutions were used for various business problems around them. After experiencing a constructivist learning process, students will be able to explain the rationale of selecting the said solution. They will realise that management method selection in problems existing around them is not made coincidentally, but based on certain theories and principles.

Based on the discussion above, this research attempted to put forward a proposal for web-based Business Management learning which is developed based on the constructivist approach which applied the inquiry based technique, as suggested by [9], and a learning cycle, suggested by [10]. To ensure the effectiveness of web-based learning in a constructivism learning environment among students, this research also proposed a Hypermedia Design Model based on the Cognitive Flexibility Theory by Spiro [11].

The inquiry-based learning, as well as problem solving, is said to be able to improve students' achievements and motivation, because students can control and determine which information to absorb, compared to the tutorial method, where students are only passive receivers. This proposal is considered suitable to be used as an alternative or an innovation to improve students' achievements and motivation for the Business Management subject.

1.2 Research Objectives

This research is to:

a. study the effectiveness of learning through educational websites using the constructivist approach, compared with learning through educational websites developed using the objectivist approach.

b. observe the differences, in terms of students' knowledge levels, of those who learned through the web-based learning environment, with those who have different cognitive styles, which are field independent (FI) and field dependent (FD).

c. study the effectiveness of educational web-based learning which uses the constructivist approach on those who have different cognitive styles, which are field independent (FI) and field dependent (FD).

d. study the effectiveness of educational web-based learning which uses the objectivist approach on those who have different cognitive styles, which are field independent (FI) and field dependent (FD).

e. observe the differences, in terms of students' knowledge levels, of those who have a field independent (FI) cognitive style after learning through educational websites developed based on the constructivist approach, compared with learning through educational websites developed with an objectivist approach.

f. observe the differences, in terms of students' knowledge levels, of those who have a field dependent (FI) cognitive style after learning through educational websites developed based on the constructivist approach, compared with learning through educational websites developed with an objectivist approach.

g. study the retention effectiveness of learning through educational websites with a constructivist approach, compared to learning through educational websites developed using objectivist approach.

h. study the effects on students' motivation in using educational websites

with the constructivist approach, compared to the learning through educational websites developed using the objectivist approach.

1.3 Research Questions

This research is to answer the following questions:

a. Is there any significant difference in term of students' knowledge levels after learning using educational websites with the constructivist approach, compared with the objectivist approach?

b. Is there any significant difference between students with field independent (FI) and field dependent (FD) cognitive styles, in terms of their knowledge levels, after learning using an educational websites based learning environment?

c. Is there any significant difference in the knowledge levels between students with field independent (FI) and students with field dependent (FD) cognitive styles after learning through educational websites using the constructivist approach?

d. Is there any significant difference in the knowledge levels between students with field independent (FI) and students with field dependent (FD) cognitive styles after learning through educational websites using the objectivist approach?

e. Is there any significant difference in the knowledge levels between students

with field independent (FI) cognitive styles after learning through educational websites using the constructivist approach, as compared with learning through educational websites using the objectivist approach?

f. Is there any significant difference in the knowledge levels between students with field dependent (FD) cognitive styles after learning through educational websites using the constructivist approach, as compared with learning through educational websites using the objectivist approach?

g. Is there any significant difference in terms of students' learning retention after learning through educational websites using the constructivist approach, as compared with the objectivist approach?

h. Is there any significant difference in terms of students' motivation after learning through educational websites using the constructivist approach as compared with learning through educational websites using the objectivist approach?

1.4 Hypothesis

Based on the research objectives and questions, the researcher will consider eight null hypotheses at a significant level of $p<0.05$, according to the given research questions.

Hypothesis 1

There is no significant difference in terms of students' knowledge levels after

learning through educational websites using the constructivist approach, as compared with educational websites developed using the objectivist approach.

Hypothesis 2

There is no significant difference in terms of students' knowledge levels between the students with field independent (FI) and field dependent (FD) cognitive styles, after learning using the educational web-based learning environment.

Hypothesis 3

There is no significant difference in terms of students' knowledge levels between students with field independent (FI) and field dependent (FD) cognitive styles, after learning through educational websites using the constructivist approach.

Hypothesis 4

There is no significant difference in terms of students' knowledge levels between students with field independent (FI) and field dependent (FD) cognitive styles, after learning through educational websites using the objectivist approach.

Hypothesis 5

There is no significant difference in terms of students' knowledge levels between students with field independent (FI) cognitive styles, after learning through educational websites using the constructivist approach, as compared

with learning through educational websites developed using the objectivist approach.

Hypothesis 6

There is no significant difference in terms of students' knowledge levels between students with field dependent (FD) cognitive styles, after learning through educational websites with the constructivist approach, as compared with educational websites using the objectivist approach.

Hypothesis 7

There is no significant difference among students in terms of learning retention, after learning through educational websites using the constructivist approach, as compared with the objectivist approach.

Hypothesis 8

There is no significant difference in terms of students' motivation after learning through educational websites using the constructivist approach, as compared with learning through educational websites using the objectivist approach.

1.5 Theoretical Framework

This research is applied into the constructivism paradigm, based on the theory suggested by Lawson [10]. This theory suggests the three aspects in human thinking, which are innate abilities, empirical inductive (EI) thinking and hypothetical deductive (HD) thinking.

These three thinking aspects occurred through a process called self-regulation. Innate abilities consist of three basic abilities, which are: a) pattern making and recognition, b) drawing inference, and c) making comparison. These abilities are presumably functioning in various stages of the self-regulation process.

It begins with the exploration process for an object or event which cannot be differentiated. Then, the mind will use the existing mental structure to assimilate the new phenomena. The interaction occurring between the new phenomena with the existing mental structure will produce a new mental pattern. Later, it will generate an expectation towards the shape of the experience a person will undergo.

If the expectation and the outcome are the same, then the object and the event will be assimilated directly into the existing mental structure, and will not require adaptation. However, if the expectation and the outcome are not the same, then what will result is called disequilibrium. A person will continue seeking the solution for the problem he is facing using certain strategies. The solution will involve an accommodation process for the existing mental structure or schema before it can be applied.

The empirical inductive (EI) thinking provides students with learning situations in which they can discover a concept or principle. With this approach, the learner first encounters the attributes and instances of an idea, then names and discusses the idea. This empirical-inductive approach gives students a concrete experience whereby they obtain sensory impressions and data from real objects and events. As a result, the learner can perceive certain stimuli and may be in a better position to make sense of a situation than if he or she had received abstract information about the particular

phenomenon solely from a classroom lecture. Empirically obtained information can be acted upon cognitively by the student and organized in the mind, where patterns may be discovered that are meaningful to the learner. This is how a concept is induced or discovered and how ideas are put forth to describe and explain a phenomenon. The teacher helps bring into the discussion the appropriate terminology for naming the concept or principle and defining it. The inductive approach, which can be thought of as an experience-before-vocabulary approach to learning

The hypothetical deductive (HD) thinking is the opposite of the inductive approach and is frequently used in science courses. With the deductive strategy, a concept or principle is defined and discussed using appropriate labels and terms, followed by experiences to illustrate the idea under study. The deductive approach is a vocabulary-before-experience model of teaching in which lecture and discussion precede laboratory or field work. The deductive approach can be used to promote inquiry sessions and to construct knowledge. The first phase presents the generalizations and rules about the concept or principle at hand, and the second phase requires students to find examples of the concept or principle. Some teachers claim that the deductive approach is useful when introducing complex ideas that do not have perceptible attributes.

[10] also suggested a learning cycle model in constructivist learning containing these elements: a) exploration, b) terms recognition and c) concept application. This model is used to perform learning steps in the website environment developed. Through the exploration process, students will be directed to explore issues related to topics they will learn. Learning usually begins with bringing forward some issues related to the

study topic. Students will seek the solutions through observation and discussion with peers at the exploration stage.

In addition, at this stage, students will perform activities related to the physical objects whose characteristics are open and unstructured. Teachers guide the students in performing the observation, measurement and data recording. Students are encouraged to discuss among themselves in preparing explanation, building up the assumptions and testing the said assumptions. Explorations also direct the students to face the possibilities of misconceptions they may have as a result of their past experiences [10].

The next stage is terms recognition, where students will be introduced to various terms and concepts related to the subject content discussed. At this stage, teachers play an active role in explaining concepts behind the questions brought forward at the exploration stage. This stage is also known as the guided discovery stage.

At the concept application stage, students will be guided through a process of applying a concept, which was understood for other, possibly different situations. It is more of a suggestion or a proposal to solve a problem faced, based on the knowledge gained at the second stage, which is the terms recognition stage. This process will take place continuously, until it forms a learning cycle [10]. The teaching process using this model occurs in a spiral, and it will occur repeatedly until the students reach the maximum understanding and appreciation level, and a meaningful learning level.

My research also referred to the inquiry-based learning proposed in [9]. This Inquiry-

based Learning Theory has been used in conducting learning through proposed websites, to ensure students gain knowledge through the exploration process, systematically seek solutions to any problems, and understand certain concepts. This strategy can ensure that the students will be able to understand the work process, to gain a more meaningful and higher quality of results.

[9] had focused on three main elements, which had become the inquiry-based learning method components: a) a set of goals defined by the teacher, b) a set of strategies to achieve the said goals, and c) a mechanism to determine when and what goal to achieve. Generally, the inquiry-based learning final goal suggested by [9] was to allow the students to build their own theories based on the rules they have learned.

They proposed 10 strategies for inquiry-based learning, which are: i) selecting positive and negative examples, ii) systematically diversifying the cases, iii) choosing evaluating examples, iv) generating hypothetical cases, v) forming hypotheses, vi) testing and evaluating hypotheses, vii) consider alternative forecasts, viii) trapping the students, ix) tracking the contradiction causes, and x) questioning the authorities.

The Hypermedia Design Model, which is based on the Cognitive Flexibility Theory [11], has also been used for creating instruction materials based on websites which are more focused on the constructivist paradigm. The Cognitive Flexibility Theory is focused on specific requirements, in order to achieve further learning goals, where the knowledge domain is complex and less structured [11].

This theory also suggests a "criss-crossed landscape" metaphor, by stating that a certain object is complex and non-linear, with multiple dimensions [11]. Therefore, in preparing the instruction materials, this theory suggests the necessity of preparing various perspectives or interpretations for the contents to be taught. The hypertext or hyperlink systems found on the websites and internet environments are said to be suitable for this learning, which is explained as random access instruction.

According to [11], an important matter which should be paid attention to in the Hypermedia Design Model is that there are dissimilarities between the design metaphor and the instructional with interface metaphor. The design metaphor refers to how a designer administers the learning domain, while preparing the said learning environment; the interface metaphor refers to how students will access the knowledge within the said environment.

Another aspect which is also important in this model is the dissimilarities between the design goals with learner objectives. Design goals are the knowledge which the designers hope the students will build up through the provided learning environment, while the learner objectives are referring to what the students really want to learn in the said learning environment. In the Hypermedia Design Model, the objectives which the students want to achieve will be given priority. Nevertheless, guidance should also be provided to assist the learners in achieving their objectives.

The ARCS motivational model by Keller [12] has also been referred to as a guide to creating a learning environment which can attract the students' interest in educational web-based learning. The model has four main components:

A - Attention

R - Relevance

C - Confidence

S - Satisfaction

Each component in the ARCS motivational model was used as a reference when designing the two proposed websites. Among the elements which can be used for the said purpose are effective colour selections, attractive graphics, providing animations, videos, music, challenging questions, relevant examples and the like.

Each student has different styles and aptitudes in gaining knowledge. One of the factors differentiating one person from another is the cognitive style aspect. [13] stated that cognitive style is a normal style of a person processing information or understanding, assuming, thinking, memorising and solving problems. Different cognitive styles explain that each student has different aptitudes, beliefs, interests and learning styles.

Among the most influencing cognitive style differences are Field Dependent (FD) and Field Independent (FI) cognitive style. [14] stated that FD is a term used to refer to students with low aptitudes for overcoming hidden contexts in understanding, which is to break down each item from its context. Students belonging to the FD group are said to be passive and have low self-control.

Meanwhile, FI is a term used for referring to students with the ability to overcome hidden contexts in understanding, despite being distracted by other elements in their

environment. Students belonging to the FI group are said to be more active, individualistic and less sensitive to others' reactions and social aspects.

At the same time, [15] has almost the same opinion as [14] concerning FD and FI learners. He stated that FD learners group are those who cannot free themselves from environmental elements or distracting backgrounds when they try to isolate certain aspects in a certain situation. They also found it difficult to apply structure to situations which have no structure, while FI learners are those who can overcome the effects of distracting background elements when they try to isolate certain aspects in a certain situation. They have the ability to build a structure for situations which have no structure.

Because the web-based Business Management learning is built using two different approaches, as well as using various media elements such as text, graphics, audio, animation, video and the like, there is a possibility that it will have different effects on different learner groups from the cognitive style aspect. Therefore, the cognitive style difference theory is among the main aspect focused on in this research.

The learning theories and models proposed above are used as foundations in planning the web-based learning materials creation for the developed Business Management subject.

1.6 Significance of Research

1. This research is expected to be able to assist Internet users, especially amongst secondary school students, to acquire educational information and improve their

achievement and motivation in Business Management course through websites easily, comfortably and in a fun way.

2. The research outcome is expected to provide a picture concerning the effectiveness of websites developed based on the constructivist approach, as compared with websites developed based on the objectivist approach. It is expected that this innovation will be able to be made into a guide for those who are involved in developing educational websites worldwide.

3. This research is expected to give students with different cognitive styles an opportunity to improve their knowledge and achievement in the Business Management subject.

1.7 Limitations and De-limitations

Limitations

Limitations are objects or events out of the researcher's control which may be able to limit the research conclusion and its eligibility for application in other situations [20]. In this research, the limiting objects were:

a. When designing the website, designers must not be convinced that the website displayed on his computer screen will be the same as what other users will see on their computers. The display will be seen differently depending on the screen resolution size and the size of the monitor used. For example, some users use the screen resolution sized 640x480, 800x600, 1024x768,

1280x1024, 1600x1200 and the like. Also, some users use computers with monitors sized 14", 15", 17", 20", 21" and the like. The website developed in this research used the resolution sized 1024x768 on a 15" monitor. Therefore, users with a higher or lower screen resolution and monitor will not be able to see the said website display seen by the designers on their computers. If they are using a lower screen resolution, a part of the website display will be hidden, and they will need to use the scroll bar to see it. On the other hand, those who are using a higher screen resolution will see a smaller website display on the screen of the monitor they are using. This is one of the limitations outside of the researcher's control which may occur, where the computer and the monitor in the computer laboratory involved have different characteristics.

b. The web-based learning is based on the computer and Internet technology. The said technology evolved at a rapid pace, and there are always more sophisticated and greater, new innovations. The computer and web-based learning materials developed five years ago may no longer be applicable today. Therefore, the research outcome through materials developed for this research may not bring the same effect in improving students' achievements and motivation in the future. This is due to the fact that, in the future, Internet technology capabilities may be far higher, and learning through the computer and Internet exposure among students will be more widespread and commonplace.

De-limitations

De-limitations are boundaries in research conducted [20]. The following are the de-limiters for this research:

a. This research only involved a portion of Form 4 students in two secondary schools in Ampang, Selangor - Malaysia.

b. This research only focused on 4 topics: i) fundamentals of business, ii) elements of commerce, iii) domestic commerce and iv) international commerce.

c. This research was conducted in two grade-A schools, where the students attending are considered to have the same level of academic achievement backgrounds, based on the SPM (GCE O-Level) for the past three consecutive years for both schools, specifically in the Business Management subject.

Chapter 2

Literature Review

2. Introduction

The Internet and website technology innovation is being used widely as an effective instruction medium for advanced countries' education systems, followed by developing countries. In order to compete with the said development, the Malaysian government has set aside a large allocation for providing ICT infrastructure which will enable web-based learning to be implemented in schools nationwide.

However, the increase in Internet users and educational websites in this country have yet to ensure an increase in students' achievements, especially in aspects of high order thinking, to produce a generation which is able to compete at an international level. The learning theory and model are among the main factors that should be considered and used as a foundation in educational website development process.

This is very important for ensuring its effectiveness in improving students' achievements after using the said educational websites. Even though there is no specific learning theory and model for an educational website's development, the existing learning theories and models can be adapted and applied as foundations in developing the said websites.

This chapter reviewed a number of instruction theories and models, with potential for being applied in website development specific for the Business Management subject learning. Apart from that, there are also other factors such as differences in students' cognitive styles and motivations, which will influence the effectiveness of learning through educational websites. All those factors will also be discussed based on findings of studies conducted in the past.

2.1 Internet Development

The Internet, which started to emerge in the 1990s, is truly admired for its abilities and sophistication. Through the Internet, information can be delivered virtually and globally across distant geographical boundaries. The related information can be accessed at any time, wherever the user is.

1993 is said to have been the starting point for the spread of the Internet into all aspects of our lives, when its restriction for commercial use was lifted [19]. Starting that year, the Internet was released to private and industrial sectors. Prior to that year, the Internet was used only for the military and for research fields in higher learning institutions [19].

Internet usage has changed the community and society lifestyle across various aspects, such as education, the economy, politics, social life, and the like. Internet usage has also changed the conventional education method into a net based education, or virtual learning. Network based education is an education program based on hypermedia which uses the World Web's attributes and sources (World Wide Web or WWW) to design and support a meaningful learning environment [37].

Web based education can equip an individual to become a member of an information community, information society or knowledge society.

The Web is a Hypertext Markup Language (HTML) protocol developed by Tim Berners Lee at the European Nuclear Research Centre in 1989, with the potential to connect to all information storage around the world. This protocol can deliver text, graphics, audio, video and animation. The web can lead to the real time interaction between a number of users over long distances synchronously (in real time) or asynchronously (in different time).

There are many programs and protocols which can be used on the Internet, such as Internet Relay Chat (IRC), which supports real time web discussions, Usenet, which allows asynchronous discussions and data and multimedia transfers, Multiple User Domains (MUDs) and Multiple User Domain Object Oriented (MOOs), which are based on the virtual world text and allow real time interactions, and electronic mail, which allows asynchronous individual communications.

Internet usage today is one of the sophisticated technologies which can assist in increasing the information, knowledge and new skills amongst all levels of society, regardless of race, beliefs, political boundaries, age and sex, through global network connections and nodes. Knowledge can be disseminated without boundaries and accessed globally.

2.1.1 Website Usage in Education

In discussions about website usage for educational purposes, there are at least two terms which are always used - web based instruction (WBI) and learning through web-based education (WBE). [37] stated that WBI can be seen as an innovation in delivering instructions to students which is using the web as a go-between medium.

Among the main web characteristics which cannot be found with other media is its ability to provide an environment which allows students to interact with teachers, students to interact with other students, or students to interact with the website environment itself. Amongst the communication channels which are usually used in a WBI environment are e-mails, chat rooms, bulletin boards and video conferences. Millions of websites which contain wide-ranging information from all over the world can be used for teaching and learning purposes.

The second term, which is learning using web-based education (WBE), is referring to learning through websites which are developed specifically for WBI purposes, and at times, solely to display educational information. For a major part of educational websites in Malaysia, the contents have been adapted to lesson syllabuses according to certain levels.

2.1.2 The Advantages and Disadvantages of Web Based Education

The main advantage of web-based education is that it overcomes barriers of physical distance and time. This lowers institutional or organizational costs, increases student enrolment, offers flexibility by allowing access to course information at any time or

place, promotes individualized learning, and reaches students who are unable to attend class because of time or distance constraints.

Lowers costs and increases institutional enrolment. From an institutional or organizational perspective, web based education is cost-effective. Many institutions are offering web based education courses or programs in order to save money. Delivering education to students who are unable to attend classes because of time or distance increases the institution's enrolment numbers without increasing the overheads [38]. The need for permanent teaching facilities is also reduced, since the students can access online information from the convenience of their own homes.

Employers utilize online courses as a way of reducing the cost of training their employees, as well as for increasing productivity, since the employees spend less time away from the office. [39] asserts that web based education also permits economies of scale. Once an online course has been developed, the class size is only limited by the server capacity and bandwidth [39]. The course resources, such as entire courses or individual components such as reusable learning objects, may be shared in order to avoid the redundancy in developing course materials [21][39].

Offers convenience and flexibility. Online learning provides education to students in a more time-efficient and convenient manner. [3] asserts that "Online, web-based classes, can often 'fit around' students' lifestyles and obligations". Students can access the instructional materials at a time and place which is convenient to them [22] [39]. Online instructional modules are available for use at any time. This is

especially important for non-traditional students whose lifestyles value "part-time study", and therefore need the flexibility of online learning [3].

Reaches remote students. Online education allows instructors to reach students in different geographical areas, as well as students who would otherwise be unreachable [23] [38]. Students such as working adults, stay at home moms, the deployed military, and the elderly and handicapped now have unlimited opportunities to take courses and attain degrees from a distance, because they are no longer limited to educational opportunities which are within driving distance of their home [1]. This, in and of itself, has far-reaching implications, in that it helps students obtain an education.

Promotes individualized learning. Web based education allows students to take control of their own learning and, therefore, learn at their own pace. Students can be given greater control over the learning environment, by allowing them to select from the learning modules or course material which best assists their own understanding and retention [39]. In addition, material can be reviewed at a later date, or as many times as necessary in order to master specific skills or retain knowledge [3].

Despite the advantages of offering web based education, there are many challenges which need to be addressed. Many of the disadvantages are directly related to the advantages previously mentioned. The disadvantages of web based education include cost issues, the time it takes to develop an online course, technical problems, the potential for poor instructional design, retention issues related to student motivation, isolation, and misconceptions about web based education.

High initial costs. Although there are many cost advantages in offering web based courses, the initial costs for planning, production and technology are much higher than for traditional courses. As [39] explains, "The development of an effective online tutorial can be very expensive-ranging from thousands to hundreds of thousands of dollars when time and opportunity costs are accounted". The human capital and the costs of converting a traditional face-to-face course to an online course can be easily underestimated [38].

Time comparison. Although web based education offers the instructors the flexibility and convenience to determine their teaching schedule, the time demands are greater for teaching a course using an online format than for teaching a course in a face-to-face setting [24]. [24] conducted a study which performed a time comparison between a course taught online and a course taught face-to-face (with the same class and instructor). He contends that "The amount of time spent teaching online was over twice the amount of time spent teaching in-class" [24].

[24] further states that the amount of time spent teaching an online course seems to proportionately increase with the number of students enrolled, and that the major difference in the additional time spent is largely due to communications with the students (time spent emailing and answering students' questions).

Technology problems. The success of web based education is very much dependent upon the technology. When the technology fails, the online course can fail with it. This causes student frustration and dissatisfaction, particularly for students who are

already uncomfortable or unfamiliar with the technology or the online environment in general.

This causes the students to either avoid the course, or focus on the technology rather than the content. [39] asserts that "Even minor problems can be a serious impediment, decreasing satisfaction and course participation while increasing cognitive load, which in turn impede learning".

Poor instructional design. [38] stresses that there seems to be a misconception that advances in technology will improve the effectiveness of web based education. On the contrary, the best web based practices depend on how creative and well-informed the instructors are [25] [38]; "The challenge of implementing effective designs on the internet and the absence of an instructor for needed clarification may make web based learning more sensitive to flawed designs" [39].

[38] explains that "Much of the quality of instruction depends on the attitude of the administration and the instructor", explaining that the attitude that technology itself will improve the quality of the class can be detrimental to the class. Instead, the administration and instructors should focus on ways to best use the technology, such as employing instructional design practices to facilitate learning in the online environment.

There seems to be a flawed mindset that it is necessary to use technology for the sake of it, rather than focusing on achieving an educational goal. [39] says that "it is as

though the technology train is leaving the station and no one wants to be left behind". This can lead to a poor instructional design or ineffective use of the technology itself.

Retention issues. Retaining students on online courses has generally proven to be a great deal more challenging than keeping students on for a face-to-face course. According to [26], course-completion rates are often 10 to 20 percentage points higher for traditional, face-to-face courses than for online course offerings.

[27] contends that students taking an online course for the first time may withdraw because of the overwhelming amount of information (technical, course navigation, alternative methods of interaction, and administrative processes for taking online courses) which they must process in addition to the course content. [28] says that students who dropped their courses were more likely to have previously believed that online courses would be less difficult than a face-to-face course.

Web based education's advantage in offering students the convenience and flexibility of taking their course from anywhere and any place is not without its disadvantages. This places more responsibility on the student to log in and take their courses, but many students lack the discipline and/or motivation to succeed in an online environment. The separation between the instructor and the teacher can also cause a psychological distance which can affect the learner's achievement and retention [29].

Furthermore, without adequate communication and community building, students can easily feel isolated or less motivated, causing them to drop out of the course. In addition, today's computer technology has given students high expectations

concerning any online activity. If comprehensive plans to help retain students are not put into place, then the students, the course and the overall program will suffer.

2.1.3 Application to Designing an Educational Website

Web based education can provide significant advantages for learners, instructors and employers. Many of the challenges associated with web based education can be addressed by the online course design, and by implementing procedures which will have positive implications for the learner. Effective web based education enforces maintaining high standards of quality while promoting accessibility, motivation and interactivity for students who are learning in the online environment [3].

Whether developing an online course, or an educational or informational website, not only must the design and layout be organized in a way which is easily accessible and user-friendly, but the content must also be developed in a way which is conducive to how students learn online, and which provides the necessary information to help the students be successful in the online environment.

In developing a website or web based learning module, it is necessary to apply instructional design principles to facilitate the learning of information and to optimize the user's experience. This requires the instructor or person developing the website to seek training on how to display information on the web which helps the students or users to more easily retain or learn from the information presented.

[23] says that "Faculty members and corporate trainers alike need to address whatever learning curve they face personally. They have to become knowledgeable

about online learning, tackle it, learn how to adapt subject areas to a web-based environment and then make the commitment to keep up with the technological advances that impact on academic and workplace instruction". [30] further stresses that the instructors must be trained in how to use the technology, but more importantly to "shift the way in which they organize and deliver material".

Since technological problems can hinder student satisfaction and success in the online environment, it is necessary to provide a description of the minimum technology, software and connectivity requirements students will need to meet in order to have a successful experience [3]. Information on how to get help should also be provided on the website. This information should be easily accessible so that students do not have to spend time looking for it.

It is also necessary to ensure that the web design interface is developed in a way which is compatible with all browsers. Users will become frustrated if what they are seeing displayed on their screen is not what is expected from the design aspect. This causes the student or user to become frustrated, and increases cognitive load, hindering the learning process. The goal should be to design the interface so that it facilitates the learning process by being user-friendly and consistent, and by providing all the necessary information to ensure student success. It is also necessary to provide the students with information regarding the technical requirements.

Since retaining students in the online environment is a huge issue, it is necessary to educate the students about the nature of online learning before they are allowed to take an online course. [28] says that the need to manage students' expectations about

this mode of learning is important, especially for those new to the format. This could be done by developing an online orientation module which addresses the following: the nature of the online course, the interaction and instructor role, the need to log on almost every day, the emphasis on a great deal of reading, how to get help, warnings about procrastination, and the flexible nature of online learning.

The module should be linked to the informational or educational website, or online course, and students must be required to take the orientation before they are allowed to enrol on an online course.

In order to address student isolation issues, the informational website could offer access to a social network to give the students a place to talk "off the record" about their online course experiences, and help them feel as if they are part of a community of online learners. Success tips and reminders of policies and procedures related to their particular online course could also be provided on the website. [31] stresses the importance of community building and its impact on student success, motivation and persistence.

2.2 Learning Theories

A learning process is a dynamic activity. Therefore, educators are always searching for a suitable foundation to make a decision on teaching methods, which should be organized so that learning can be carried out effectively [15]. There are various groups followed by educators in determining a suitable teaching method.

There are two major groups which exist in learning theories and models, which are behaviourists and cognitivist groups. Cognitivists are divided into two, which are the objectivism group and the constructivism group. These two groups have different views on knowledge perspectives, and how instruction and learning take place.

2.2.1 Behaviourism

Behaviourists are of the opinion that learning is an action which is observed externally. Learning is said to take place when there is a relationship between S-R, which are stimulation (S) and response (R). According to [40], when there is repeated stimulation and response, then learning will take place. He presented an operand familiarization theory, which is that a behaviour followed by reinforcement will become a familiarization. Should a positive reinforcement be given, then the behaviour will be done repeatedly and will become familiar.

The usage of computer aided instruction method, or CAI, mainly used this behaviourist approach in its early stage. For example, students' activities when using a computer are solely carried out by taking a step-by-step prepared tutorial, and then answering quiz or multiple choice questions as exercises. Each right or wrong answer will be rewarded appropriately.

Learning which applies this behaviourist theory is usually from courses which involve skilled techniques such as drawing skills, for example, drawing through imitation or the "imitation process". Students will draw the same object repeatedly, until they are familiarized and no longer need to look at the object.

Even though learning with this method is effective in training hand skills, it is only suitable for learning at an initial stage, and does not contribute to generating new ideas. This approach will also not support high level learning or creative thinking, while modern day learning requires basic understanding and high creativity. Skills will be gained should there be a repeated stimulation and response, after which learning will take place.

Behaviourist theory is also often used as a foundation in designing educational websites. Among the educational websites in this country which fits the behaviourism context is Timesguides.com (http://www.timesguides.com/spmrg/index.html). This website is more focused on revision activities and exercises, with the purpose of getting good grades in examinations. This site provides questions which are mainly multi-objective and which can be answered online. The said questions will be updated from time to time. Should the students answer correctly, words such as "good" will be displayed as a reward.

2.2.2 Cognitivism

The cognitivism group disagrees with the behaviourists, who assume students to be passive machines. Cognitivists are of the opinion that humans are organisms which have purposes in their behaviour and always interact with nature. They emphasize internal processes which take place in the human mind. According to [41], students organized various changes in their schema during learning, through the adaptation process towards the environment. Prior to that, [42] was of the opinion that a person naturally learns by discovering relationships between various stimulations found in nature itself.

[43] explained that a student's cognitive development is a basic transformation, which is a biological fixation process of the highest psychological function. He recommended a zone of proximal development (ZPD), which is a space located between a knowledge or skill which already exists in a student, and its potential level. Therefore, teachers have a certain role to provide guidance to students so that a student's potential can be developed according to the appropriate potential.

There are two approaches in instruction based on this cognitive paradigm, which are the objectivist and the constructivist. The objectivist approach believes that knowledge is in a cumulative form, and that learning will be the outcome based on prerequisites fulfilled, such as past knowledge required for further learning.

Amongst the learning theories following this objectivist approach is the theory put forward by [44], [45] and [46]. [44] listed five learning products, which are verbal information, intellectual skills, cognitive strategy, motor skills and attitude. In the context of students taking the Business Management subject, they should be able to use intellectual skills, cognitive strategy, motor skills and attitude in applying their knowledge. For example, when students were asked to make a criticism of the generated solution for a problem in front of their friends, based on the theories, management elements and management principles which they have learned.

According to [44], learning is an internal activity which occurs through input and output transformation, while teaching is an external activity which supports these internal activities. He also presented nine teaching scenes for producing learning. [45] presented the algo-heuristic theory; to maximize knowledge acquisition based

on this theory, he suggested the use of a "snowball method", which is the first basic operation when the said network is taught and practiced, followed by the second operation being taught and the first basic operation being practiced. The third basic operation is taught and practiced, and later practiced together with the two previous basic operations.

On the Business Management course, the "snowball method" can be applied as a case study skill. For example, at the first stage, students are taught to establish a business company. From that company, students are given instructions to choose their business products. Then, students are taught to create a marketing strategy for the selected products. From that marketing strategy, students will be exposed to the problems which are usually faced in marketing certain products, and students will try to solve all of those problems through a combination of their knowledge and creativity.

[46] suggested the Structural Learning Theory, where the syllabus is broken down into smaller structures (atomic components). According to this theory, students need to be given common problems before being able to solve new problems. In Business Management, this theory is applicable when teaching topics in the form of creating materials or products. For example, to create a product packaging design, first students need to be taught about elements found in a product's packaging. Elements in product packaging are illustrations, the brand, a logo and a caption. Once students successfully design all of those elements, they are incorporated into a product packaging design.

Many studies showed the suitability of this objectivist instruction, but it is more suited to teachers who prepare all of the teaching materials, while students sit passively. For the Business Management subject, teaching management theory is usually done according to this objectivist approach. Through this approach, teachers prepare teaching materials systematically, such as modules or distribution notes, and students follow the lesson presented based on certain fixed objectives. As for a teaching aid material, teachers use self-developed charts or transparencies bought from suppliers.

The objectivism approach is also often used as a guide for designing educational websites. Among the websites in Malaysia which are suited to the objectivist group is the Score A website (http://www.scorea.com/eng/index.cfm). This website contains a number of basic elements, such as an introduction, objectives to achieve, tutorials, assessments and reinforcement.

Behaviourism and cognitivism paradigms mentioned above have been the practice of the majority of teachers in Malaysia. This is according to the directive from the Ministry of Education, Malaysia, which required every teacher to plan the lesson and write this down in the lesson planning book each time, before starting to teach. In the said lesson plan, it must contain at least the subject, objectives to achieve, steps and evaluation. Teaching scenes such as this matched the objectivism paradigm.

2.2.3 Constructivism

The constructivism learning approach emphasized that humans gain knowledge from their mental efforts. Constructivism concerns students in a meaningful experience,

where students interpret the information themselves without following what was mapped out by other people [46]. This approach focuses on how to study, generate and test the knowledge gained.

According to [47], while a student studies, he must form concepts and categorize by differentiating items with various types and forms found in the environment. Through this forming concept, a student will organize the information collected into meaningful units. With this process, a student will understand his environment, and the said concept will continue to grow in line with his maturity. Constructivism emphasizes the process in which a student creates and expands ideas [48].

In the 21st century, the constructivism theory is said to be becoming more popular. This theory has psychological and philosophical perspectives by taking into account how an individual builds or creates what is learned and understood by them [49]. The main concept of constructivism is that the knowledge is built by the student, and not just disseminated by an individual [50].

Constructivists believe that a person is active and builds his knowledge in the classroom, with the purpose and desire to know based on his experiences [51] [52] [53]. In this environment, the teacher plays the role of facilitator. Students are encouraged to question each other and to make arguments based on their own perspectives for solving the given problem.

This constructivist view is suited to web-based instructions. For example, the teacher can suggest a group activity, and each group is given an assignment based on certain

topics. Students are required to gather information and materials from the recommended websites or through their own searches.

Among the constructivist approach in learning is the inquiry based instruction theory by [9], and learning through discovery like with the learning cycle model by [10]. The approach suggested by this constructivist group is focused on the student, where learning takes place as a result of the student's efforts or through the experiences of the student himself.

Constructivists believe that an active, spontaneous and self-guided learning approach is necessary [10]. Because of management, art is always alive and must be given life, so teaching Business Management should always be active, creative, dynamic, student-focused and constructive, so both approaches suggested by [9] and [10] are expected fits for being applied in this Business Management instruction.

Learning through websites invites teachers and those who are involved in educational website development to shift their teaching paradigm from behaviourism and cognitivism to constructivism. The constructivist approach is said to be able to change the passive transmission of information attitude to a more active one, by providing a teaching-learning environment which can increase high-order thinking skills.

This group also believes in teaching-learning which is focused on the multi-sensory involvement of the student, and in an interactive and exploratory learning environment which can help increase said skills. Hence, the usage of websites which

have hypermedia, hypertext and hyperlink characteristics is very appropriate in this constructivist context. Therefore, websites should fully benefit from teachers in teaching-learning.

The constructivist approach has currently been applied in research by information technology expertise. Various tools were designed by the researchers as teaching and learning tools, which apply constructivist approach theory. A good example of research is that being carried out by a group of researchers from Durham University, UK. They have developed a tool called Knowledge Puzzle [32].

Knowledge Puzzle is a tool for knowledge construction from the web. Its main contribution to web-based learning was the adaptation of information structures on the web to cope with the interlink knowledge structure in the learner's mind [32, 33]. The experimental results of this tool showed evidence of success in promoting a constructivist approach for web-based learning [33].

Active student participation is one of the important components in the success of a learning process through websites. According to [54], learning through websites should have the following characteristics:

- Produce a pure learning context and involve real problem solving.
- Students are responsible, and have the initiative to learn by themselves in forming a certain skill.
- Teachers act as facilitators and give guidance, but not as a source of information.
- Active discussions between students and the teacher.
- Learning in a group method, which is learning collaboratively and cooperatively.
- A pure learning assessment strategy in assessing the actual skill.

From the discussion above, the constructivist paradigm is thought to be best suited to today's secondary school Business Management learning environment. This is because the website learning environment allows students to participate actively. Amongst the learning methods under the constructivist paradigm are inquiry based learning, experiments, discussions, simulations and problem solving.

2.3 Inquiry Based Learning

Learning based on the inquiry approach is not something new, and there are various definitions related to it. [55] stated that "if we asked ten different educators to define "inquiry", surely we will get eleven different definitions about it". Inquiry based learning is a form of active learning, where progress is assessed by how well students develop experimental and analytical skills, rather than how much knowledge they possess.

The inquiry approach in learning can be seen in various forms, depending on the subject studied. For example, for a science subject, inquiry may involve students making an investigation and explaining a certain phenomenon which may be new to them, or students being required to test a hypothesis scientifically in a lab test.

According to International Science Education Standards [16], inquiry refers to the various ways which have been used by scientists for studying the world and the way which they suggested explanations, according to evidence acquired from their research. In learning, science through inquiry also refers to the activities carried out by students in building their knowledge and understanding scientific ideas like methods performed by scientists studying this world.

Meanwhile, in social science, through inquiry, students may be required to analyse materials from primary sources which can be used to explain, as well as to understand, a certain incident from a historical event, and how they can relate with what is happening today. In the Business Management field, inquiry can be conducted for almost all learning activities, whether in theory or in generating solutions to the problem solving part.

For example, before starting a business project, there are a number of questions, such as: "Will the difference between the size and colour of a certain product affect its demand and sales?" Then, students will be shown certain places and asked to make observations and provide answers based on the questions given. For the case study project, inquiry can be conducted by asking students to experiment involving spontaneous actions using various information and techniques.

For example, in creating a certain business product, students were asked to plan at least 10 actions for marketing processes, and choose one of the best from the said plan. Then, the students were asked to make a number of copies of the action and to perform a study based on different products.

Through research and experiment, as well as mistakes which may have occurred during the project output creation process, it will surely provide a very meaningful experiment and learning for the students. [56] defined inquiry as an indirect learning which involved exploratory activities and discoveries related to the process of gaining information. It is based on questions and problem solving in teaching and learning activities. Through the said activities, students will be involved in

processing mental information, to gain meaningful understanding and to be actively involved in their learning themselves. [57] categorized inquiry based learning into four different levels (Table 2.1).

Level	Type of Inquiry	Description
0	Confirmation	Students confirmed certain principles based on the explanations by the teacher and the result of a certain study known earlier
1	Structured Inquiry	Students carried out research based on the questions and steps determined by the teacher.
2	Guided Inquiry	Students carried out research based on the questions provided by the teacher, and the exploratory steps selection was determined by the students themselves.
3	Open Inquiry	Students carried out research based on the questions and steps constructed and selected by themselves according to certain topics.

Table 2.1: The Four Levels of Inquiry Based Learning [57]

Based on Table 2.1 above, the inquiry based learning levels suggested in [57] depended on how many roles were given to the students in their learning process. The more roles given to the students in their learning activities, the higher the inquiry based learning. On the other hand, the more roles given by the teacher, the lower the level of inquiry based learning among the students.

If all problems, procedures and answers had been prepared by the teacher, and the students are only receivers of their learning, then this will not be considered to be

inquiry based learning (confirmation). However, if problems, procedures and answers were given by the students themselves and the teacher only acted as a guide, it will be inquiry based learning of the highest level (open inquiry).

Should the teacher prepare the problem and procedure while the students are required to find the answer according to the provided procedures, then it is categorized as structured inquiry. Furthermore, if the teacher only provided problems, while the students themselves determined the procedures as well as the answers for problems given, then the said learning is categorized as guided inquiry.

[58] used the terms material-directed inquiry and learner-directed inquiry for web based developed education materials. Material-directed inquiry is usually more structured and organized, as well as containing a step-by-step direction based on scientific questions which needed to be solved by students. Furthermore, students are asked to explore the contents found in the said teaching material through observation, measurement, result recording and conclusion building.

On the other hand, learner-directed inquiry is more open-ended, giving freedom to students to build questions or hypotheses for their research. Students will design research steps and carry out inquiry activities based on their own planning. According to the National Research Council [16], the material-directed inquiry learning activity can be used to focus the students on building certain concepts, while the learner-directed inquiry provides opportunities for students to develop cognitive styles and scientific reasoning.

Based on the discussion above, there are various definitions and approaches, as well as levels, in inquiry. Each approach certainly does have its own advantages and disadvantages. The inquiry approach which is going to be used should be adapted to the field and the level of thought of the students involved. For example, open inquiry and learner-directed inquiry are certainly more suitable for students in tertiary education and not suitable for primary school children, while guided inquiry and material-directed inquiry are certainly more suitable for school-level students.

Guided inquiry is one of the most suitable approaches for designing a Business Management website, because the students need to be given basic guidance to start the questions and stimulate them to keep continuing the exploration. Many studies found that students did not make good decisions with computer based learning, which gave them freedom to control their learning themselves. The more control given to the students, the less they learn [59] [60] [61].

2.3.1 Business Management and Guided Inquiry Based Learning

In Business Management, in order to produce students with high level thinking, innovative and creativity, they should be taught to learn through inquiry or exploration, just like how a manager or a tactical specialist would. A manager or an entrepreneur would probably not be able to reach a good management level if he just sat in a room without any serious thinking. They should explore using various sources, including what there is around them.

According to [62], the main process in designing is generally through the problem solving process. A manager is just like a scientist who is experimenting in a lab. A

certain assignment will yield a high outcome if a certain problem is solved using a systematic approach. A successful manager generally follows the same pattern in acquiring and building productive ideas, even though they may not be aware of how the process they underwent actually takes place.

As a policy, an entrepreneur or a manager will experiment through a number of stages. Usually, it starts through collecting various ideas and skills through reading and research. Normally, a certain issue or question will be the focus of the reading and research. The next step will be identifying what the actual problem is which needs to be solved, and beginning to explore the said question. Lastly, the said issue will be broken down into research questions or design issues which will drive someone to work on experimenting until they are successful.

In managing or producing innovative ideas, there is a form of tasks which are built up in a series. A part of the effort is being able to solve certain problems, and suggesting an issue which should be used in order to complete the next work or research. Working in a series is the more important part of the management process. The ability to experiment, evaluate and learn from mistakes, as well as to build experience in solving certain problems, will produce individuals who are creative and innovative in whichever field.

For the Business Management Curriculum (refer Appendix D), emphasis was given to the importance of students having the opportunity to learn through their own experience, in order to master the facts and theories in management. The emphasis

on mastering process skills is intellectually higher compared with mastering the facts and theories acquired through memorizing.

When students have mastered this skill, they can find answers, as well as form ideas or concepts themselves concerning any phenomenon, in solving various questions in certain management. For example, knowledge and understanding of business basics will assist students in choosing the most effective action to take in building a business. The actions taken in their management system are not done coincidentally, but based on certain purposes and principles.

There are various theories and models put forward by those who are involved in education related to guided inquiry. [17] defined guided inquiry as a learning process where teachers provide basic elements as part of learning, and then ask the students to generalize. Teachers act as facilitators who start the questions to stimulate the students, so that they continue to explore. The said approach is in parallel with the Learning Cycle model suggested in [10], and the guided inquiry theory suggested in [9], which emphasizes the teacher's instruction behaviour, to ensure the effectiveness of certain learning and discoveries.

2.3.2 Lawson Learning Cycle

[10] suggested a learning cycle model in constructivist learning. Figure 2.1 below represents elements which can be found in the learning cycle suggested in [10]. He suggested three major processes in the learning cycle, which are a) the exploration stage b) term introduction and c) concept application.

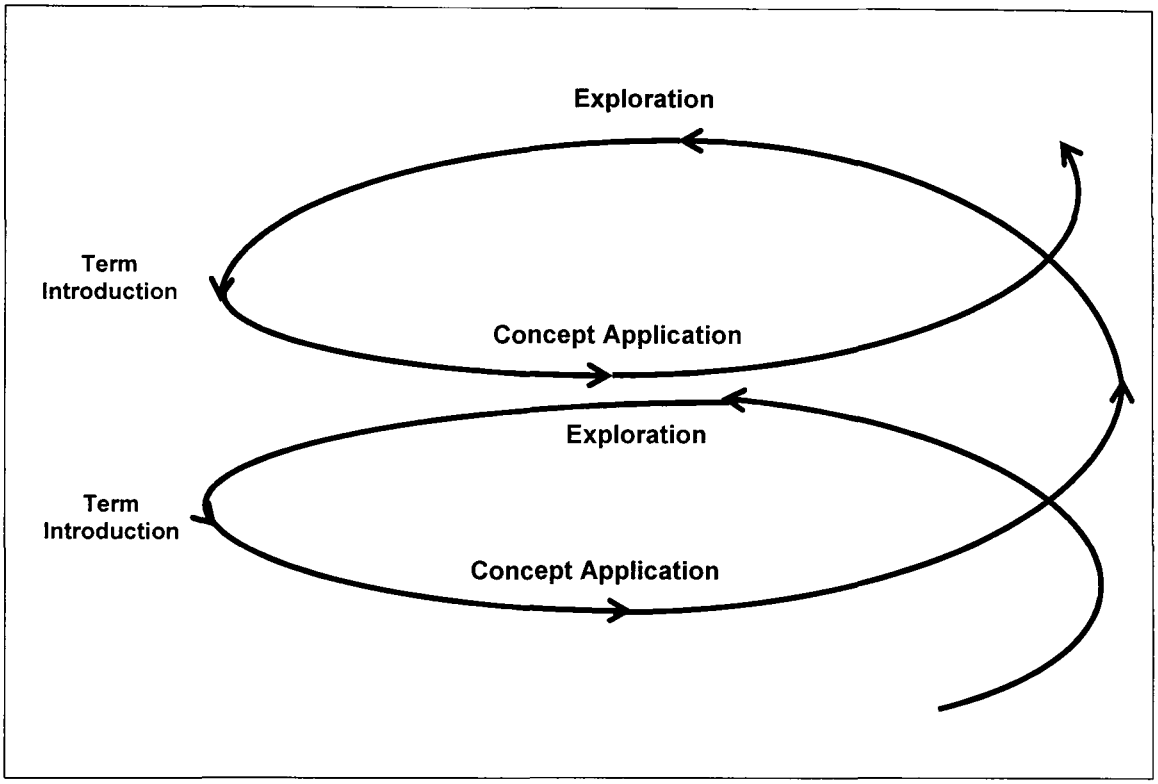

Figure 2.1: Lawson Learning Cycle [10]

Based on the diagram above, during the exploration process, students will be taken to explore issues related to the topic which is to be learned. In Business Management teaching, for example, at the exploration stage, students will be asked to make observations on a phenomenon which they will learn about.

For example, for the product marketing topic, the teacher will ask questions such as "Why are most of the fast food restaurants painted red and yellow?" Students will find the answers through observation and discussion with friends in this exploration stage. Before the teacher gives any formal presentation related to the topic, the students will carry out activities related to the physical object which is not structured and open. The teacher guides the students to make the observation, measurement and data recording.

The students are encouraged to discuss together with their own peers in preparing the explanation, making assumptions and testing that assumption. Exploration will also direct the students to face the possibilities of any incorrect views which they have as a result of an existing experience [10].

For the second stage, which is term introduction, students will be introduced to various terms and concepts related to the subject syllabus. At this stage, the teacher plays an active role in rolling out concepts. As an example, in learning to develop a product label, the teacher will state that primary colours, comprised of blue, red and yellow, cannot be produced by mixing other colours, that primary colours have strong attractions, and that primary colours are very suitable for use in designs with the purpose of attracting attention. This stage is also known as guided discovery.

For the next stage, students will go through a phase known as concept application. At this stage, the students will be taken through a process of applying the concept which was understood in other situations which may be different. It is more of a recommendation or suggestion for how to solve the problem which is being faced, based on the knowledge gained in the second stage, the term introduction stage.

For example, the teacher will ask other questions, such as "...why are products like sweaters sold in European and American countries?" This process will take place continuously until it forms a learning cycle [10]. The learning process which uses this model happens in a spiral form, and it happens repeatedly until the students reach the maximum understanding and appreciation level, and a meaningful learning level.

2.3.3 Guided Inquiry

[9] suggested a model of inquiry based learning to allow the students to develop their own theories based on the rules which they have learned. [9] focused on three major items which became inquiry based instruction methods, which are:

a. A set of objectives which the teacher developed.

b. A set of strategies to achieve the said objectives.

c. The mechanism to determine when and which objective to achieve.

Generally, the final objective of the inquiry based learning suggested in [9] is to allow the students to develop their own theories based on the rules which they have learned. They proposed 10 strategies for this inquiry based learning: i) choose positive and negative examples, ii) systematically diversify the cases, iii) choose evaluation examples, iv) generate hypothesis cases, v) form the hypothesis, vi) test and evaluate the hypothesis, vii) consider alternative predictions, viii) trap the students, ix) detect the causes for denying, and x) question the authority.

Through guided inquiry, the students will build knowledge based on learning experiences and thought processes which they have gone through. The learning gained is through a change in the way they think, form, build and test self-knowledge. According to [9], teachers usually face a problem in identifying which strategy is the best to get the best results from their students. For that purpose, [9] used dialog control structure, which consisted of three basic parts: i) the strategy to choose cases based on the main objective, ii) the student model and iii) the priority rule set. For the strategy of choosing cases based on the main objective, they outlined three basic considerations, which are important cases compared with less important

cases, from the concrete level to the abstract level, and choosing cases which occurred more often, rather than cases which occurred less.

This Inquiry Based Learning Theory recommended in [9] was to assure that the students gained knowledge through the exploration process, systematically finding answers for any problem, and next, understanding certain concepts before producing work. This strategy can ensure that the students are able to understand the work process towards producing a more meaningful and high quality result.

Through the suggested inquiry based learning, students will be guided in comparing two or more variables systematically. Based on the questions given, at last the students will be able to build the required concepts. Students will also be guided to refuse wrong and unsuitable concepts.

Even though the learning steps in the Learning Cycle model [10] and Guided Inquiry [9] mentioned above are more focused on the classroom activities, these two models can also be adapted to designing learning through the website environment. The teacher's role as a guide can be replaced by material -directed elements which can be programmed using certain programming languages, such as those discussed previously. In designing educational websites, the Lawson Learning Cycle Model [10] can be used as a guide for preparing the learning steps, while guided inquiry [9] can be used as a guide in planning learning strategies for a web-based learning environment.

2.3.4 Studies on Inquiry Based Learning

Many studies have been conducted around the inquiry context. However, most of the studies are based on learning in the classroom. Among the studies conducted for inquiry based learning is by [63]. He made a comparison between two consequential effects of learning involving a number of lab activities on 103 grade 7 students of the Earth Science subject. One of them used the inquiry based approach, and another used the deductive approach (traditional). The result of the study found that the students in the inquiry group were excellent in generating and expanding the content of the lesson.

In a meta analysis, [64] compared the teachings using the inductive approach (inquiry) and the deductive approach (traditional). The study findings showed that there was no main effect between the two approaches, but a number of interaction effects can be seen. First, the inductive approach is more positive on middle level students and excellent for high level students.

[65] conducted a study of 133 college students relating to the introduction to physical science. 66 of the students have been trained in formal reasoning using inquiry approach consistently, while other students are a control group who used the traditional method. The said study found that the inquiry students group were better in formal skills compared with the control group.

[66] had carried out an instruction using the guided inquiry approach on a large group of students (220 students), to give a better understanding concerning important concepts in the Chemistry subject. For the initial stage, he used a traditional

approach, which was delivering the instructions through lectures. Based on the test given, it was found that only 55% of the students passed.

For the next four semesters, [66] used the guided inquiry approach, where instructions were started by proposing certain questions to give the opportunity to students to give their opinions and to discuss collaboratively with their friends. The students gave an active response in the learning. Four semesters after the said approach was conducted, a test given showed that 91% of the students passed, 3% failed and 6% withdrew themselves from the course. This report showed that guided inquiry had successfully increased students' performances in their learning.

The learning cycle is one of the learning models based on inquiry which is very effective, and has been used a lot in designing, as well as developing, instruction materials. Many studies regarding the learning cycle were conducted, especially in science subjects. The learning cycle was identified by the Science Curriculum Improvement Study (SCIS) as one of the instruction strategies which is very effective in increasing students' knowledge in the science field since the 1950s [67].

Many studies conducted showed that a learning approach using the learning cycle can increase performance, provide a clearer explanation of a concept, can increase scientific thoughts, and can increase the ability to give arguments among students compared with the traditional learning approach, which is more of an information delivery format [68] [63] [69] [70] [71].

[72] did a study on the effectiveness, as well as the memory of students, for the scientific concept, after using text based learning materials. The first text material was developed based on the learning cycle, where it started with exploration and examples, followed by a terms definition (concept), while the second text learning material was developed based on the traditional approach, where it started by giving a terms definition first, and was followed by an explanation.

123 grade 10 students from two high schools were involved in this study. Students were divided into two groups and given a pre-test before using the different text materials. One post-test was given to both groups after they finished reading the said text materials. A week later, another post-test was conducted on the students involved.

Overall, the findings from the study showed that the performance of the group who studied using text developed according to the learning cycle approach was higher in both post-tests, compared with the group who studied using text material developed according to the traditional approach. The study proved that text materials developed based on the learning cycle approach were easier to understand for explaining scientific concepts, as well as providing a better long term memory effect, compared with the text materials developed based on the traditional approach.

[73] made an evaluation concerning the effects of the on-line learning module developed based on the learning cycle on 100 teaching trainees from three universities. One pre-test and one post-test was given to those teachers before and

after completing the assignments given through the module taken online, which was developed based on the learning cycle approach.

As an addition, the teaching summary reports for each of the teachers involved were also evaluated using Learning Cycle Rubric version 4. The findings from the study showed that the module developed online using the learning cycle approach was able to increase the understanding, as well as the ability, of the teaching trainees who were involved in carrying out instructions in the science subject.

Overall, the findings gained from the studies conducted showed that learning through inquiry and the learning cycle can increase students' performances in understanding a concept, can give a clearer explanation of a concept, can increase scientific thinking, can increase the ability to give arguments, and offer a better effect for the student's long term memory. Even though this study is more focused on science subjects, it should also provide the same effect for other subjects, such as Business Management and Languages.

2.4 Individual Differences Theories

In the teaching and learning process, one must be aware that students who will undergo a learning process consist of individuals who are different, in terms of abilities, performances, interests and learning styles. [74] stated that individuals are different in receiving, organizing, processing and memorizing information. Both of them explained how an individual differs in interacting with the environment, gleaning knowledge from it, developing and classifying the knowledge, and then in applying the said knowledge.

Behavioural scientists have long known that instruction will be more effective if individual differences in the student's existing knowledge and the student's development levels are taken into account [14]. Relating to that, studies in the cognitive field were done and it was found that individuals are different from one another [44].

According to [15], there are 10 types of cognitive styles which are well known, which are:

1. Field Independence (FI) vs. Field Dependence (FD)
2. Conceptual Style
3. Category Width
4. Concept Difference
5. Levelling vs. Sharpening
6. Scanning
7. Reflecting vs. Spontaneous Action
8. Risk Taking vs. Cautious
9. Tolerance for Strange Experience
10. Convergent Thinking vs. Divergent Thinking

2.4.1 Field Independent (FI) and Field Dependent (FD)

Among the cognitive styles listed above, the field independent (FI) versus field dependent (FD) cognitive style has been used a lot in the education research field [13] [14] [15]. FI and FG cognitive styles refer to the way in which an individual perceives the world around him through analysis against a global method.

An FI individual is said to be someone who can master the effect of background elements which interfere when he tries to separate an aspect in a given situation. On the other hand, an FD individual cannot free himself from elements in the environment which interfere, and also finds that it is difficult to apply a structure to an unstructured situation [14].

2.4.2 Study Related to the FD and FI Cognitive Style Differences

From a number of studies conducted, FI and FD individuals are not very different in terms of learning abilities or memory, but they are more influenced by the content and instruction methods [15]. FI individuals are more interested in abstract ideas and principles [75].

Students belonging to the FI group have been found to prefer assignment oriented learning activities, while FD students prefer a learning situation which allows them to interact with other students [15]. Besides that, those who belong to the FI group can solve new problems with their own hard work, have the skills to analyze, and are more inclined to be self-employed [18].

FD and FI individuals also displayed differences from a motivational aspect. According to [15], FI students have internal motivations, compared with FD students who require external motivation. It is also the same with materials usage; the FI students are found not having any difficulties in learning unstructured materials compared with FD students. FI students are more inclined to the hypothesis testing

approach in the concept learning process, compared with FD students who are more inclined to the viewing approach in the concept learning process.

A number of studies conducted showed the effects of cognitive style differences on learning and academic achievement. [76] carried out a study on the effects of the usage of text and text together with graphics in instructional materials. 61 university students were involved in the study. The study found that the FI student group had a better result compared with the FD student group in the presentation of the material using only text. Meanwhile, for text and graphic presentation, there was no significant difference between FI and FD students. The implication from this study is that FD students benefited from the use of graphics in the presentation of instructions.

[77] used the HyperCard Program to teach a group of students categorized into FI and FD groups. After the students received the treatment through learning using the said computer program, a test was conducted. Findings from the study showed that the FI student group's performance was higher than the FD group.

Another study conducted by [78] was on a group of students with different cognitive styles in medical studies, using hypertext based courseware materials. Findings from the study showed that the FI student group used more time to access the information in the lab compared with the FD students. The FI student group also showed more interest in exploring all of the contents found in the learning materials provided.

Based on the different traits between students with FI and FD cognitive styles, there will probably be different effects on web-based learning depending on its use of inquiry and tutorial approaches.

2.5 Motivation Theory

Psychologists believe that students' motivation will increase through intrinsic characteristics, such as giving feedback, animation, video, audio, interactivity and individuality. There are two forms of motivation, which are intrinsic motivation and extrinsic motivation. Extrinsic motivation can be given to the students through instruction methods and materials used. For example, extrinsic motivation can be done through reward and praise.

According to [79], studies found that when extrinsic motivation was used, the objective which the students wanted to achieve would be more focused on the reward, as opposed to the learning. On the other hand, through intrinsic motivation, students will give more attention to the learning. Intrinsic motivation is something which already exists in instruction material, and which can motivate students. [79] suggested a number of things which can be used to spark intrinsic motivation. Amongst them is the games learning technique, the use of exploration, student control, giving challenges to the students, sparking the students' curiosity and giving encouragement, even if the students are making a mistake.

[80] suggested four factors which can increase students' motivation:

- Challenge
- Curiosity

- Control
- Fantasy

Challenges can be created by preparing lessons which are not too easy, but at the same time, not too difficult. Challenging objectives from the initial lesson can provide a positive effect by increasing student motivation. Curiosity can be increased by giving them a situation which can spark conflict. With that, students will find information to explain or to solve the said conflict.

Three methods of student control which are suitable enough to be carried out are by allowing the students to determine the possibilities of what may happen, ensuring that there are choices, and allowing students the power to make the decision. Fantasy has a relationship with the action in gameplay. Traits found in gameplay can be used to increase student motivation.

The ARCS motivation model by Keller [12] contains these attributes: a) attention, b) relevance, c) confidence and d) satisfaction. In the ARCS Model, the first motivation attribute is to gain and maintain attention. According to [81], events can attract the students' attention and spark motivation to know what the next stage will be. Among the elements which can attract attention in a website's design is the usage of attractive graphics, animation, audio, video and use of colours suitable for the student's age level.

The second attribute in the ARCS Model is relevance, which relates to the desire or objective of the student. Examples used in the learning material must be related to

situations normally experienced by students who will use the said website. Besides that, animations, graphics, audio, video, illustrations and other elements used in the website developed must be related, and able to explain the concepts and theories developed by the students. Illustrations or unrelated things will only interfere with the student's concentration in understanding a certain concept or theory.

The third requirement in the ARCS Model is to build confidence in the students' abilities to successfully carry out assignments. With confidence, students are able to do or smooth out an effort well. According to [82], students need to be given motivation so that they have confidence in learning successfully. It can be achieved by showing the students what they are expected to achieve [83].

Finally is the satisfaction requirement, which is the student's satisfaction when an achievement or outcome from an effort fulfilled their expectation. This is because students will see the reward they will get after doing a number of activities on the said website. Amongst the elements which can be used are scoring each activity completed by the students. Each student will work to get a score higher than their friends.

In developing instruction materials, especially those which are based on computer and web technology, all four attributes in the ARCS Model must be used as a guide and for consideration. The ARCS Model will help the designer produce educational websites with learning environments which will offer more motivation to the students and the users.

2.6 Conclusion

This literature review showed that web-based learning is the new alternative, and has the potential to provide more meaningful learning. Many researchers, such as [2] and [3], found that learning through the web is more effective compared with the traditional method. Further studies found that learning through inquiry is said to be the most effective in increasing the students' performance from learning.

Overall, findings obtained from the studies conducted showed that inquiry based learning and the learning cycle can increase students' performances in understanding concepts, can give clearer explanations about concepts, can increase scientific thinking, can increase the ability to give arguments, and can have a better effect on the long term memory of the students.

Next, the educational websites which are designed and developed based on guided inquiry and material-directed instruction are said to be the most suitable methods for learning at school level. This is because many studies carried out found that students do not make good decisions in computer-based learning which gives them the freedom to control their own learning. The more student control which was given, the less the students studied.

Studies also showed that individuals are different in receiving, organizing, processing and memorizing information. Based on the different characteristics among students who have the FI and FD cognitive style, it is possible that it will have different effects on web-based learning which uses inquiry as well as the tutorial approach.

Lastly, in developing instructional materials, especially the ones based on the computer and web technology, motivational elements, as recommended by the ARCS model, should be used as a guide and for consideration. The ARCS model is said to be able to assist the designer in producing educational websites with learning environments which give more motivation to the students and the users.

Chapter 3

Methodology

3. Introduction

The objective of this research is to test the effectiveness of educational website design developed based on the constructivist approach, as compared with educational website design developed based on the objectivist approach, in improving the students' knowledge level, motivation and student retention for Business Management, from amongst Form 4 students in secondary schools.

This research would also like to study the effects of students with the field independent (FI) cognitive style, as compared with students with the field dependent (FD) cognitive style, in knowledge test achievement after browsing the given educational websites. Next, this research is to observe the students' motivation towards educational websites developed based on different approaches. This chapter explains the methodology used throughout this research.

3.1 Research Design

This research was 2x2 quasi-experimentally conducted using the pre-test - post-test control group design, as suggested in [84]. This research design consisted of a treatment group and a control group. Subjects were randomly selected for these two groups. Independent variable treatment was conducted for subjects in the treatment group. The research design is explained by Figure 3.1 and Figure 3.2 below:

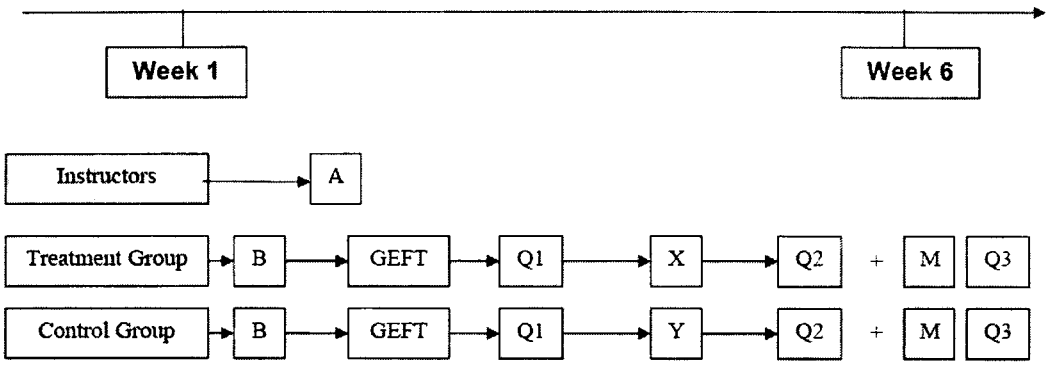

Figure 3.1: Research design

A	Orientation on learning through educational websites for the instructors involved.
B	Orientation on computer and educational websites usage among the participating students.
GEFT	Group Embedded Figure Test
X	Treatment (web-based learning session using web-based design-constructivist approach)
Y	Control (web-based learning session using web-based design - objectivist approach)
Q1	Pre-test
Q2	Post-test 1
Q3	Post-test 2
M	Attitude measurement questionnaire (Instructional Materials Motivation Scale)

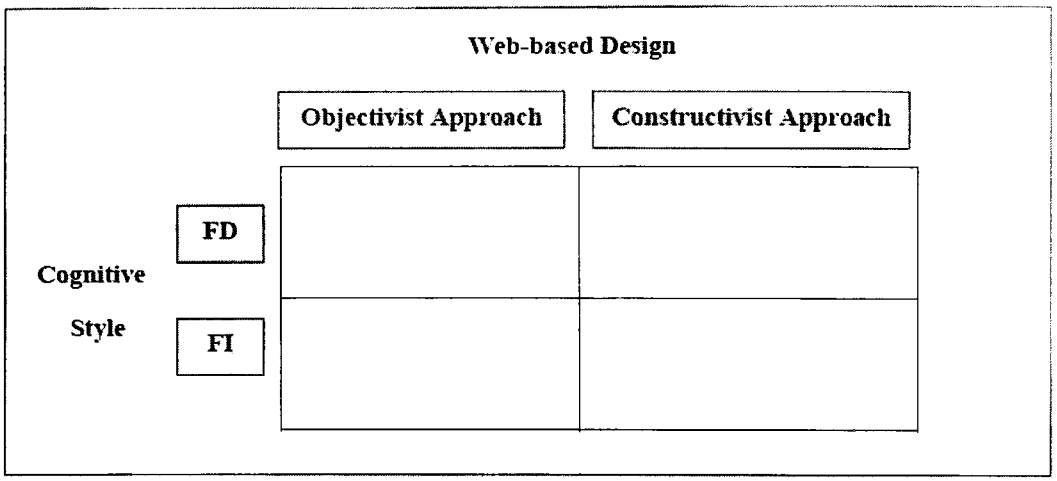

Figure 3.2: Factorial 2x2 design

Teacher Orientation

Teachers involved in this research were instructed on steps they have to take throughout this research. Information and instruction on learning steps using the provided websites were also given prior to conducting the actual research. Instructions for teachers involved in this research were provided.

Students Orientation

Students selected to participate in this research, either in control or treatment groups, were given an orientation session on computer operation and browsing the web prior to conducting the actual research. In the said session, students were given a CD-ROM titled Basics of Business, which was adapted to the Form 4 Business Management syllabus.

Also, in the same session, the participating students were shown educational websites and the Utusan Education Portal browsing experience. This orientation was conducted for three lesson hours (120 minutes). This session was important to ensure

every student participating in this research had the ability to use a computer, and a skill to browse websites when the actual research was conducted.

3.2 Variables

This research involved three types of variables, which were dependent, independent and moderator variables.

3.2.1 Independent Variable

An independent variable is also known as an experiment variable or treatment variable. An independent variable can be manipulated by the researcher, as suggested in the research design. The independent variables in this research are the two approaches in websites design, which are;

a. The design of educational websites developed based on the constructivist approach: an educational website for teaching a topic in the Business Management subject, which is "Fundamental of Business", was developed and compiled according to the approach suggested in the constructivist learning theory. On the said website, students were given questions to answer first, before being introduced to the main concepts and principles related to the topic discussed. For the constructivist approach, teachers act as facilitators who start the questioning to urge students to continue exploring [17].

In developing the computer-based teaching materials, the teacher's role as a guide was replaced with instruction materials which can be programmed using specific programming languages. Through the website developed based on the constructivist

approach, the designer has developed learning steps which allow users to explore, in order to solve a multitude of questions related to certain topics. Students will be guided to explore using the links suggested. Next, students are guided on developing certain concepts related to the topic discussed. The learning steps on the said website are inductive.

b. The design of educational websites developed based on the objectivist approach: an educational website to teach the same topic in the Business Management subject, which is "Fundamental of Business", was developed and compiled according to the approach suggested by the objectivist approach. The opposite of the constructivist approach, the design of the educational website developed based on the objectivist approach introduced the main concepts and principles related to the discussed topics first, before the related questions were given. The teaching method used was a step-by-step method, to achieve the learning objectives determined at the beginning of the lesson. The learning process is more deductive.

3.2.2 Dependent Variables

A dependent variable is also known as a criteria variable, which is a predictive variable dependent on the independent variable. A dependent variable cannot be manipulated by the researcher, and can only be measured. In this research, there were three dependent variables:

a. Improvement in knowledge test achievement: knowledge test achievement was determined based on the Post Test mean score difference between control and treatment groups, using covariate analysis (ANCOVA). The ANCOVA analysis was

used to control the difference between sample groups which cannot be controlled by the sampling method at the initial stage (statistical control). Pre-Test was used as a covariate which adjusts the Post Test results. The analysis result (mean) is the adjusted mean using ANCOVA, and not the mean of the raw Post Test result.

b. Students' motivation levels towards educational website design: the level of students' motivation toward educational website design given was measured using the Instructional Materials Motivation Scale (IMMS), a motivation test developed by John M. Keller [12]. Through this test, the researcher was able to observe the level of students' motivation towards the materials and teaching approach used. The questionnaire contained 35 questions.

c. Students' retention level: the retention in this research was measured by the declination or improvement difference between the Post Test 1 and Post Test 2 mean scores for both treatment and control groups.

3.2.3 Moderator Variables

The moderator variable, also known as the relational variable, is connected to the free variables and dependent variables. Moderator variables will affect free variables. The moderator variables in this research are the students' cognitive styles, which are either:

a. a field-dependent (FD) cognitive style: students with a GEFT score below the GEFT mean score for the sample groups were categorised as FD students.

b. a field-independent (FI) cognitive style: students with a GEFT score above the GEFT mean score for the sample groups were categorised as FI students.

3.3 Research Population and Sampling

Considering that the main objective of this research is to observe the effect of using websites developed based on the constructivist and the objectivist approaches for a topic in Business Management, population selection was focused on students taking Business Management subjects. From a sampling aspect, [85] stated that, in causal-comparative and experimental research, the sample size needed in a group must be at least 15 subjects. A total of 141 Form 4 students from two schools in the Ampang District of the state of Selangor were selected for this research.

Sample selection was determined based on the following conditions:

1. The selected schools are Grade A day schools, and offer Business Management subjects at Forms 4 and 5.
2. The participating schools should have computer laboratory facilities which are equipped with at least 20 computers.
3. The two selected schools must be similar in their students' achievement backgrounds in Business Management subjects. This was determined based on the GCE (O Level) results analysis for the previous three years, issued by the Selangor State Education Department. Other than equable geographic, socio-economic and infrastructure facilities factors, the achievement in GCS (O Level) examinations, especially in Business Management subjects, also gave an equable picture for both schools selected for this research.
4. 70 - 75 Form 4 students who are taking Business Management subjects were involved for each school selected.

3.4 Research Instruments

3.4.1 Pre-test and Post-test

These two tests were given to determine the existing knowledge level achievements of students participating in the research, before and after being treated with Business Management web-based learning.

Pre-tests were given to students prior to participating in the Business Management web-based learning. The said test contained 25 multiple choice questions related to the "Fundamental of Business" topic, and was given to all students participating in this research. The time given to answer all of those questions was 35 minutes. (Please refer Appendix A)

The construction weight for the questions given covered informative, comprehensive, application and analytical questions. As for the difficulty level, 5 questions were for low levels, with 10 medium level questions and 10 high level questions. The student's score was determined item-by-item, where a correct answer was awarded 1 point, and a wrong answer not awarded any points.

Post Test 1 was given right after the students participated in the Business Management web-based learning. This test also contained the same 25 questions as the pre-test, but the order of the questions changed. The test was also given to all students participating in this research. The time given to answer the questions was 35 minutes.

Post Test 2 observes the students' retention effects between the two websites developed, using the different approaches. The test was given to all research group members two weeks after post-test 1 was conducted. This test also contained the same 25 questions, but the order of the questions was changed, so that it varied from pre-test and post-test 1. The time for answering the questions was maintained at 35 minutes.

Because the test instrument was developed by the researcher, a pilot test was conducted to test its validity and reliability. The question contents validity was evaluated by two main state Business Management coaching teachers and a lecturer with expertise in test items development field. This was to ensure that the said test was in accordance with the topics and concepts required by the said subject's curriculum.

The said questions' reliability, as well as validity, was also determined through a pilot test conducted on a group of students taking Business Management subject in Form 4, from two schools which were not participating in the actual research. Data obtained was analyzed using Item and Test Analysis Program (ITEMAN™) version 3.5 [35].

3.4.2 Group Embedded Figure Test (GEFT)

The GEFT measuring instrument was used to classify cognitive styles for field-dependent (FD) and field-independent (FI) students [18]. The GEFT test used in this research was the GEFT Test published by Mind Garden, Inc [36]. This test requires the students to seek and fit simple figures into a number of complex shapes.

Generally, this test comes in three parts, and is based on the allocated time. For part I, the time given was 2 minutes. To complete parts II and III, the time given was 10 minutes. (Please refer Appendix B)

Based on the said test, students who score above average in GEFT are known as FI students, while students who scored lower than average are known as FD students. This test was conducted after a sample of 154 students were identified and selected randomly. From the research conducted, this instrument had a high validity.

3.4.3 Attitude Questionnaire on Educational Websites' Usage

The motivation test used was in accordance with the Instructional Materials Motivation Scale developed by John Keller (Appendix C). The purpose of this test was to observe their motivational changes towards the instructional materials and methods conducted. This questionnaire contained 36 questions. Students with a motivational test mean score of more than 2.5 were considered motivated or having a positive attitude toward the said instructional materials. The said test's reliability index is between 0.8 and 0.9.

3.5 Research Procedure

a) Pilot Study

A pilot study was conducted to determine the reliability and validity of the instrument, as well as materials developed.

i. The pilot test was conducted on the 25 pre-test and post-test questions. It was conducted for the purpose of testing the reliability and validity of the questions. At the initial stage, the test instrument was evaluated by two

main state Business Management coaching teachers, and a lecturer with an expertise in developing test items. All weaknesses and suggestions given by the evaluators were used in order to further stabilise the developed instrument. Next, the said test instrument was tested on 46 Form 4 students from two secondary schools who were not involved in the actual research. The data from the test was analyzed using the Item and Test Analysis Program (ITEMEN) version 3.50. Two criteria were used to evaluate the items developed, the "index of difference" and the "index of difficulty". According to [86], the index of difference is for measuring how much a test can differentiate a high and low group. A good index of difference must be >=0.4, and have a positive value. A higher value indicates that the item is better. However, according to [87], items with an index value between 0.20 and 0.39 can still be used, on the condition that the item is corrected, while items with an index of 0.19 or lower should be rejected or re-examined. The index of difficulty is the percentage of students who can answer a given question correctly. The index of difficulty value is between 0.0 and 1.0. According to [86], an index of difficulty distribution of between 0.20 and 0.85 is acceptable and usable to conduct a performance test. Other than that, the alpha value was also used to observe the reliability of the instrument. According to [87], if the alpha value was less than 0.6, then the instrument used in the said research had a low reliability value. The alpha value gained for this test was 0.73. This meant that the reliability index for this test instrument was high and acceptable. The index of difficulty and the index of difference tested on each item of the pre-test and post-test instruments were as listed

in Table 3.1. Based on this table, the index of difficulty for the 25 said items was between 0.28 - 0.76. This meant that all items in this test were acceptable and usable. Also, based on the same table, it was found that the value of the index of difference for all items was between 0.21 - 0.79. Therefore, all items in the said test could be used in the actual research. Nevertheless, items with an index of difference value between 0.2 - 0.34 were corrected and cleaned further, as suggested in [88].

ii. Other than formative evaluation conducted throughout the material development process, both fully developed websites were also tested on four Form 4 students and a Business Management teacher, who were not involved as research samples, at a selected secondary school. This study was important to identify content suitability and problems faced by students while learning sessions took place. All problems raised during the said test had been solved and corrected before the actual research was conducted.

Item	Index of Difficulty	Index of Difference
1.	0.75	0.21
2.	0.70	0.64
3.	0.61	0.29
4.	0.52	0.64
5.	0.28	0.57
6.	0.35	0.57
7.	0.61	0.24
8.	0.52	0.21
9.	0.54	0.24
10.	0.52	0.21
11.	0.59	0.43
12.	0.70	0.21
13.	0.43	0.43
14.	0.46	0.57
15.	0.46	0.64

16.	0.59	0.36
17.	0.46	0.36
18.	0.50	0.29
19.	0.37	0.71
20.	0.39	0.21
21.	0.52	0.79
22.	0.39	0.43
23.	0.63	0.21
24.	0.50	0.79
25.	0.50	0.64

Table 3.1: Pre-test and post-test items analysis

b. Actual Research

For the actual research, the lesson was conducted by Business Management teachers in a computer laboratory at selected schools. Even though the researcher was also present while the actual research was being conducted, the researcher only acted as an observer. Explanations about operation and execution methods had been given to the teachers involved before the actual research was conducted.

During the learning session, the teacher's role was minimal, because learning steps had already been provided in the websites developed. Students only needed to follow the instructions and learning steps provided in both website environments. Teachers only acted as facilitators to ensure that the lesson went smoothly, and according to the time determined. The length of time for a lesson for both control and treatment groups were the same, which was three period. (120 minutes).

3.6 Research Execution

The following steps made this research project a success:

Step1: Prepared the research proposal.

Step 2: Designed and developed educational websites.

Step 3: Conducted formative test on the suitability of the websites produced.

Step 4: Conducted a pilot study to test the validity and reliability of items for the pre-test and post-test, as well as both websites developed.

Step 5: Conducted orientations on learning through educational websites for the teachers involved.

Step 6: Conducted orientations on computer and educational websites usage among the participating students.

Step 7: Conducted GEFT test.

Step 8: Selected samples for both control and treatment groups.

Step 9: Conducted orientations on computer usage and web browsing using programs and other websites for students.

Step 10: Conducted a pre-test on both control and treatment groups.

Step 11: Conducted learning sessions for both groups.

Step 12: Conducted post-test 1.

Step 13: Conducted attitude measurement questionnaire.

Step 14: Conducted post-test 2.

Step 15: Carried out data analysis.

3.7 Data Analysis

All data obtained after the research was processed and analyzed by the researcher using Statistical Package for Social Science (SPSS) software, version 12.0 [98]. The analyses undertaken were:

1. Descriptive Statistics used to calculate mean frequency and standard deviation for pre-test and post-test.

2. One-way covariate analysis (ANCOVA) was used to identify significant

differences in the knowledge test achievement between the two groups, using different websites from the design aspect based on the constructivist and the objectivist approaches. It was also used to observe the differences in the mean achievements of students with field-dependent (FD) and field-independent (FI) cognitive styles, after learning using materials developed based on websites.

3. Two-way ANCOVA analysis was also used to observe whether or not independent variables (cognitive styles and websites design) had any significant interaction relationship effects on dependent variables (students' knowledge test achievement).

4. ANOVA Repeated Measures were used to observe retention differences among students who studied using websites developed based on the objectivist approach and websites developed based on the constructivist approach.

5. The one-way ANOVA analysis was used to observe the differences from a motivational aspect amongst student groups, after learning through website materials developed using different approaches (objectivist and constructivist).

3.8 Conclusion

This chapter described research methodology by focusing on the research design, research variables, student sample, research procedure, treatment and research data accumulation, as well as data analysis methods. All steps suggested were used as a guide by the researcher throughout the execution of the said research.

Chapter 4

Materials Development

4. Introduction

For this research, two websites have been developed for the "Fundamental of Business" topics learnt through the Business Management subject. Both web sites contain the same learning materials which cover four main topics, which are: 1) fundamental of business, 2) the elements of commerce, 3) domestic commerce and 4) international commerce. The first website was designed based on the tutorial method, which is more focused on an objectivist approach, while the second website was designed based on a constructivist approach.

4.1 Instructional Development Model

In creating web-based instruction material, two instructional development models are used:

i) The Dick, Carey and Carey Model [89], to develop a web site based on the objectivist approach.

ii) The Hypermedia Design Model [11], to develop a web site based on the constructivist approach.

According to [90], even though there is no specific theory or model to act as a guide in creating web-based instruction material, he suggested these two models, which can be modified to create web-based instruction materials. Dick and Carey's Instructional

Design System Model is suitable to use in learning based on the objectivism paradigm, while the Hypermedia Design Model [11], which is based on the Cognitive Flexibility Theory, is suitable to use in learning based on the constructivism paradigm.

4.1.1 Dick, Carey and Carey Model (Objectivist Approach)

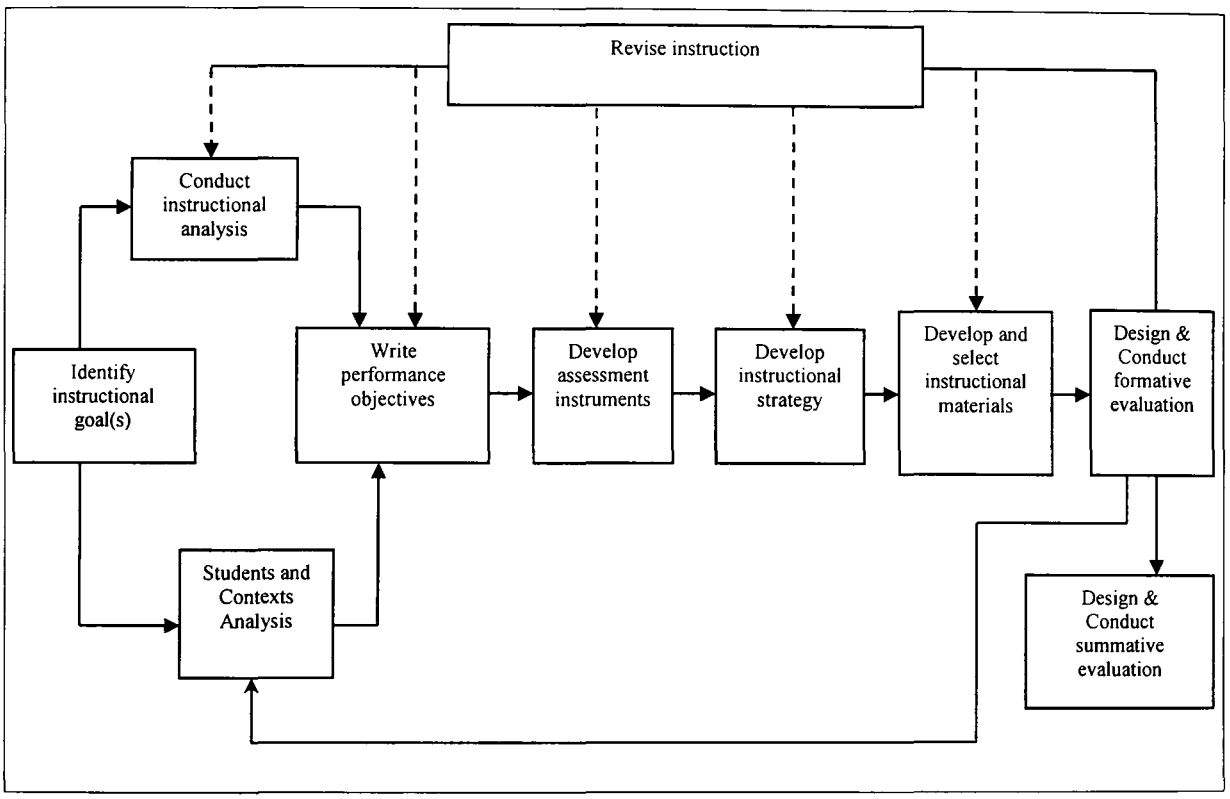

Figure 4.1: Instruction Development Model, suggested by Dick, Carey and Carey [89]

The Dick, Carey and Carey Model [89] is a product or material oriented instructional development model (Figure 4.1). It begins with identifying instruction objectives. This is followed by two steps running in parallel, which are analyzing instruction, and analyzing students and contexts/environment. The next step is writing measurable performance objectives. Then, an appropriate instructional strategy is developed, and instructional material is developed or selected. Next, a formative test

is conducted to review the instruction effectiveness. The final step is to conduct a summative evaluation to evaluate how much of the predetermined objectives have been achieved.

The Dick, Carey and Carey Instruction Model [89] has been used during the process of developing the Business Management website which uses the objectivist approach step-by-step. At the identifying instruction objectives stage, the researcher had surveyed the Business Management Subject Syllabus Manual, and had discussions with a few Business Management teachers with more than ten years of experience teaching the said subject.

The purpose was to identify the topics and sections in the said subject which the majority of the students were having problems mastering. Besides that, the 2006 GCE (O Level) performance report issued by the Malaysia Examination Board for the Business Management subject was also referred to.

Based on discussions with the teachers involved, as well as the Business Management 2006 GCE (O Level) performance report, it was found that the student knowledge of introductory topics related to business are still weak, and that most of them are still unsuccessful in understanding basic topics which they should have mastered.

The second step was to gather information about the knowledge, skills and attitudes of students who would be using the website which will be developed. This web site would be used by Form 4 students at a normal daily school, who are taking the

Business Management subject. The next step was to write measurable performance objectives after the students used the said website. The next criteria test item was provided for each predetermined objective. The objectivist approach was selected in developing the instructional strategy.

Meanwhile, the media used to impart the said instruction is a computer media using a web environment. A formative test was also conducted during the website development process, in order to improve any weaknesses and deficiencies before it was used. Next, a pilot study was conducted to collect additional data regarding the developed web site usage.

The final step in the proposed educational website development process was designing and conducting a summative evaluation for the purpose of determining the level of achievement of the original instructional goals. Based on the Dick, Carey and Carey model, there is one activity phase found at the top (Figure 4.1), revise instruction, which applies to all steps, except the first and the final step. This means that, throughout the website development process, changes were made if the designer could detect deficiencies and weaknesses in certain parts.

4.1.2 Hypermedia Design Model - Cognitive Flexible Theory (Constructivist Approach)

The Cognitive Flexible Theory focused on specific needs to achieve advanced learning goals, where the knowledge domain was complex and ill-structured [11]. This theory also suggested a "criss-crossed landscape" metaphor, by stating that something is complex when it contained various dimensions and non-linear [11]. Based on this theory, instruction materials should prepare students with various

perspectives or interpretation on the contents which will be taught. The hypertext and hypermedia systems found in the website and Internet environments are said to be suitable for this type of learning, which is more of a random access instruction in its nature.

According to [11], the "criss-crossed landscape" of the Hypermedia Design Model is using geographical/cartographical design metaphors. An important thing to remember is that there is a difference between design metaphors, and instructional or interface metaphors. Design metaphors focus on how a designer administrates a learning domain when preparing the said learning environment; interface metaphors focus on how a student will access knowledge with the said environment.

One of the assumptions behind this model is that guidance and instructions given by instruction media are more important than a teacher's instruction in a classroom situation. Another important aspect which is also important for this model is the fact that there is a difference between design goals and student objectives. Design goals are the knowledge that the designer hoped the student would develop through the provided learning environment, while student objectives are what the student actually wanted to learn through the learning environment.

Most instruction design models with tendencies towards the objectivist view are more focused on design goals, whilst for the Hypermedia Design Model, the objectives that a student want to achieve are given priority. However, guidance is also necessary to help students achieve their objectives.

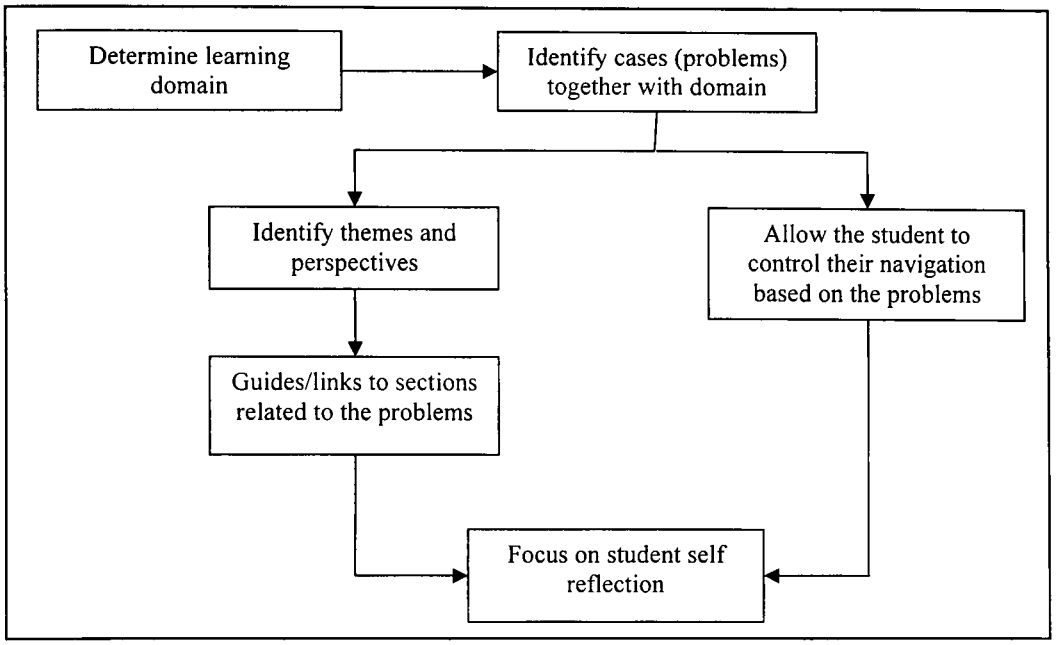

Figure 4.2: Hypermedia Design Model [11]

The Hypermedia Design Model in Figure 4.2 was used during the process of developing a Business Management website using the constructivist approach. Based on the model, the first step was to determine the learning domain scope which would be presented to students. In this section, the focus would only be on the "Fundamental of Business" topics which were related to: i) fundamentals of business, ii) elements of commerce, iii) domestic commerce and iv) international commerce.

After the learning domain scope was determined, the next step was to identify various learning elements or problems to be studied. At this stage, the designer suggested questions related to the topics in the learning domain, which were related to "Fundamental of Business". This was done to create problems which would be used by students as an inducement for them to explore, in order to gain answers to the given problems.

Also, at this stage, the designer had already considered instruction material elements, such as text, graphics, voice, animation and video, which could explain the determined learning domain. Next, this model was divided into two parts, which were the guidance part and the student control part. In the guidance part, the designer suggested activities which were able to guide students towards the learning goals in mind.

Even though there were no specific objectives to achieve, learning goals needed to be provided. For the student control part, the designer prepared a section where students were free to decide what they wanted to know, without any intervention from the designer. For example, the designer created links to other related sites, as well as galleries which contained various business examples which students could explore. For the guidance part, the next step was to determine the design goals and develop the interface metaphor. At this stage, learning elements from the determined learning domain considered to be the most important needed to be selected.

There are small parts of declarative and procedural knowledge which ought to be mastered by each student. Different from an objectivist approach, these are only suggested to students, and not something which students must master after using the said learning material. Next, this model suggested that the designer provide links to learning elements in certain suggested sections, so that students could solve the given problems.

Lastly, the most important part in developing this website was for students to monitor themselves on what they had learned. This part was to assist students in

deciding whether or not they had achieved their learning objectives. This was assuming that each student had their own objectives. The designer could only provide the tools or questions and guidance which could be used by students to evaluate themselves.

4.2 Education Website Design Based on the Tutorial Method (Objectivist Approach)

In developing Business Management website instruction material based on the objectivist approach, the researcher used the tutorial learning model (Figure 4.3), as suggested by Alessi and Trollip [91]. Normally, the instruction material developed based on tutorials comes with structured and organized steps. Tutorial methods had been used in almost all subject fields, from human sciences, to social sciences and physical sciences [92]. Figure 4.3 below displays the structure and steps found in the tutorial method.

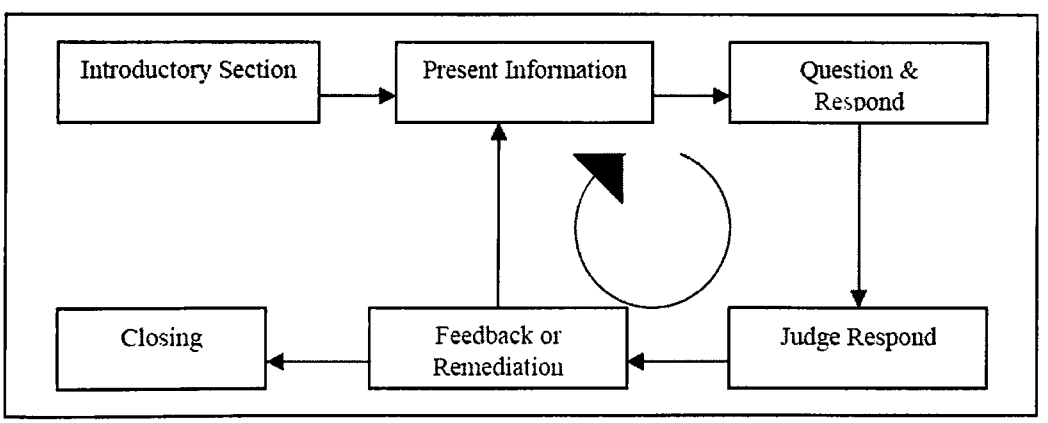

Figure 4.3: General Structure and Steps in the Tutorial Method (Source: Alessi & Trollip [91])

For the tutorial method, the first step begins with the introduction. This section contains information about the purpose and contents found in the said lesson. In addition, objectives needed to be achieved after students used the said material are

also found in this section. This is followed by briefings and explanations on lesson contents to be conveyed. Students are required to follow the tutorial learning activities step-by-step, as suggested. Afterwards, students are given exercises or quizzes to see how far their understanding in their learning goes; feedback on students' answers is provided.

Next, students will get their total marks from the exercises or quizzes. For the next step, students can return to the contents section, or continue with other activities, such as enhancement activities. Learning activities shall continue until the lesson is terminated by the student or the program itself. Figure 4.4 below is the introduction section of a Business Management website which has been developed based on the objectivist approach.

In the left-hand section of the Business Management website developed using the objectivist approach (Figure 4.4), there is a menu in the form of buttons under the contents section, which is the learning step in the objectivist approach. It consists of an introduction section, learning objectives which must be mastered by students after using the said website, a tutorial, which is the lesson, and questions to test the student's understanding.

Finally, there is the gallery section and links to other websites which are more focused on enrichment activities. Overall, through this objectivist approach, all objectives, as well as learning activities, were prepared by the designer, and the students must follow it just as planned by the said website material developer.

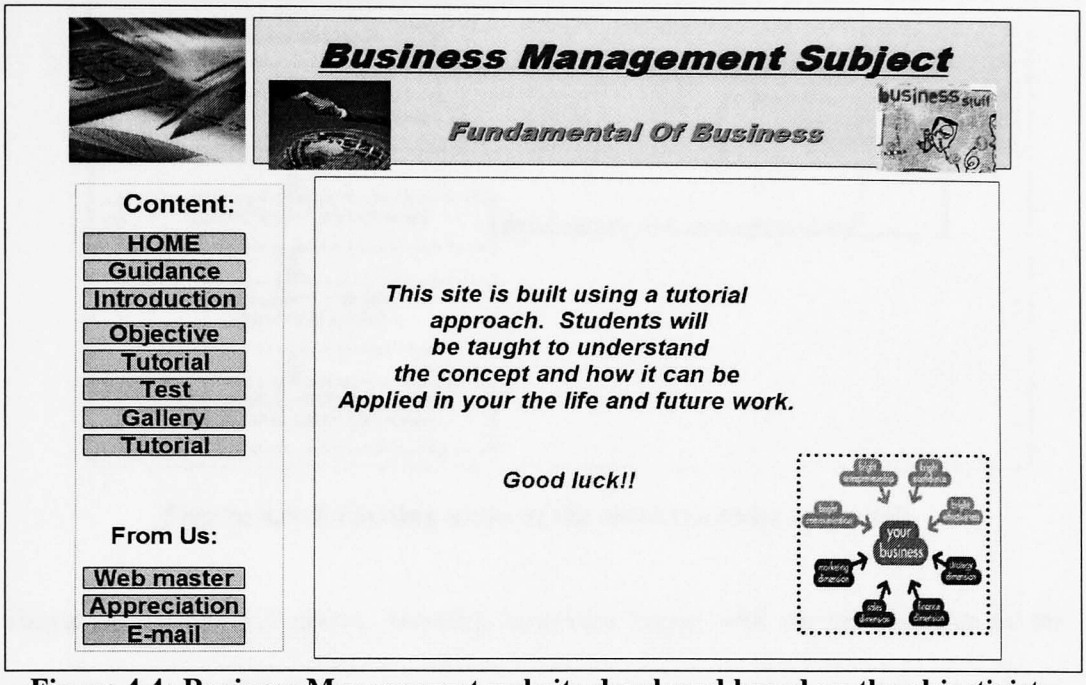

Figure 4.4: Business Management website developed based on the objectivist approach

4.3 Education Website Design Based on the Constructivist Approach

The following Figure (4.5) shows an image of the learning steps for the Business Management website developed based on the constructivist approach. The learning steps in the figure were modified from the learning steps in the Learning Cycle suggested by Lawson [10]. Lawson suggested three main processes in a learning cycle: a) exploration, b) term introduction and c) concept application.

Different from the objectivist approach, the constructivist approach begins with an explosion of numerous questions to stimulate students to continue exploring. The objectivist approach is more deductive, while the inquiry approach is more inductive.

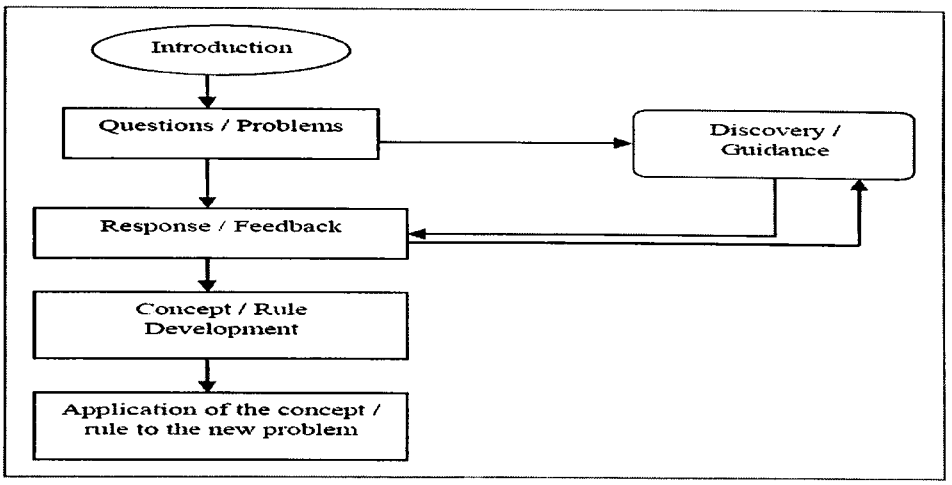

Figure 4.5: Learning steps in the constructivist approach

Based on Figure 4.5 above, learning activities begin with an introduction to the learning domain. This is necessary, in order to create a learning atmosphere which is related to certain topics in a certain lesson. This can be seen clearer in the introduction section of the developed Business Management website (Figure 4.6).

In this section, the designer attempted to draw the students' attention by introducing the developed website, as well as giving a guide on how students should use the website in their learning. If students are ready to start their learning activities, they are instructed to press the "start" button.

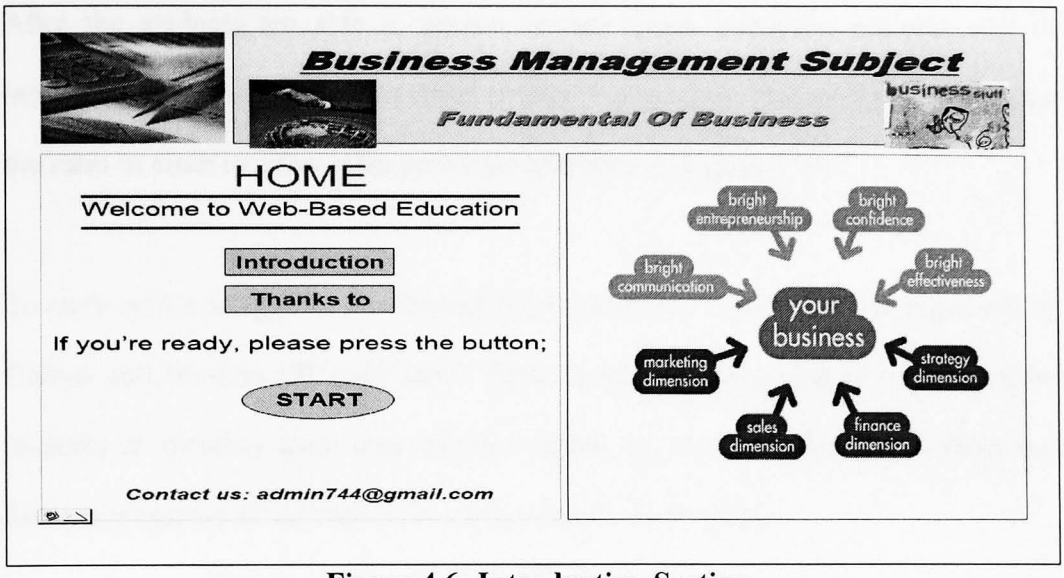

Figure 4.6: Introduction Section

Next, the learning will begin by presenting questions related to the learning domain. Students will be guided to explore based on the given questions (Figure 4.7). The problems raised will be able to stimulate students to explore or to reflect. Students will be guided to explore through the suggested links (Figures 4.8 and 4.9).

Once the students are ready, they can answer the question straight away by typing the answer in the space provided. There is more than one answer which can be considered for the questions presented. If the students fail to give the appropriate answer, they will be guided to a more accurate answer (Figure 4.10). Students will be given a chance to present answer suggestions without any limit. Once the answer given meets the question requirement, a concept or rule related to it will be given (Figure 4.11).

After the students are able to answer several given questions, students will be introduced to rules or important terms (Figure 4.12). Next, students are guided to use the rules in order to solve other problems related to it (Figure 4.13).

To carry out learning activities through the learning cycle, the strategies suggested by Collins and Stevens [9] were used. These strategies were used in order to allow students to develop their own theories based on the rules learned. Collins and Stevens presented 10 strategies for inquiry based instructions:

- Choosing positive and negative examples,
- Systematically diversifying the cases,
- Choosing evaluation examples,
- Generating hypothesis cases,
- Forming hypothesis,
- Testing and evaluating hypothesis,
- Considering alternative prediction,
- Trapping students,
- Detecting contradiction causes,
- Questioning the authorities.

However, not all ten strategies are used. The designer had chosen a number of suitable strategies to use. Among them was the "choosing positive and negative examples" strategy.

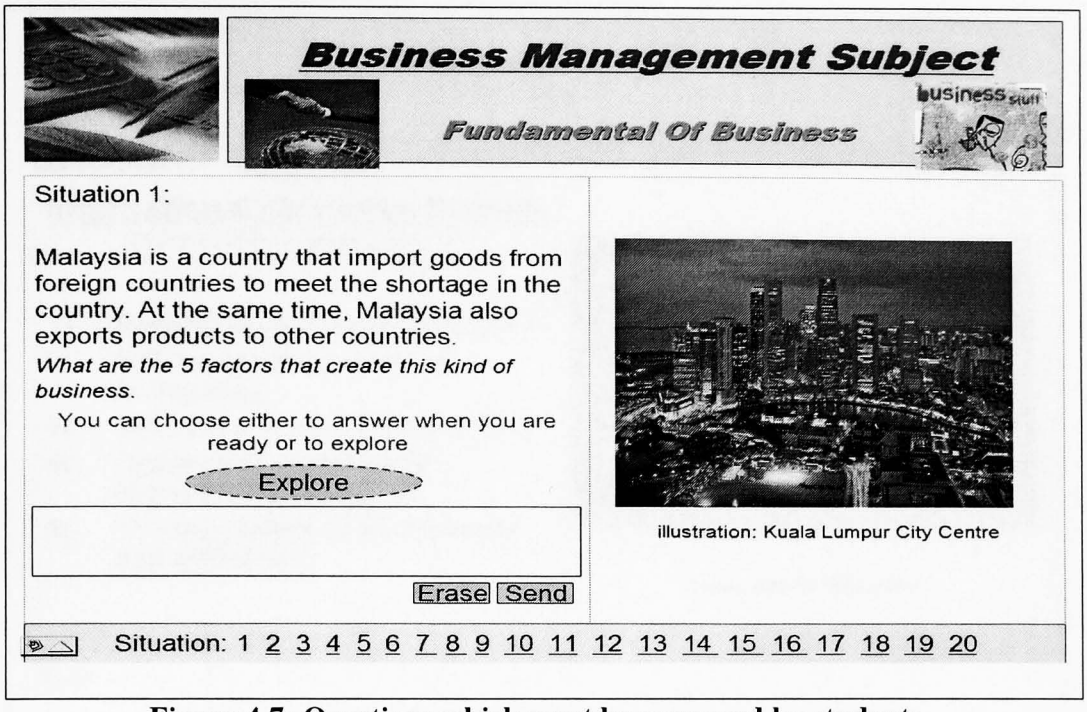

Figure 4.7: Questions which must be answered by students

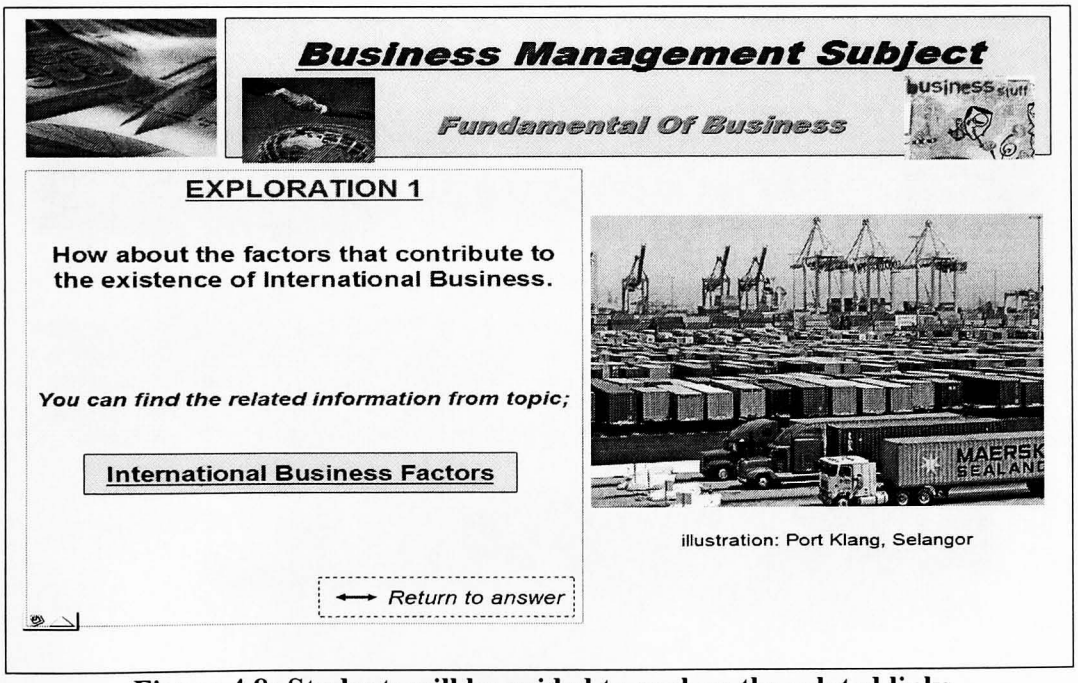

Figure 4.8: Students will be guided to explore the related links

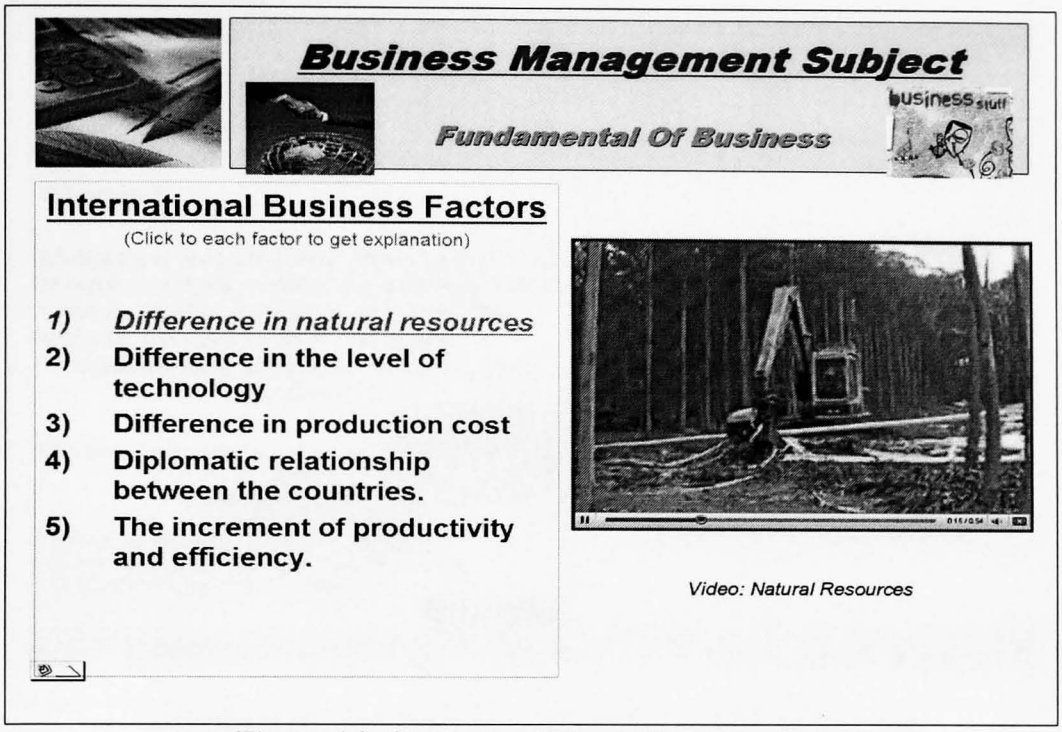

Figure 4.9: Students will be guided to explore

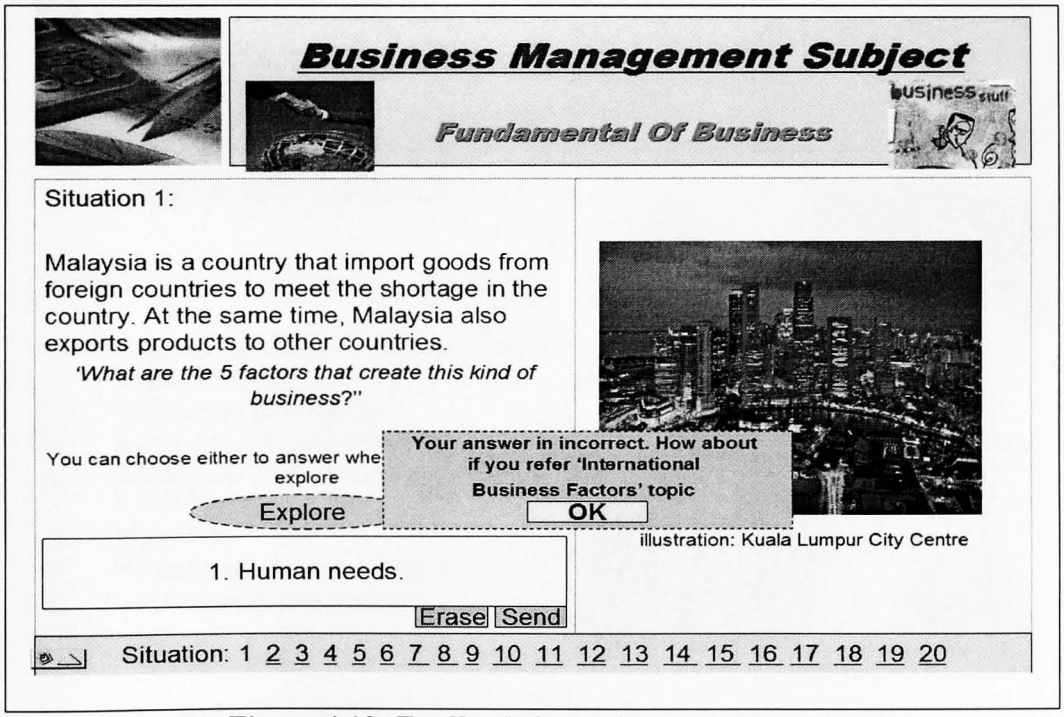

Figure 4.10: Feedback for an inaccurate answer

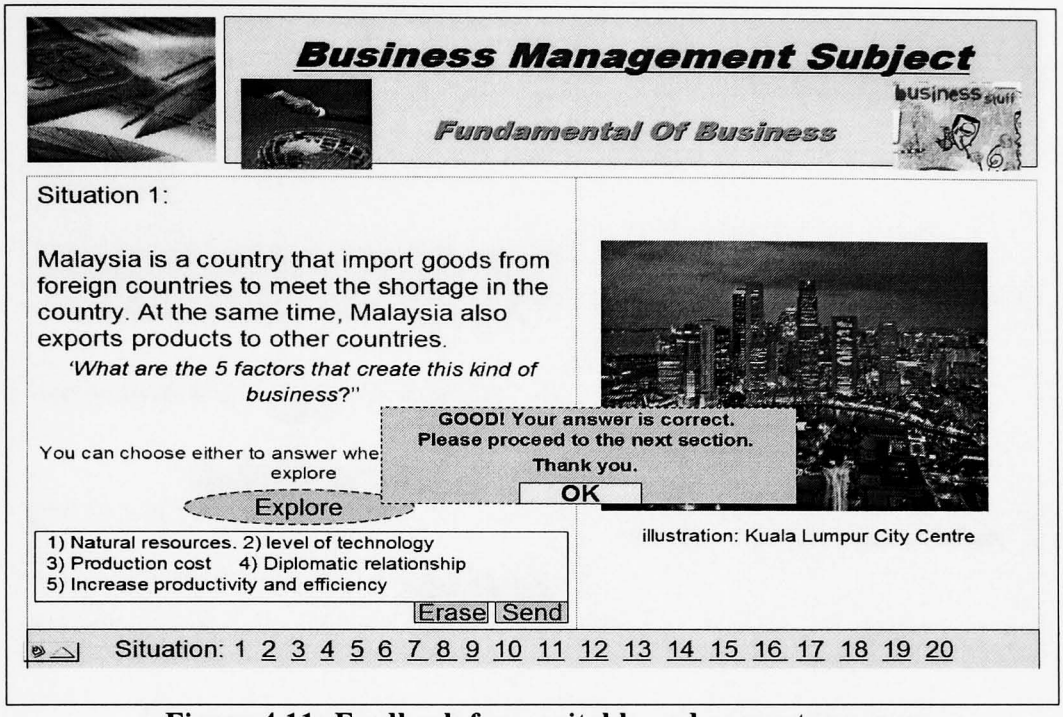

Figure 4.11: Feedback for a suitable and accurate answer

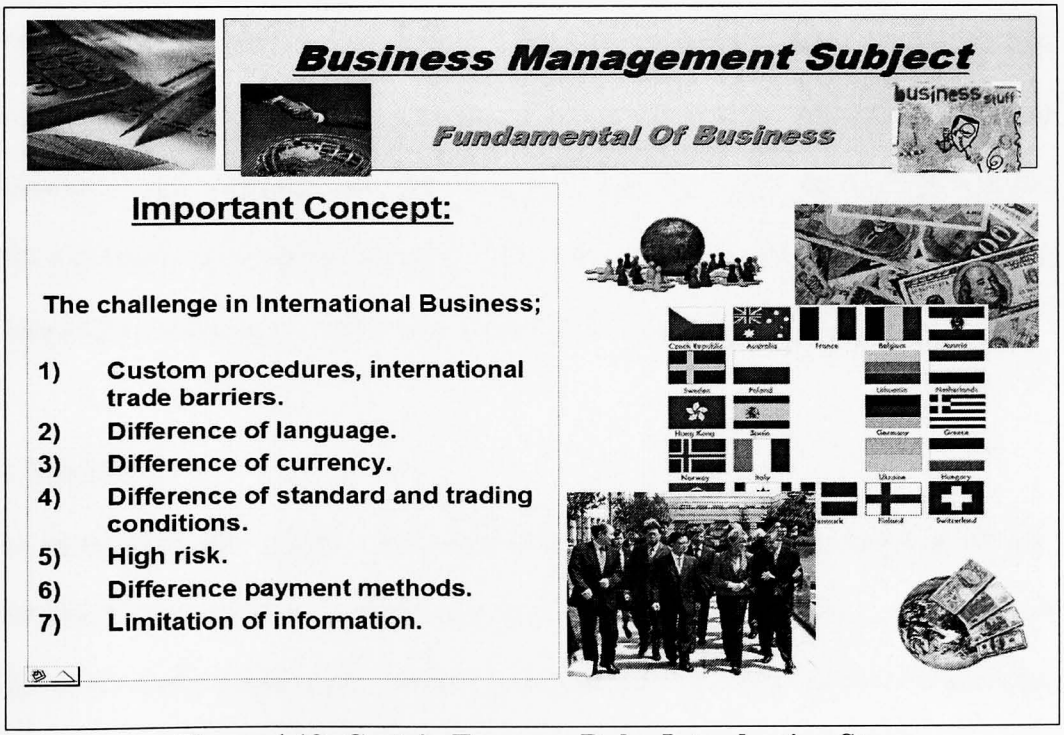

Figure 4.12: Certain Terms or Rules Introduction Stage

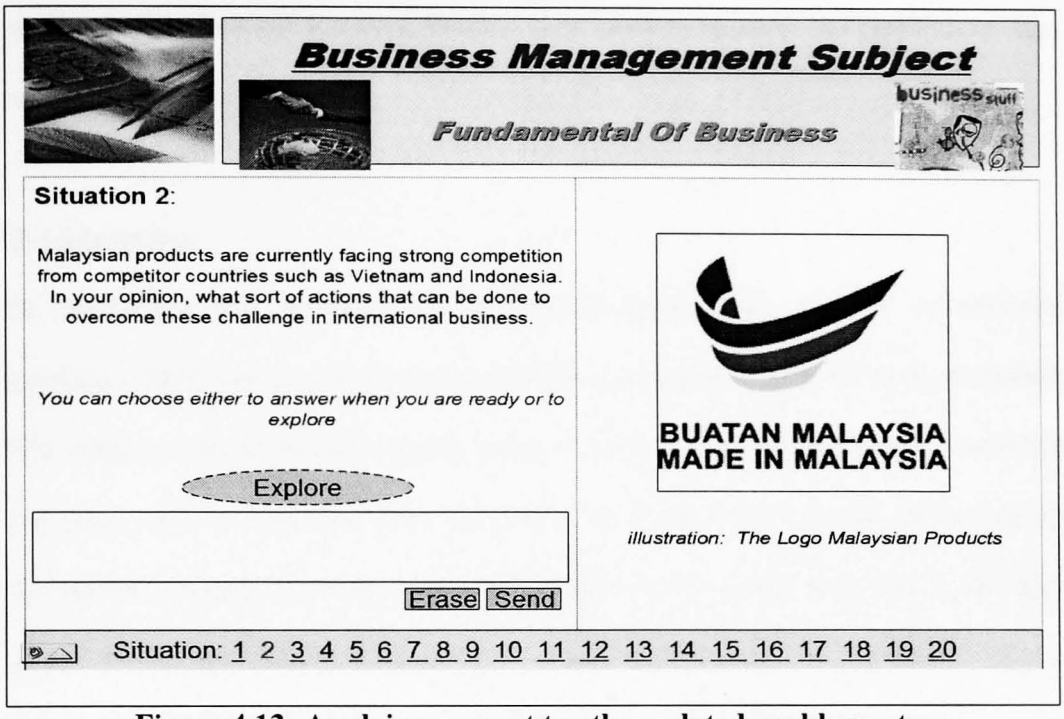

Figure 4.13: Applying concept to other related problems stage

4.4 Interface Design

[93] stated that inappropriate screen interface design will hinder communication. Many reading studies in computer-based learning provided suggestions from the aspects of font, colour and graphic usage [94]; [95]; [96]. In designing both websites for this study, the designer referred to the suggestions presented by [97], which were simplicity, consistency, clarity, and aesthetics such as balance, harmony and unity.

i. Simplicity

In developing this website, the contents to be conveyed were broken down into smaller topics, so that it would be easier to understand, as well as to avoid confusion due to too many displays on a screen. Animation and video can only be viewed when the user clicks a button. Hypertexts and hyperlinks were also used for links to other sections, such as the gallery, activities and quizzes, to avoid confusion on the

webpage. The forward and back buttons were used to move to the previous or next screen.

ii. Consistency

In developing this website, the consistency aspect was given a considerable emphasis. This was to give the users comfort, and make it easy for them to explore this website. Among the consistency aspect for this site is the presentation, which has the same order or sequence from one section to another. Just as with the layout, all the buttons, banner, text and illustrations were placed in the same layout for each page. As for the colour, such as the colour for the title, text, captions, banner background and the like, are also consistent from one page to another.

iii. Clarity

Clarity in communication comes from the question of what we wanted to say. There are three points to consider in planning website content: (i) what the students need to know, (ii) what the students should know very well and (iii) what the students do not want to actually know. The language used in this website is simple, the sentences are short or simple, and supported by illustrations to explain the meanings being conveyed. The illustrations found on almost every page will speak louder than words.

iv. Aesthetics

Balance, harmony and unity are aesthetic properties taken into consideration when developing this website. These three elements are important to give comfort to the

users who navigate it. From the balance aspect, this website uses the asymmetrical (informal) balance principle (Figures 4.14 and 4.15).

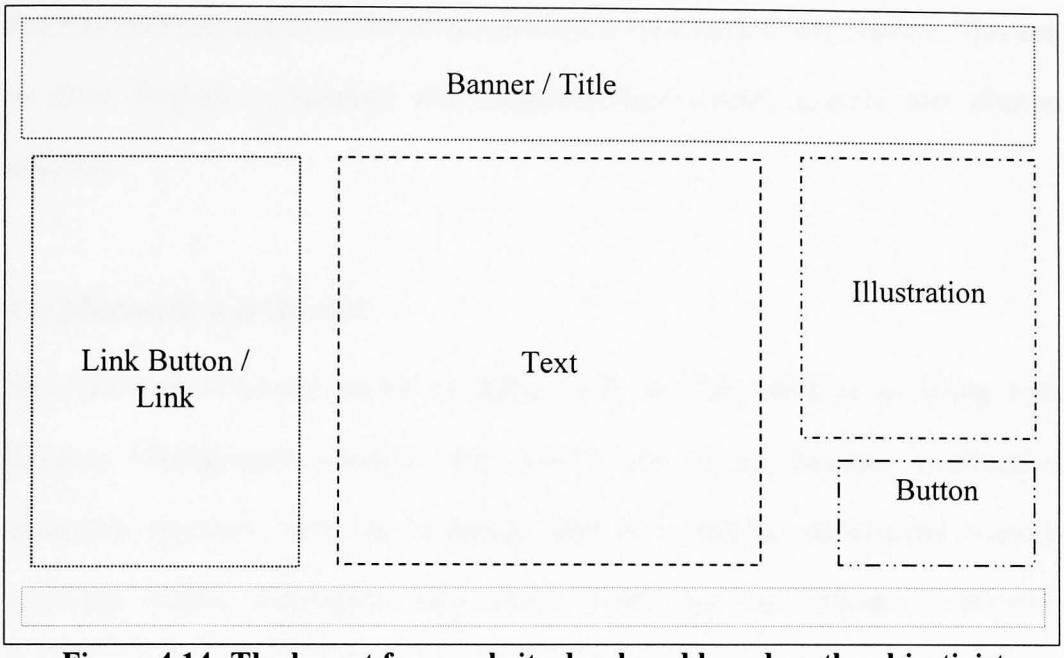

Figure 4.14: The layout for a website developed based on the objectivist approach

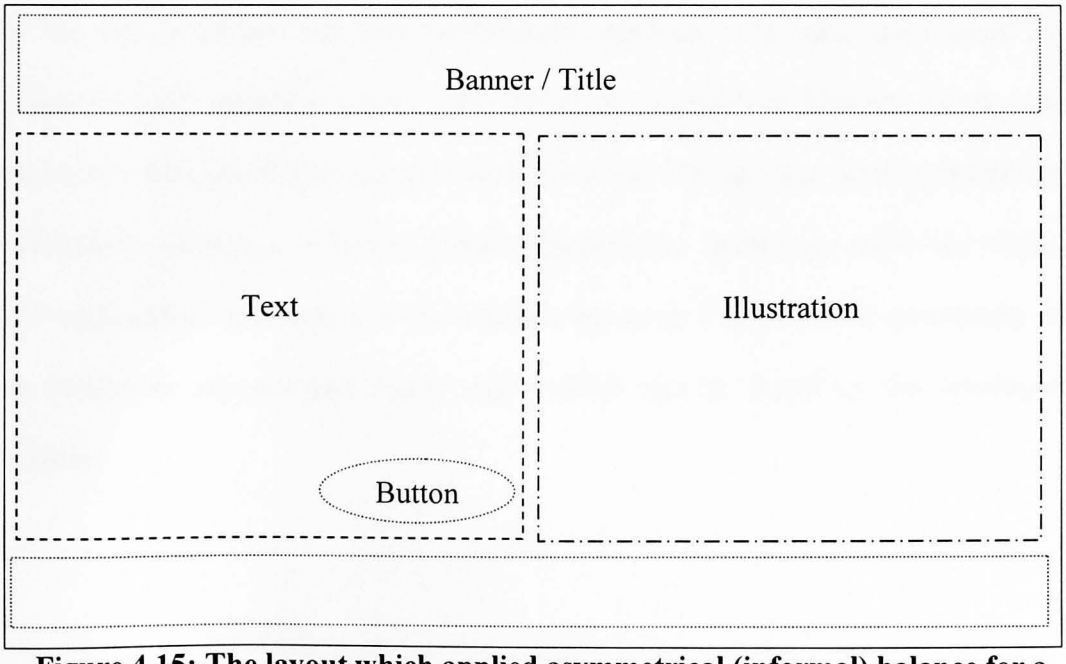

Figure 4.15: The layout which applied asymmetrical (informal) balance for a website developed based on the constructivist approach.

Apart from the layout balance, colours and shapes in this website are also designed so that it looks balanced. The harmony aspect of this website refers to the text and colour application, screen presentation and graphic style, while the unity refers to the fact that elements found on the screen seemed to be related to one another. This can be done through a balanced and complementary colour, graphic and illusion selection.

4.5 Motivational Model

The ARCS motivational model by Keller [12] was also used in designing both Business Management websites. This model was chosen because it offered a systematic approach, and was frequently used in conducting educational research involving student motivation. The ARCS model has the attention, relevance, confidence and satisfaction attributes.

In the ARCS Model, the first motivational attribute is to gain and secure the students'/users' attention towards the developed educational website. Among the elements which can attract attention to the Business Management website design are interactivity elements, attractive graphic applications, animation, audio and video, and using colour appropriate to the student's age level. Figure 4.16 is an example of an interactive element and music audio which can be found on the developed website.

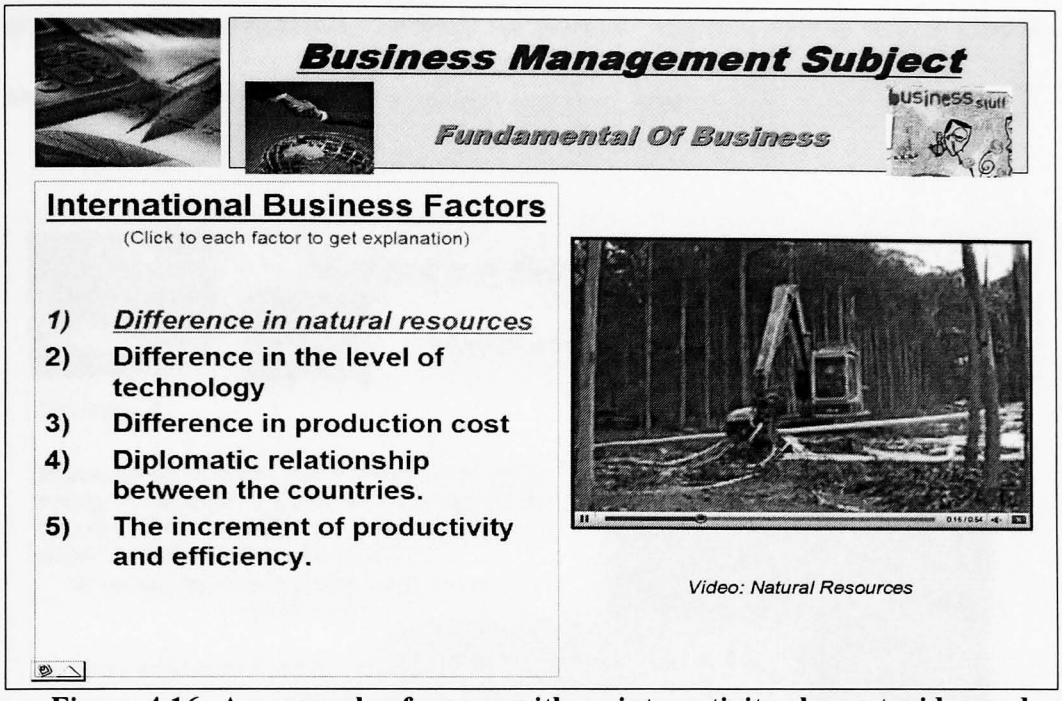

Figure 4.16: An example of a page with an interactivity element, video and audio

The second attribute of the ARCS Model is relevance, which is related to the student's desire or goals. The examples used in the learning materials must be related to situations normally experienced by the students who are using the website. Besides that, animation, graphics, audio, video, illustrations and the like used in the developed website must be relevant, and be able to explain concepts and theories which will be developed by the students. Irrelevant illustrations or items will only distract the student's concentration in understanding certain concepts or theories.

The third requirement in the ARCS model is the need for both websites to help in building confidence in the student's ability to carry out an assignment successfully. With confidence, students are able to do or smooth out a job well. According to [82], students must be given motivation, so they will have confidence in learning successfully. It can be achieved by showing what is expected to be achieved by

students [83]. For example, feedback on students' answers will be able to give the students confidence toward this website's usage (Figure 4.17).

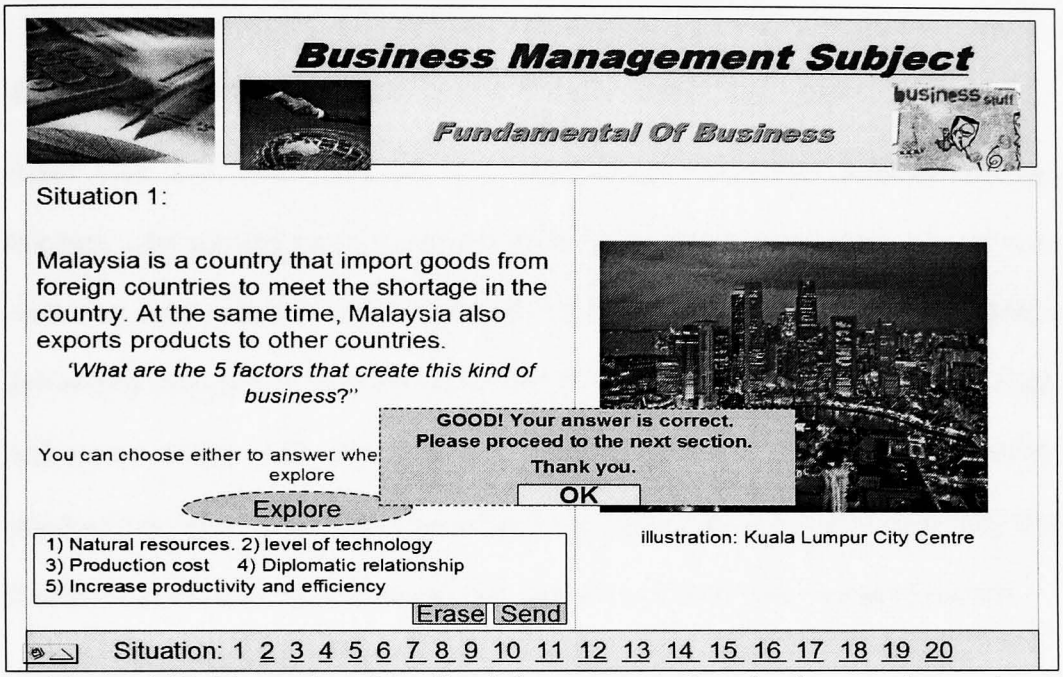

Figure 4.17: Examples of feedback for answers given in the exercise section

The fourth requirement is satisfaction, which is the student's satisfaction when an achievement or outcome from effort met their expectation. Students will gain satisfaction when they are able to solve problems which challenge them. Amongst other elements which can be used is giving them a score on each activity they solved in the quiz section. It is hopeful that an educational website with a learning environment which will give more motivation to the students can be achieved based on the four attributes in the ARCS Model.

4.6 System Requirements

Both websites developed in this study were developed using a number of software and programming languages, such as Adobe Photoshop 7, Macromedia Flash MX,

Macromedia Dreamweaver MX, Java Script, ASP Script and others. To properly browse these websites, users should use 1024 x 768 pixels resolution, besides the Flash Player, Video Player and Audio Player requirements.

4.7 Formative Evaluation

Apart from my own evaluation and modification, two other students and two teachers, who are also the main trainers of Business Management, were referred to in reviewing the content of both websites developed, while a teacher with expertise in developing educational websites was referred to for evaluating the instruction design and screen design used. All comments given by students, teachers and specialists involved had been taken into consideration to perfect the developed materials. The formative evaluation was conducted throughout the website development process.

For the first phase, the evaluation was conducted by a teacher with expertise in website development. Among the suggestions given by him was inserting animation elements in the early stage of the presentation, so that the users would be attracted and gain an early image of materials which would be presented. He also suggested a change in the type and size of the font used, in order to make the text easier to read.

The evaluation for the next stage was conducted by two teachers with more than 10 years teaching experience for the Business Management subject, who were also the main state trainers in the said subject. The researcher had held discussions with the two teachers, in order to get feedback on both websites developed, particularly regarding syllabus accuracy, design effectiveness and technical problems they faced when using the websites.

The formative evaluation was also conducted on two Form 4 students who were not involved in the actual study. The researcher interviewed them to get feedback related to content clarity, clarity of instructions given, clarity of language used, appropriateness of the questions given, and the ability of the material to increase their motivation to follow the lesson. Some modification was done based on their feedback and suggestions.

The modification of the content was to correct a few rather confusing terms, improve a few unclear instructions, correct spelling errors and improve items in the exercise section, so that it would be in accordance with the actual examination level.

From a screen design aspect, the modifications made were for improving the appropriateness of the graphics, colour and illustrations, and for reducing the density of the display due to unnecessary items, while for the technical aspects, a few broken links, as well as unclear audio quality, had been rectified.

4.8 Pilot Study

At this stage, both websites which had been completely developed were tested on four students and a Business Management teacher, all of whom were not involved as study samples in the computer lab of the secondary school selected. This study was important in identifying appropriateness and problems which may emerge from the actual learning session.

All problems which arose, especially those related to material appropriateness and the computer system found in the lab, had been identified. Among the problems

faced by those who were involved in this study were unclear displays and static animations. Steps have been taken to rectify those problems, including changing the resolution of the computer screen, and installing certain software required to allow the animation in the learning material to be displayed properly.

4.9 Conclusion

Developing instructions and learning materials using websites required a variety of expertise and skills, in order for the material to actually be effective and of good quality. Therefore, the instruction design model, screen design model and motivational model should be paid attention to, as well as be made as a guide throughout the development process. The details mentioned in the discussion above are very important, so that the material developed can really help the students increase their knowledge, motivation, thoughts and achievements, as well as interest after they have used the websites.

Chapter 5

Research Findings

5. Introduction

This chapter involves data analysis of the effects of both independent variables, which are the designs of the websites developed based on the objectivist approach and the constructivist approach, and the cognitive style, whether independent field (FI) or field dependent (FD), on developing knowledge, retention and motivational levels of the students.

The statistics analysis package SPSS, version 12.0, was used to analyze the quantitative data collected. Descriptive statistics were used to count the mean frequency and standard deviation of the pre-test and the post-test. To see whether or not the website design factor and cognitive style had any influence on the dependent variable, covariate analysis (ANCOVA) was used at a significant level of $p<0.05$.

ANCOVA analysis was used to control the difference between the sample group which could not be controlled by sample selection methods at the initial stage. Repeated-Measures ANOVA analysis was used to see the students' retention differences between both website designs. To see the difference in students' motivation between the student groups who learned with two different websites, a one way ANOVA analysis was used.

5.1 Descriptive Data Analysis

The purpose of this research is to determine the learning effects of the educational website developed based on the constructivist approach, compared with the website developed based on the objectivist approach, on students' knowledge achievement, retention and motivation in topics of "Fundamental of Business" for the Business Management subject.

5.1.1 Sample Characteristics

A total of 154 students participated in this study. From that total, only 141 students were chosen. A total of eight students were excluded, because of failing to complete one or more experiment procedures. Other than that, five more students were excluded from both the control and treatment groups, due to their low achievements in the pre-test (less than 20%), or too high an achievement (more than 75%).

This is because these students are considered outliers, who have a highly noticeable difference from the overall majority involved in the study conducted. If they were not excluded, they would disrupt and spoil the whole data analysis findings [97]. Apart from that, the aim was to ensure the students who were involved in this study would be of the same level between the control group and treatment group. The samples excluded from this study were done so only at the data analysis stage, but they were still involved in each study stage and data collection. The purpose was to avoid disruption to their learning process, and to comply with the study ethics.

In this study, the students were divided into two groups, the control group and the treatment group, as shown in Table 5.1. The control group consisted of students who learned using the website developed based on the objectivist approach, while the

treatment group consisted of students who learned using the website developed based on the constructivist approach.

Website Design	Number of Students
Objectivist Approach (Control Group)	73
Constructivist Approach (Treatment Group)	68
Total	**141**

Table 5.1: The number of students in each control and treatment group

5.1.2 Group Distribution for Each Factor

The students were divided into two cognitive style groups, field dependent (FD) and field independent (FI). Based on the GEFT analysis, the GEFT average for this study sample was 10.7. Therefore, samples which obtained scores of more than 10.7 were categorized as FI, while samples which obtained a GEFT score of less than this mean value were categorized as FD. The student distribution for these two cognitive groups is shown in Table 5.2 below. Students who belonged to the FD group were 70 (47.8%), while students who belonged in the FI group were 71 (52.2%).

Cognitive Style	Frequency	Percentage
Field Dependent (FD)	70	49.6
Field Independent (FI)	71	50.4
Total	**141**	**100**

Table 5.2: Field Dependent (FD) and Field Independent (FI) Cognitive Style Frequency

5.1.3 Descriptive Data Tests

The scores for the pre-test, post-test 1 and post-test 2 are shown in Table 5.3 below. The pre-test was conducted on all the students involved, before they started their

learning using the materials developed based on the website. Post-test 1 was conducted on both groups, the control group and the treatment group, as soon as the students finished their learning using the prepared materials, while post-test 2 was conducted two weeks later.

The post-test 1 and post-test 2 mean scores are higher compared with the pre-test score. There was a 10.36% increase in the post-test 1 score mean, and a 6.59% increase in the post-test 2 mean score, compared with the pre-test mean score.

	Pre-test Score	**Post-test 1 Score**	**Post-test 2 Score**
N	141	141	141
Mean	45.91	56.27	52.50
Mode	48	52	44
Median	44.00	56.00	52.00
Standard Deviation	10.16	12.17	12.14
Skew	.117	.126	.122
Minimum	24	28	28
Maximum	72	88	80

Table 5.3: Mean, median, standard deviation and range of the pre-test score, post-test 1 score and post-test 2 scores

Table 5.4 shows the pre-test, post-test 1 and post-test 2 scores, as well as the standard deviation for each group, which was the group of students who learned using the website developed based on the constructivist approach, and the group of students who learned using the website developed based on the objectivist approach. Analysis showed that the student group learning using the website developed based on the constructivist approach had obtained a higher score mean when compared with the

student group learning using the website developed based on the objectivist approach in all three tests.

Website Design	Objectivist Approach			Constructivist Approach		
N	73			68		
Score	Pre-test	Post-test 1	Post-test 2	Pre-test	Post-test 1	Post-test 2
Mean	44.08	51.53	48.27	47.88	61.35	57.03
Median	44.00	52.00	48.00	48.00	60.00	56.00
Standard Deviation	9.95	10.67	10.90	10.09	11.68	11.85
Skew	.125	.010	.055	.109	.077	.045
Minimum	24	28	28	24	36	32
Maximum	68	76	72	72	88	80

Table 5.4: The mean and standard deviation of the pre-test, post-test 1 and post-test 2 scores for each group

Table 5.5 is the post-test 1 score mean and standard deviation for each student group with different cognitive styles. Field independent (FI) students showed a higher post-test 1 score than the field dependent (FD) student group.

Website design	Cognitive style	Post-test 1 Mean Score	Standard Deviation	N
Based on the Objectivist Approach	FD	52.39	11.31	41
	FI	50.44	11.42	32
			Total	**73**
Based on the Constructivist Approach	FD	56.83	10.60	29
	FI	64.72	11.42	39
			Total	**68**
Overall Total	FD	54.23	11.16	70
	FI	58.28	12.85	71
			Total	**141**

Table 5.5: Post-test 1 mean score and standard deviation for each group in the cognitive style aspect

5.2 Findings of Inference Statistic Analysis

The data was analyzed using Analysis of Covariance (ANCOVA). In the analysis, the mean score for the pre-test was set as the covariate. In this section, the findings from this inference statistic analysis were elucidated and referred to the prescribed hypotheses. Assumptions for the analysis method used will be listed. The analysis details which proved that those assumptions were met will also be explained.

5.2.1 Initial Testing to Determine the ANCOVA Analysis Requirements

A t-test was used in determining whether or not there was a significant difference between the control group and the treatment group in the knowledge test achievement, based on the result of the pre-test given to them. Table 5.6 shows that there was a significant different in the students' achievement at the initial stage, based on the results of the pre-test.

The mean for the student group which used the website developed based on the constructivist approach was 47.88, while the mean for the student group who used the website developed based on the objectivist approach was 44.08. The t-value obtained was 2.252 (df=139), while the p value was 0.026.

Website design	N	Mean	Standard Deviation	t-Value	df	Sig. (2-tailed)
Based on Constructivist	68	47.88	10.09	2.252	139	.026
Based on Objectivist	73	44.08	9.95			

Table 5.6: The analysis on the pre-test result t-Test for control and treatment groups

Because there was a significant difference between the control and treatment groups at the pre-test stage, the researcher decided to use the ANCOVA analysis to test the hypotheses for this study. By using the ANCOVA analysis, the difference between the sample groups at the initial stage which cannot be controlled by the sample selection method done randomly can be controlled [87]. The ANCOVA will control the said difference through the existence of the pre-test, where this test was used as a covariate which would be made a measuring tool.

Even though the researcher had tried to obtain an equal sample between the control and treatment groups (as explained in Chapter 3), there were a few details which were outside the researcher's control while the actual study was conducted. Among the factors identified for why the random sample selection was hard to control by the researcher was the administration policy of one of the schools, who had decided that only certain teachers and classes were to be involved in this study.

To ensure that both groups (control and treatment) were at the same level for this study, five students with low scores (less than 20%) and high scores (more than 75%) in the pre-test were excluded.

Overall, only students from both groups with scores between 24% and 72% in the pre-test were chosen and involved in this study. The samples were excluded from this study the during data analysis process. They were still involved in every stage of the study, to avoid disruption to their learning process, and as compliance to the study ethics.

5.2.2 Conditions which Must be Complied with in Analysis of Covariance

According to [98], the Analysis of Covariance (ANCOVA) selection can only be made once the following ANCOVA assumptions are met:

a. Dependent variable has a normal distribution. This condition must be met as a covariate value and any factor level in the analysis.

b. Dependent variable variance for conditions mentioned in (a) above are homogenous.

c. Cases representing random samples from the population and dependent variable scores do not influence each other.

d. The covariate has a linear connection with the dependent variable at all factor levels.

A discussion of whether or not the ANCOVA conditions were met for this study now follows.

a. Normal distribution for dependent variable

Through the analysis using a histogram and Q-Q plot, the data distribution on the histogram (refer Appendix F) is shown to be almost approaching the normal curve, while the distribution on the Q-Q plot approached the normal distribution diagonal line. All the said data indicates that the dependent variable distribution is normal [97].

b. Homogeneity of variances for the dependent variable

Table 5.4 shows that the standard deviations for the post-test 1 mean score for both website designs were between 10.09 and 11.68. The homogeneity of variances test is shown in Table 5.7 below. In the said test, the p value is 0.315, showing that the variance for the two study groups is homogenous [98].

Dependent Variable: Post-test 1

F	df1	df2	Sig.
1.018	1	139	.315

Table 5.7: Levene Test for Variance Homogeneity

c. Random sampling

Samples were from Form 4 students who were taking the Business Management subject. Samples were chosen from two schools in the district of Ampang, Selangor, Malaysia which have the computer lab facilities (please see the explanation in Chapter 3). For every chosen school, samples consisted of intact groups, because this study is a quasi-experiment study.

d. Linear relationship between the covariate (pre-test mean score) and dependent variable (post-test mean score).

The linear relationship between the covariate and dependent variables can be determined by using the Homogeneity-of-Slopes Test, through one-way Analysis of Covariance.

Dependent Variable: Post-test 1 Mean Score

Source	Sum of Square Type III	Degrees of Freedom	Mean Square	F	Sig.	Eta Squared	Observation[a] Exponent
Modified Model	13522.90	23	587.95	9.54	.00	.65	1.00
Short cut	199283.83	1	199283.83	3235.28	.00	.96	1.00
Design	887.31	1	887.31	14.40	.00	.11	.96
Pre-test Score Mean	9109.65	13	700.74	11.37	.00	.55	1.00
Design *Pre-test Score Mean	**386.26**	**9**	**42.91**	**.69**	**.71**	**.05**	.33
Error	7206.85	117	61.59				
Total	467172.00	141					
Modified Total	20729.75	140					

a Generated using alpha= .05
b R Square=.65 (R Square adjusted=.58)

Table 5.8: Homogeneity-of-Slopes Test

Table 5.8 shows that there is no significant interaction between the website design and the score mean in the pre-test (shown by "Design *Pre-test Score Mean"). The $F_{9,117}$ value is 0.69, and the p value is 0.71. This result shows that the slopes of the two groups are homogenous [98].

5.3 Findings of Analysis of Covariance (ANCOVA)

Hypothesis 1:

There is no significant difference in term of students' knowledge levels after learning through educational websites using the constructivist approach, compared with educational websites developed using the objectivist approach

The main effect of the website design on the post-test 1 score mean was analyzed using one-way ANCOVA. Independent variables consisted of the website design

based on the constructivist approach and the website design based on the objectivist approach. The dependent variable is the post-test 1 mean score, stated as the percentage of correct answers. The pre-test mean, which is the covariate for this study, was also stated as the percentage of correct answers.

Referring to Table 5.4, the student group who learned using the website designed based on the constructivist approach obtained a higher post-test 1 mean score compared with the student group who received the objectivist approach (Treatment Post1 Mean: 61.35; Control Post1 Mean: 51.53).

However, the ANCOVA analysis findings (Table 5.9) indicated there was significant differences in knowledge test achievements, after learning using websites based on the constructivist and learning using websites based on the objectivist ($F_{1.138}$ =25.04; p: 0.00). This result instantly refuted hypothesis 1 above.

Dependent Variable: Post-test 1 Mean Score

Source	Sum of Square Type III	Degree of Freedom	Square Mean	F	Sig.	Eta Squared	Observation [a] exponent
Modified Model	11983.113(b)	2	5991.556	94.532	.000	.578	1.000
Short cut	2607.430	1	2607.430	41.139	.000	.230	1.000
Pre-test	8589.048	1	8589.048	135.513	.000	.495	1.000
Design	**1587.115**	**1**	**1587.115**	**25.041**	**.000**	**.154**	**.999**
Error	8746.646	138	63.381				
Total	467172.000	141					
Modified Total	20729.759	140					

a Generated using alpha = 0.05
b R Square = .578 (Adjusted R Square = .57)

Table 5.9: One-way ANCOVA for post-test 1 mean score with website design (constructivist and objectivist approach) and pre-test score mean as covariate

Referring to Table 5.9, the strength of the connection (effect size) is shown by the partial eta squared. The partial eta squared value shown in Table 5.9 is 0.15, and it is a large effect size. According to [98], the strength of the connection (effect size) is

within the range of 0 to 1. Normally, .01, .06 and .14 indicate small, medium and large effects.

Based on this fact, it is suggested that the connection between the website design and the post-test 1 mean score is large. This means that the website design difference explained almost 15% of the post-test 1 mean score variance, after the pre-test mean score was controlled statistically.

After the pre-test mean score difference was controlled through ANCOVA analysis, the post-test 1 mean score was higher for the treatment group (constructivist approach website design) (Mean = 59.80), which was at least 7% more than the control group mean (objectivist approach website design) (Mean = 52.97), as shown in Table 5.10.

This finding suggested that the knowledge test achievement of the students who learned using the website developed based on the constructivist are better off compared with the students who learned using the website developed based on the objectivist.

Dependent Variable: Post-test 1

Website Design	Mean (%)	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Constructivist Based	59.809(a)	.975	57.882	61.735
Objectivist Based	52.973(a)	.940	51.114	54.831

a. Evaluated based on covariates in website design:
Pre-Test Score Mean = 45.91%.

Table 5.10: Post-test score marginal mean and standard error for every website design

Hypothesis 2

There is no significant difference in term of students' knowledge levels between the students with field independent (FI) and field dependent (FD) cognitive styles, after learning using educational web-based learning environments.

Based on Table 5.5, the FI student group obtained a higher post-test 1 mean score (Mean = 58.28) compared with the FD student group (Mean = 54.23). The ANCOVA analysis (Table 5.11) shows a significant difference between the two groups ($F_{1,138} = 6.11$; p:0.015). This shows that the FI student group obtained a significantly better post-test 1 achievement compared with the FD group. This result refuted hypothesis 2 once and for all.

Dependent Variable: Post-test 1 Mean Score (%)

Source	Sum of Square Type II	Degree Of Freedom	Mean Square	F	Sig.	Eta Square	Observation[a] Exponent
Modified Model	10833.810(b)	2	5416.905	75.539	.000	.523	1.000
Shortcut	2012.320	1	2012.320	28.062	.000	.169	1.000
Pre-Test Score Mean	10254.760	1	10254.760	143.004	.000	.509	1.000
Cognitive Style	**437.812**	**1**	**437.812**	**6.105**	**.015**	**.042**	**.689**
Error	9895.949	138	71.710				
Total	467172.000	141					
Modified Total	20729.759	140					

a Generated using alpha =0.05
b R Square = .523 (Adjusted R Square = .516)

Table 5.11: One-way ANCOVA for post-test 1 mean score with cognitive style and pre-test mean score as covariate

Referring to Table 5.11, the strength of the connection (effect size) is indicated by the partial eta square. The 0.04 partial eta square value shown in table 5.11 is a small size effect [98]. Based on this fact, it is suggested that there is a small effect in the connection between the cognitive style and post-test 1 mean score. This means that

the cognitive style explained almost 4% from the post-test 1 mean score variance, after the pre-test mean score was controlled statistically.

After the difference in pre-test 1 was controlled through ANCOVA, the mean score for post-test 1 for both groups was as shown in Table 5.12 (FD group mean: 54.49; FI group mean: 58.02). This finding suggested that the students' knowledge test achievements with field independent (FI) cognitive styles were better compared with students with field dependent (FD) cognitive styles in an educational website learning environment.

Dependent Variable: Post-test 1

Cognitive Style	Mean	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Field Independent (FI)	58.020(a)	1.005	56.032	60.008
Field Dependent (FD)	54.494(a)	1.012	52.492	56.496

a. Evaluated based on covariate in cognitive style: Mean Score Pre-test = 45.91.

Table 5.12: Post-test score marginal mean and standard error for each cognitive style

Hypothesis 3

There is no significant difference in terms of students' knowledge levels between students with field independent (FI) and field dependent (FD) cognitive styles, after learning through educational websites using the constructivist approach.

Table 5.13 shows that the FI cognitive student group obtained a higher post-test 1 mean score (Mean: 63.54^{a}), which was approximately 12% more than the post-test 1 mean score of FD cognitive students (Mean = 51.32^{a}), by learning through websites developed based on the constructivist approach.

Independent Variable: Post-test 1 Mean Score

Website Design	Cognitive Style	Mean	Standard Error	95% Confidence Scale	
				Lower Limit	Upper Limit
Constructivist	Field Independent (FI)	63.539(a)	1.176	61.213	65.865
	Field Dependent (FD)	51.322(a)	1.296	48.758	53.886

a Evaluated based on the covariate in the model: Pre-test Mean Score = 45.91.

Table 5.13: Descriptive statistic for FD and FI groups' post-test 1 mean scores for the constructivist group

For the same analysis, the pairwise comparison with the Bonferroni correction for multiple comparison is given in Table 5.14. This ANCOVA analysis found that there was a significant difference (p=0.00) between the FD and FI cognitive style student groups in learning through websites developed based on the constructivist approach. Therefore, hypothesis 3 is reputed.

This finding suggests that the student group with a field independent (FI) cognitive style obtained a significantly higher achievement compared with the student group with a field dependent (FD) cognitive style, in learning through websites developed based on the constructivist approach.

Dependent Variable: Post-test 1

(I) Group	(J) Group	Mean Difference (I-J)	Standard Error	Sig.(a)	95% Confidence Interval Difference	
					Lower Limit	Upper Limit
Constructivist – FI	Objectivist - FI	8.827(*)	1.797	.000	4.015	13.638
	Constructivist - FD	**12.217(*)**	**1.754**	**.000**	**7.521**	**16.913**
	Objectivist - FD	9.221(*)	1.656	.000	4.788	13.654
Objectivist - FI	Constructivist - FI	-8.827(*)	1.797	.000	-13.638	-4.015
	Constructivist- FD	3.390	1.892	.452	-1.675	8.455
	Objectivist - FD	**.394**	**1.804**	**1.000**	**-4.437**	**5.225**

Based on observed values

* The mean difference is significant at level .05

a. Multiple comparison correction: Bonferroni.

Table 5.14: Pairwise comparison between the same website design with different cognitive styles

Hypothesis 4

There is no significant difference in terms of students' knowledge levels between students with field independent (FI) and field dependent (FD) cognitive styles, after learning through educational websites using the objectivist approach.

The data in Table 5.15 shows that the FI cognitive student group obtained a higher post-test 1 score (Mean = 54.71[a]) compared with FD cognitive students (Mean = 54.32[a]), in learning through websites developed based on the objectivist approach. However, the said difference is small, at approximately 1%.

Dependent Variable: Post-test 1 Mean Score

Website Design	Cognitive Style	Mean	Standard Error	95% Confidence Scale	
				Lower Limit	Upper Limit
Objectivist	Field Independent (FI)	54.712(a)	1.370	52.003	57.421
	Field Dependent (FD)	54.318(a)	1.153	52.037	56.599

a Evaluated based on covariate in the model: Pre-Test Score Mean = 45.91%.

Table 5.15: Post-test 1 mean score and standard error for FD and FI cognitive styles

For the same analysis, the pairwise comparison with Bonferroni correction for multiple comparisons is as shown in Table 5.14. Through ANCOVA analysis, it was found that there was no significant difference (p=1.00) between FD and FI cognitive student groups, in learning through websites developed based on the objectivist approach. Therefore, hypothesis 4 above is accepted.

This finding suggests that students with field dependent (FD) cognitive styles obtained an equal achievement in knowledge tests with the field independent (FI) cognitive style students, in learning through websites developed based on the objectivist approach.

Hypothesis 5

There is no significant difference in terms of students' knowledge levels between students with field independent (FI) cognitive styles, after learning through educational websites using the constructivist approach, compared with learning through from educational websites developed using the objectivist approach.

The data in Table 5.16 shows that the field independent (FI) cognitive student group which learned through the website developed based on the constructivist approach obtained a higher score in post-test 1 (Mean = 63.54[a]), compared with the students who learned through the website developed based on the objectivist approach (Mean = 54.71[a]). The difference is approximately 9%.

Dependent Variable: Post-test 1

Cognitive Style	Website Design	Mean	Standard Error	95% Confidence Scale	
				Lower Limit	Upper Limit
Field Independent (FI)	Constructivist	63.539(a)	1.176	61.213	65.865
		54.712(a)	1.370	52.003	57.421

a Generated based on the covariate in the model: Pre-test Mean Score = 45.91.

Table 5.16: Post-test 1 score and standard error for website based on constructivist and objectivist approaches for the Field Independent group

The ANCOVA analysis result is shown in Table 5.17. For the same analysis, the pairwise comparison with Bonferroni correction for multiple comparison shows that there was a significant difference (p=0.00) between the field independent (FI) cognitive student group who learned through websites developed based on the constructivist approach and the website developed based on the objectivist approach. Therefore, the hypothesis 5 above is refuted.

This finding suggests that the field independent (FI) cognitive student group which learned through the website developed based on the constructivist approach obtained a significantly higher knowledge test achievement compared with the FI student group which learned through the website developed based on the objectivist approach.

Dependent Variable: Post-test 1

(I) Group	(J) Group	Mean Difference (I-J)	Standard Error	Sig.(a)	95% Confidence Interval Difference (a)	
					Lower Limit	Upper Limit
FI – Constructivist	**FI – Objectivist**	**8.827(*)**	**1.797**	**.000**	**4.015**	**13.638**
	FD – Constructivist	12.217(*)	1.754	.000	7.521	16.913
	FD – Objectivist	9.221(*)	1.656	.000	4.788	13.654
FD - Objectivist	FI – Constructivist	-9.221(*)	1.656	.000	-13.654	-4.788
	FI – Objectivist	-.394	1.804	1.000	-5.225	4.437
	FD – Constructivist	**2.996**	**1.729**	**.513**	**-1.634**	**7.626**

Based on observed values

* The mean difference is significant at level .05

a Multiple comparison correction: Bonferroni.

Table 5.17: Pairwise comparisons of the same cognitive style with different website designs

Hypothesis 6

There is no significant difference in term of students' knowledge levels between students with field dependent (FD) cognitive styles, after learning through educational websites with the constructivist approach, compared with educational websites using the objectivist approach.

The data in Table 5.18 shows that the Field Dependent (FD) cognitive style students who learned through the website developed based on the objectivist approach obtained a higher post-test mean score (Mean = 54.32^a) compared with the student who learned through the website developed based on the constructivist approach (Mean = 51.32^a). This difference is approximately 3%.

Dependent Variable: Post-test 1 Mean Score

Cognitive Style	Website Design	Mean	Standard Error	95% Confidence Scale	
				Lower Limit	Upper Limit
Field Dependent (FD)	Constructivist	51.322(a)	1.296	48.758	53.886
	Objectivist	54.318(a)	1.153	52.037	56.599

a Generated based on the covariate in the model: Pre-Test Score Mean = 45.91.

Table 5.18: Post-test 1 score and standard error for website designs based on constructivist and objectivist approaches for the Field Dependent group

For the same analysis, the pairwise comparison and Bonferroni correction for multiple comparisons is as shown in Table 5.17. The one-way ANCOVA analysis found that there was no significant difference (p=0.51) between the field dependent (FD) cognitive style students, after learning through the website developed based on the constructivist approach and the website developed based on the objectivist approach. Therefore, hypothesis 6 above is accepted.

This finding suggested that, among the FD students, there are equal achievements in their knowledge tests with students who learned through both website designs.

Hypothesis 7

There was no significant difference among students in terms of learning retention after learning through educational websites using the constructivist approach compared with the objectivist approach.

In this hypothesis, the students' learning retention was measured using post-test 2, which was conducted two weeks after post-test 1. The Repeated Measures of the ANOVA analysis were used to see the difference. Referring to Table 5.19, the students who learned using the website designed based on the constructivist approach

obtained a higher post-test 1 mean score (Mean = 61.35) compared with the post-test 2 mean score (Mean = 57.03). The difference is approximately 4% between post-test 1 and post-test 2 for students who learned using the website developed based on the constructivist approach.

Meanwhile, the students who learned using the website developed based on the objectivist approach also obtained a higher post-test 1 mean score (Mean = 51.53) compared with the post-test 2 mean score (Mean = 48.27). The difference between post-test 1 and post-test 2 is approximately 3% for the student group who learned using the website developed based on the objectivist approach.

	Learning Method	Mean	Std. Deviation	N
TIME 1 (Post-test 1)	Constructivist	61.35	11.680	68
	Objectivist	51.53	10.669	73
	Total	**56.27**	**12.168**	**141**
TIME 2 (Post-test 2)	Constructivist	57.03	11.847	68
	Objectivist	48.27	10.895	73
	Total	**52.50**	**12.145**	**141**

Table 5.19: Post-test 1 and post-test 2 mean for constructivist and objectivist groups

The result of the ANOVA Repeated-Measures analysis on this study data, shown in Table 5.20, produced Wilks' Λ=0.99, $F_{1,139} = 0.59$ and p=0.45. This difference is not significant. Based on the analysis, the above hypothesis 7 is accepted.

This research suggested that the learning retention of students who received the constructivist approach was equal to the retention of students who received the objectivist approach.

Multivariate Test (c)

		Value	F	Hypothesis df	Error df	Sig.	Eta Square	*Noncent. Parame-ter*	Observation Exponent (a)
TIME	Pillai's Trace	.176	29.786(b)	1.000	139.000	.000	.176	29.786	1.000
	Wilks' Lambda	.824	29.786(b)	1.000	139.000	.000	.176	29.786	1.000
	Hotelling's Trace	.214	29.786(b)	1.000	139.000	.000	.176	29.786	1.000
	Roy's Largest Root	.214	29.786(b)	1.000	139.000	.000	.176	29.786	1.000
TIME * DESIGN	Pillai's Trace	.004	.585(b)	1.000	139.000	.445	.004	.585	.118
	Wilks' Lambda	**.996**	**.585(b)**	**1.000**	**139.000**	**.445**	**.004**	**.585**	**.118**
	Hotelling's Trace	.004	.585(b)	1.000	139.000	.445	.004	.585	.118
	Roy's Largest Root	.004	.585(b)	1.000	139.000	.445	.004	.585	.118

a Generated using alpha = .05
b Accurate Statistic
c Design: Intercept+METHOD With Subject Design: TIME

Table 5.20: The post-test 1 and post-test 2 ANOVA *Repeated-Measures* for website design (constructivist and objectivist approaches)

Hypothesis 8

There was no significant difference in terms of students' motivation after learning through educational websites using the constructivist approach compared with learning through educational websites using the objectivist approach.

Referring to Table 5.21, the students who learned using the website designed based on the constructivist approach obtained a Motivation Test mean score of 3.69, compared with the student group which learned using the objectivist approach (Mean = 3.60). As shown in Table 5.22, the one-way ANOVA analysis result of this study produced the values of $F_{1,139} = 2.392$, and $p = 0.124$. This difference is not significant. Based on this analysis, hypothesis 8 above is accepted.

This study finding suggests that there is no difference in the motivational levels of students who learned using the constructivist approach compared with the motivational levels of the student group which learned using the objectivist approach.

Motivation Test

	N	Mean	Standard Deviation	Standard Error	95% Confidence Interval For Mean	
					Lower Limit	Upper Limit
Constructivist	68	3.6998	.36161	.04385	3.6122	3.7873
Objectivist	73	3.6092	.33350	.03903	3.5314	3.6870
Total	**141**	**3.6529**	**.34906**	**.02940**	**3.5948**	**3.7110**

Table 5.21: Mean and standard deviation for the Motivation Test score

Motivation Test

	Sum of Square	Df	Mean Square	F	Sig.
Different Groups	**.289**	**1**	**.289**	**2.392**	**.124**
Within Groups	16.769	139	.121		
Total	17.058	140			

Table 5.22: One-way ANOVA for Motivation Test mean score with website design (constructivist and objectivist based)

5.4 Conclusions

For this study, the data was analyzed using ANCOVA. The dependent variable was the students' knowledge test achievement measured through post-tests, and the independent variable was the website design. There were two versions of the website, which were developed based on the objectivist and constructivist approaches.

The statistical control on differences among the cases in the sample was done through covariate selection in the analysis. The covariate used in this study was the pre-test mean score. The ANOVA Repeated-Measures Analysis was used to see the difference in students' learning retention among the groups who learned through different website designs. Furthermore, the one-way ANOVA analysis was used to see the differences in terms of students' motivation after using the website developed

using the two different approaches. The alpha value used was 0.05. The following is the summary of the said analysis findings:

i. From the one-way ANCOVA analysis, it was found that the main effect of the website design was significant. The students' knowledge test achievements for those who learned through the website developed based on the constructivist were significantly better compared with the students who learned through the website developed based on the objectivist approach.

ii. The students' knowledge test achievements with field independent (FI) cognitive styles were significantly better compared with the achievements of student groups with field dependent (FD) cognitive styles for website based learning.

iii. The students with field independent (FI) cognitive styles had significantly higher achievements in knowledge tests compared with the student group with field dependent (FD) cognitive styles, after learning through the website developed based on the constructivist approach.

iv. There is no significant difference between FD and FI cognitive style students after learning through the website developed based on the objectivist approach.

v. Students with field independent (FI) cognitive styles, who learned through the website developed based on the constructivist approach, attained a significantly higher achievement in the knowledge test compared with the students who learned through the website developed based on the objectivist approach.

vi. The FD student group which learned through the website developed using the constructivist approach attained an insignificant achievement in the knowledge test compared with FD students who learned through the website developed using the objectivist approach.

vii. The students' retention for those who received the constructivist approach was not significant compared with the retention of the students who received the objectivist approach.

viii. There was no significant difference in the students' motivational levels for those who learned using the constructivist approach compared with students who received the objectivist approach.

Chapter 6

Discussion and Conclusion

6. Introduction

This research involved developing two websites related to the "Fundamental of Business" topics in the Business Management subject, which were designed using two different approaches: one using the objectivist approach, and another using the constructivist approach. Next, this research compared the effectiveness of the two designs on the students' knowledge test achievements, motivation and students' retention, after learning through these two websites.

At the same time, this research looked at different cognitive styles among the students, which were field dependent (FD) and field independent (FI), on students' knowledge levels after learning using the websites. This research also looked at the effects of using two different website designs, with different cognitive styles, on their knowledge levels.

6.1 Discussion

6.1.1 Descriptive Data

A total of 141 Form 4 students who were taking the Business Management subject from two secondary schools in the Ampang District, Selangor were fully involved in this study. These students were divided into two groups – control and treatment. The

control group consisted of 73 students who learned the "Fundamental of Business" topic, using a website developed based on the objectivist approach, while the treatment group consisted of 68 students who were learning the same topic, using a website developed based on the constructivist approach.

Each group was further divided into two types of students, those who were field dependent (FD) cognitive and those who were field independent (FI) cognitive. In the control group, there were 41 FD students and 32 FI students. In the treatment group, there were 29 FD students and 39 FI students.

Table 6.1 showed the total sample, as well as the post-test 1 mean score, for each group after being controlled through ANCOVA analysis.

	Constructivist	**Objectivist**	**Total**
FD Cognitive Style	N: 29 Mean: 51.32[a]	N: 41 Mean: 54.32[a]	**N:70** **Mean: 54.49[a]**
FI Cognitive Style	N: 39 Mean: 63.54[a]	N: 32 Mean: 54.71[a]	**N: 71** **Mean: 58.02[a]**
Total	**N: 68** **Mean: 59.81[a]**	**N: 73** **Mean: 52.97[a]**	

Table 6.1: Total sample, as well as the post-test 1 mean score for each study group

Based on the descriptive data, on the whole, the post-test 1 mean score for both control and treatment groups had increased, compared with the pre-test mean score, after learning through the website material provided. For the control group, the post-test 1 mean score (Mean = 52.97a) was higher compared with the pre-test mean score (Mean = 44.08).

For the treatment group, the post-test 1 mean score (Mean = 59.81a) was higher compared with the pre-test mean score (Mean = 47.88). However, the increase in the mean score for the treatment group was higher (11.92%) compared with the mean score increase for the control group (7.89%), after the differences between the two groups were controlled through the ANCOVA analysis.

On the whole, through post-test 1, the mean score for the treatment group was higher compared with the control group. In addition, the mean score for the FI cognitive group was higher compared with the FD cognitive group.

For post-test 2, the mean score for both groups showed a small decline compared with the post-test 1 mean score. However, the mean score for both groups was still high compared with the pre-test mean score. Post-test 1 was given as soon as the students completed their learning session with the website materials provided, while post-test 2 was conducted two weeks after post-test 1. Nevertheless, on the whole, through post-test 2, the treatment group mean score (Mean = 57.03) was higher than the control group (Mean = 48.27).

Based on the descriptive analysis, on the whole, there was an improvement in the knowledge of students who learned through the website developed using different designs. However, the improvement of students' knowledge for the treatment group (using the website developed based on the constructivist approach) was significantly higher compared to the control group (using the website developed based on the objectivist approach).

From a retention aspect, both groups were still showing a better knowledge level, even though a small decline occurred two weeks after the said learning materials were used. However, there was no significant difference in the retention between both the control and the treatment groups. Overall, through post-test 2, the knowledge level for the treatment group was still higher compared with the control group, two weeks after using the learning materials based on the said website.

6.1.2 Major Effects

a. Major effect of the website design

This study found that the students who learned the "Fundamental of Business" topic using the website developed based on the constructivist approach obtained a significantly higher achievement on their knowledge test compared with the students who learned using the website developed based on the objectivist approach.

The findings of this study are in accordance with the theory stating the role of a teacher as a guide in the Learning Cycle [10] and the Guided Inquiry [9], assisting students in gaining a more significant and meaningful understanding. As explained in this study, the role of a teacher as a guide in the website environment developed was replaced by the computer program.

Questions given at the beginning of the lesson through the website developed based on the constructivist approach would assist the students in thinking, to find the answers for the said situation. A strong curiosity had compelled the students to explore, observe, predict, test hypotheses, and build concepts concerning the questions given through the suggested links. Students will also use their past

knowledge, to apply it to this new situation. When students are actively involved in organizing their own understanding of certain matters, it will give them a more meaningful understanding. Furthermore, it will be easier for them to apply certain theories or concepts they gain themselves to other related questions or problems.

On the other hand, for the control group which used the website developed based on the objectivist approach, they were only being passive information receivers through the information display activities which were linearly arranged. This group had undergone a deductive and passive learning process, where all of the learning objectives and directions were provided for them. Students are only required to follow the lesson prepared from one step to the next. Finally, they will know whether or not their learning objectives were achieved, depending on the result of the quiz prepared after completing the tutorial.

The knowledge seeking satisfaction and authority, as well as high level thinking, does not exist in this group, because all of the theories and concepts were provided and presented by others, and were only required to acknowledge it based on the explanation and evidence provided for them. This is the kind of situation which is regularly being argued in computer based learning such as CAI, which does not involve students in problem solving processes, instead students are only being passive receivers [99]; [100].

The study findings were also in accordance with previous study findings, whether classroom learning oriented or computer based, using CAI, CD-ROM and websites in various subjects. A number of studies conducted previously (such as [63]; [65];

[67]; [72]) showed that inquiry or learning cycle techniques were able to improve students' achievement compared with the traditional approach, which is more oriented on information presentation in a classroom environment.

The study findings also showed that, through inquiry learning, students were better in generating and expanding lessons, had given active responses in their learning, were more capable of giving explanations of certain concepts, able to increase scientific thinking, and able to increase the ability to give arguments among students, compared with the traditional learning approach which are more for information presentation [68]; [63]; [69]; [70], [71].

Studies related to the inquiry approach in computer based learning also showed the same findings. Some studies found that hypermedia based instruction (HBI), which is more for inquiry approach, either through CD-ROM software or through websites, is more effective in improving students' academic achievements compared with computer aided instructions (CAI), which are more towards the objectivist approach [101]; [102]; [103].

Among the characteristics of CAI learning is computer based learning, which is more for linear learning activities with tutorials, simulations, exercises and games, while HBI learning (hypermedia based) is computer based, more complex, non-linear, with links to a variety of media and information, and allows students to control their learning, as well as provide interactivity and exploration elements [104].

Studies related to problem based learning (PBL), which is more inclined towards the constructivism paradigm, also showed a higher achievement in learning amongst students. [105]'s study found that students who were guided by their tutors, who emphasized the learning process aspect in PBL (in line with the constructivist approach), showed a better performance compared with students who were guided by their tutors, who emphasized the contents (in line with the objectivist approach).

[106] also found that tutors who were putting too much emphasis on the contents of a certain lesson would not be able to carry out their role as an effective facilitator. [73] found that modules which were developed using an on-line learning cycle approach were able to increase the understanding, along with the abilities of teaching trainees in carrying out their instructions.

[107] found that the constructivist approach application was more effective in improving students' achievements in science, along with high levels of thinking skills compared with the direct approach in web based learning. [108] reported that the inquiry method was effective in reinforcing scientific skills, while [109] found that the students' performances in science concepts and scientific reasoning abilities could be improved through learning sessions using the Learning Cycle.

Even though the studies conducted were focused on science subjects, these findings proved that developing learning materials based on the constructivist approach and the learning cycle was able to improve the knowledge level in the Business Management subjects. The result from this study, supported by previous study findings, proved that the knowledge test achievement, after learning through a

website developed based on the constructivist approach, was significantly better compared with learning through a website developed based on the objectivist approach.

b. The effects of different cognitive styles

Many researchers had recommended that, in order to ensure the effectiveness of learning based on computer systems, the cognitive style differences aspect is one of the factors which should be considered and applied in the said learning materials environment [110]; [111]; [100]; [112]. This study had found that students with a field independent (FI) cognitive style obtained a significantly higher knowledge level compared with students with a field dependent (FD) cognitive style, for "Fundamental Business Management" related topics in a web-based learning environment.

In general, this study's findings confirmed the cognitive style difference theory led by [18]. FI students are individuals with individualistic attitudes, and do not need others for processing information. They have their own abilities in structuring their knowledge. On the other hand, FD students prefer social interactions, depending on others in structuring information for them, and are more ready to accept inputs given to them by those with authority.

FI individuals are also said to be those who are able to master disruptive background elements when they try to separate a certain aspect in a certain situation. Meanwhile, FD individuals cannot free themselves from disruptive background elements, and also find it hard to apply structure to situations without structure.

Based on different traits among FI and FD students, the web-based learning environment has given an advantage to the FI students. In this study, both the control and the treatment groups had learned using materials developed based on websites individually. Therefore, FI students gained more benefits compared with FD students, because FI students are those who are more prepared to learn individually, while FD students are more prepared to learn in groups. Besides that, the freedom to control their own learning in a website environment had also given an advantage to FI students compared with FD students.

The website environment which comes with various elements such as text, graphics, animation, audio, video, hypertext and hypermedia does not give the FI students any problems, because they are able to separate disruptive background elements. They are also more capable of choosing necessary information in their learning. However, FD students are facing difficulties in freeing themselves from disruptive background elements, and are often faced with problems in choosing important and less important information in the said website environment.

The result from this study is in accordance with previous findings related to computer technology based learning, either using a CD-ROM or a website for various subjects. Many studies related to multimedia and web-based learning environments had shown that this learning environment had given a higher chance for FI students to obtain better achievements in their learning, compared with FD students [103]; [113]; [114]; [115]).

Previous studies also found that FI students had gained greater benefits compared with FD students in a learning environment where they were allowed to control the learning material or media themselves [116]. The following studies conducted by [117] found that FI students are more attracted to, and showed more efforts in web-based learning, compared with FD students.

The findings from this research, as well as from previous research, show that FI cognitive students obtained better performances compared with FD students in a computer and web-based learning environment. The characteristics found in computer and web-based learning materials, as well as in individual learning, are among the factors of why the FI students had obtained better performances compared with FD students in their learning.

6.1.3 Interaction Effects

a. The connection between constructivist approach website design and cognitive styles

In this study, it was found that field independent (FI) cognitive style students obtained a significantly higher performance compared with field dependent (FD) cognitive style students, in learning through a website developed based on the constructivist approach. The higher performance among FI students through learning based on a website developed using the constructivist approach, is due to the fact that the said website characteristics are suited to the way they learn.

The website developed based on the constructivist approach required students to think, observe, test the hypotheses, and find answers for questions raised through

links in various media, such as text, audio, video and graphics. Learning steps were not linear, and students were given the freedom to control their learning. However, students were still guided through certain feedback each time they gave an answer to a given question.

Even though the questions were provided, the exploration steps were determined by the students themselves through the provided links. Therefore, FI students were shown to be individuals who were more effective in learning though exploration, information selecting, evaluating relevant materials, and building their own understanding [74], so this website had given them an advantage. For FD students, the freedom given to choose necessary information themselves often gave them problems, particularly when there was no clear guidance on where they should go and what they should do in a website environment with hypertext and hypermedia.

FD students are also often faced with problems in making their own decisions about questions raised in the website environment developed based on the constructivist approach. This is due to the fact that FD students are individuals who prefer to depend on others, and they are more inclined to viewing approaches in the concept learning process.

Findings in this study are in accordance with findings from similar studies conducted in the past. [78], [103] and [118] had conducted a study on hypertext and hypermedia usage among FD and FI students in a learning environment based on computers and websites. They found that FI students had shown a better performance, compared with FD students in a learning environment which was not organized linearly,

through discovery activities, and that this was in line with the website developed based on the constructivist approach.

The findings from this study and other studies conducted proved that FI students learned more effectively, and showed a better performance compared with FD students in an educational website environment developed based on a constructivist approach which required students to explore. Learning steps were not linear, and students were given the freedom to control their learning.

b. The connection between the website developed based on the objectivist approach and cognitive style

The findings from this study showed no significant difference between FD and FI cognitive students in learning through the website developed based on the objectivist approach.

The website developed based on the objectivist approach was developed linearly, and the lessons were organized and presented in a step-by-step manner. All concepts and theories to be conveyed were organized, and the students only needed to read and comprehend, as well as absorb the knowledge in their mind.

Certainly, approaches such as this do not give any advantages to FI students. This is because FI students are more inclined towards learning which will allow them to choose the necessary information themselves, through exploration activities. They get less satisfaction through learning which is more like information transfer, where there is no challenging element.

Therefore, FI students did not show a better performance compared with FD students in the website environment developed based on the objectivist approach. The website attributes which are more in the form of information display and transfer, are not in line with the desires and styles of FI students, who are more inclined towards a learning environment with more freedom and more challenging for their mind.

On the other hand, designs such as this should have given an advantage to FD students compared with FI students in their learning. According to [102], FD students are more ready to choose step-by-step instructions. FD students are also more ready to accept learning which is organized, with their learning objectives already decided [119]. However, the findings in this study did not show any significantly higher performance among FD students in their lessons compared with FI students.

Individual learning without any external guidance, while the students surf the website developed based on the objectivist approach, is among the factors which may have caused FD students to fail to show a better performance than FI students in the said lesson. Apart from the organized learning materials, FD students also need social interactions in understanding certain things in their learning.

This opinion is in accordance with the suggestion proposed by [120] and [121], which stated that FD students require external assistance, as well as input from others, to understand certain things. Based on these opinions, apart from organized learning materials, FD students also require social interactions to ensure a higher improvement in their learning performances.

These research findings are in line with previous research. For example, [102] had stated that FD students are more ready to choose step-by-step learning, but found that through his quantitative data for learning based on hypermedia materials, there was no significant difference in the performances among FI and FD students in the said learning. This is because, other than an organized material presentation, FD students also require social interaction and peer help in a learning environment with links to various media [102]. [117] also found no significant difference in knowledge levels between FD and FI students in individual learning which used materials conveyed structurally through the Internet.

From this finding, and from findings conducted previously, it was found that FD students did not show a better performance than FI students in individual learning. Apart from structured and organized step-by-step learning materials, FD students also require peer help in order to improve their performance in web based learning.

c. The connection between the FI cognitive style and website design

This study found that field independent (FI) cognitive style students who had their lessons through a website developed based on the constructivist approach, had obtained a significantly better performance compared with FI students who had their lessons through a website developed based on the objectivist approach. This finding was in accordance with the theories and findings from previous studies.

This finding showed that FI students had benefited more through a learning environment which used a constructivist based website. In this learning environment,

students were guided to explore, solve problems and build knowledge related to the "Fundamental of Business" topic. This environment is very suitable for FI students' attributes, because those who belong in the FI group were found to prefer task-oriented learning activities. FI students were also found to prefer instructions which are impersonal and inductive [15]. Besides that, those in the FI group were able to solve new problems through their own hard work, had the skills to analyze, and were more interested in working on their own [14].

In addition, FI students did not face any difficulties in learning unstructured materials, and they were more inclined towards the hypotheses testing approach in the concept learning process in a constructivist approach web environment. On the other hand, FI students do not like learning which is more towards the viewing approach in the concept learning process, as displayed in a website developed based on the objectivist approach. [122] also found that FI students are more ready to develop and structure their knowledge themselves, rather than by receiving and agreeing with the knowledge passed from others.

Therefore, this finding proved that FI students obtained a better performance through lessons using materials developed based on the constructivist approach, compared with materials developed based on the objectivist approach.

d. The connection between the FD cognitive style and website design

The findings in this study showed that, for field dependent (FD) cognitive style students, there was no significant difference between learning through a website

developed using the constructivist approach compared with a website using the objectivist approach.

While this finding was not significant, but based on the descriptive data, the mean score for FD cognitive style students who were getting their learning materials through an objectivist based website was higher than that for FD students who were getting their learning materials from a constructivist based website.

Based on the cognitive style difference theory, FD students are more ready, with a more structured and linear learning environment. FD students are also more inclined towards a viewing approach in the concept learning process. However, FD students are faced with difficulties when learning using less structured and non-linear materials [14]; [15].

In this study, the website developed based on objectivist approach was more structured and linear, and more towards information presentation, while the website developed based on the constructivist approach was not linear, and required a student's own involvement in information processing and building their knowledge. Based on the attributes put forward, FD students should have obtained a better knowledge level in learning through the website developed based on the objectivist approach, compared with the website developed based on the constructivist approach.

Previous researchers also found that FD students had obtained better achievements in learning using more structure and organization with step-by-step materials, whether it was based on classroom learning, or computer and web-based learning. In the

meantime, some studies related to learning through computers and websites also showed that FD students had better achievements using structured learning materials, as opposed to unstructured materials [75]; [100].

The study findings by [123] also found that FD students had obtained better results in learning based on a computer program which applied a program control, where students were guided using step-by-step learning. [124] found that FD students had shown a higher achievement of learning through a web-based lesson which provided guides and examples in an organized way, in line with the website developed based on the objectivist approach.

The knowledge levels of FD students may have improved significantly in learning through websites developed using the objectivist approach, if other aspects were taken into consideration. As discussed previously, FD students require external assistance, as well as being dependent on others in comprehending certain concepts or theories. Therefore, group learning and discussion may be able to help FD students improve their understanding and knowledge levels in learning using a website developed based on the objectivist approach.

6.1.4 Learning Retention Effects

This study found that there was not a significant difference in terms of retention between the group who got their lessons through an educational website using the constructivist approach, and the group who learned using an educational website developed based on the objectivist approach. However, overall, both the control and treatment groups still showed a high knowledge level, with only a small decline in

the knowledge level after getting their lessons using the materials provided two weeks later.

In this study, the retention was measured through the difference in the declination or incrementing between the post-test 1 and post-test 2 mean scores for both the control and treatment groups. Findings from this study showed a small decline in the knowledge level for post-test 2, compared with post-test 1, for both the control and treatment groups. The declination difference between the control and treatment groups was too small and insignificant. However, if it was looked at in the terms of knowledge level difference in post-test 2 between the two groups, it was found that the mean score for the treatment group was still higher than for the control group.

Amongst the factors which may have caused this insignificant difference in terms of retention between the control and treatment groups may have been the time and the too short test frequency factors. The difference may have been more pronounced if the delayed post test was to be conducted more than once, and for a longer period. In this study, the memory retention difference between the control and treatment groups was only tested once through post-test 2, two weeks after post-test 1 was conducted. The findings would probably be different if the post-test was done more than once, and for a longer period.

Learning through a website developed based on the constructivist approach should give a better retention effect than learning through a website developed based on the objectivist approach. This is because, through the constructivist approach, students are involved in building and structuring their knowledge themselves. Situations such

as this should have reinforced students' memories of things they have learned. On the other hand, memories are easily lost when students only receive and agree with the knowledge passed to them through others' explanations, as displayed with the website developed based on the objectivist approach.

6.1.5 Motivational Effects on the Learning Materials

There was no significant difference in terms of motivation towards using the learning materials among students who learned through an objectivist-based website, compared with students who learned using a website developed based on a constructivist approach.

Even though this finding was insignificant, based on the mean score difference between the two groups, it was shown that the motivation level of the treatment group was higher than that of the control group. Among the factors which may have caused these insignificant findings would be that both groups were using materials developed based on computers and websites. Web-based learning materials are still considered new today. As usual, novel and not much used material will give a higher motivation for students to use it.

These findings confirmed the [125] assumption, stating that new technologies are able to increase motivation and gain students' interest to follow the provided lessons. In addition, each group only used the materials prepared for their group, without looking at materials used by the other group. In other words, the treatment group cannot compare the advantages of the approach gained by the control group, and vice versa; they can only evaluate the materials used by their own group.

Generally, this study found that both the control and treatment groups showed a high motivation level in using the web-based learning materials provided. The survey instrument, the Keller Learning Material Motivation Scale, was used to measure students' motivational levels. From these instruments, students who obtained a mean of more than 2.5 were considered motivated toward the said learning materials.

Based on the survey forms given to both groups, the mean scores for both methods were high, being more than 2.5. This finding showed that website usage in instruction and learning was able to increase the motivation of both the treatment group (using the website developed based on the constructivist approach) and the control group (using the website developed based on the objectivist approach) towards the "Fundamental of Business" topics.

Past studies also showed similar findings, in terms of motivation among students who were using different materials in learning through computer and Internet technology. [126] found that the students showed a positive reaction towards computer usage in writing and communication courses they had taken. The studies conducted by [38] and [1] also found that learning through the web and Internet were able to increase students' motivation in their learning.

Therefore, web-based learning can be considered to be something new among the students in Malaysia, so it had given them a motivation to use it, without considering if it was beneficial or not.

6.2 The Implication of the Study

6.2.1 Implication Related to Website Design

The utilization of web-based learning materials for the "Fundamental of Business" topics in the Business Management subject increased the students' knowledge and motivation for learning. This finding also showed that the knowledge levels of students who used website learning materials developed based on the constructivist approach were higher than students who used website learning materials developed based on the objectivist approach.

As discussed in Chapter 1, one of the factors to cause the Business Management subject to become unpopular amongst the student is the incompetence of instruction methods, and the minimal use of interactive instructions focused on students. Hence, it leads to low achievements for the students in this subject. It is expected that the findings in this study can be made as one of the alternatives to overcome the problem. This is because it has been proven that utilization of web-based learning materials can increase the learners' knowledge levels and motivation in the subject.

Also, as explained before, most instruction materials used to teach concepts and theories in the Business Management subjects are more teacher-focused, where teachers will present and explain the instruction material contents. This gave little chance for students to actively participate in building their knowledge through inquiry, as suggested by the Instruction Syllabus Explanation for Business Management. Even though the website was beginning to be utilized in instruction

and learning, it has yet to be able to ensure that active learning focused on the students building their own knowledge will take place.

This study proved that learning through a website developed using the objectivist approach cannot improve students' knowledge levels better than learning through a website developed using the constructivist approach. This is because, through the objectivist approach, the contents in the book were simply transferred to a website format. It was still in the information display and transfer format, where students will learn step-by-step, and memorize all theories, concepts and information displayed on the website.

It did not involve the students in problem solving, decision making or exploration activities. In other words, a website developed based on the objectivist approach did not emphasize inquiry and high level thinking, as recommended by the Ministry of Education, Malaysia.

A website design developed through the constructivist approach was proven to be very effective in improving students' knowledge levels and motivation, particularly in understanding certain concepts and theories in the Business Management subject. It also helped students gain a more meaningful and insightful understanding.

On the said website, learning started with questions which challenged the students' minds. Next, a strong curiosity pushed the students to explore, observe, predict, test the hypotheses, and develop concepts related to questions given through the suggested links. When students were involved in actively organizing their own

understanding about certain matters, it gave them a more meaningful understanding. Then, it would be easier for them to apply certain theories or concepts they gained themselves to other related questions or problems around them.

A reading survey showed that constructivist study and the learning cycle were often used in learning science subjects. However, this study proved that the constructivist approach and the learning cycle were also successful in improving students' knowledge levels in the "Fundamental of Business" topic for the Business Management subject. Therefore, the constructivist approach and learning cycle were also considered to be suitable to convey the instructions related to certain concepts and theories in other subjects, such as geography, languages and history.

The advantages in computer, web and Internet technologies should be benefited by those who are involved in preparing learning materials so that they can convey truly meaningful instructions to the students. In this globalization era, among the main requirements which exists in the education field is to produce students who are able to think at a high level, as well as producing critical ideas and creative inventions which are able to compete in an international market in the future. It is hoped that the learning materials produced later will truly be able to fulfil the said requirements.

6.2.2 Implication Related to the Student's Cognitive Style

As discussed before, to ensure the effectiveness of a computer system based instruction, the cognitive style difference aspect is among the factors which should be considered and applied in the said learning material environment. In designing certain instruction materials, especially those based on educational websites, the

cognitive style difference aspect of students who will be using it should be considered. This is because studies have found that students have different styles in their way of understanding certain subjects.

Studies found that FI students are individuals who are more effective in learning through exploration, information selection, evaluating relevant materials and building their own understanding, while FD students are individuals who are more effective in learning using more organized learning materials, and require social interaction and help from others in understanding certain matters in their learning.

The findings from this study were hoped to serve as a guide for designers, instructors or teachers involved in developing and conducting instructions based on educational websites. They should prepare the learning material and atmosphere which meets the needs of all students with different cognitive styles.

6.3 Suggestions for Further Study

This study showed that learning through a website developed based on the constructivist approach was able to increase students' knowledge in understanding the "Fundamental of Business" topic, especially among FI cognitive students. For FD cognitive students, their knowledge test achievement was still low compared with FI students, after learning through both of the websites prepared.

Further study is required to identify an appropriate learning strategy to use, so that FD students' knowledge levels can be effectively increased through web-based learning. Among the strategies suggested were pair learning, cooperative learning

and collaborative learning. This is because, in this study, the learning was individualistic, so it was proven that FI cognitive students benefited more than FD students.

As discussed, FD students are more inclined toward social interaction, being dependent on others in structuring information processes and require external motivation in their learning, compared with FI students, who prefer to learn individually and are less dependent on others.

This study finding did not show any difference in terms of retention between student groups who had learned using the website developed based on the objectivist approach with the website developed using the constructivist approach. Therefore, further study which involved a number of post-tests (delayed post-test) which were longer, and at least three times, is required to see the said retention effect. The researcher suggested the utilization of Doubly Multivariate Repeated-Measures or Doubly Multivariate Within Subject Design analysis, as recommended by [127], to see a clearer effect of the retention difference between the two groups.

Other than the cognitive style, other individual differences such as the learning style, attitude, gender and the like should be studied in a web-based learning environment. The said findings will surely benefit all parties in conducting web-based learning more effectively. Apart from quantitative data, qualitative data can also be used to see the differences between the groups and cognitive styles in learning using the developed materials. For example, log trail can be used to detect students' navigation

in the said web environment. It can also give a picture of the students' earnestness in using the learning materials given to them.

6.4 Summary

These research findings, supported by previous research, has proven that website design which was developed based on the constructivist approach was able to improve students' knowledge levels in their learning, compared with the objectivist approach.

On the whole, field independent (FI) cognitive style students benefitted more than field dependent (FD) students, by learning using web-based learning materials. This study also found that FI students obtained a higher knowledge level than FD students through learning using a website developed based on the constructivist approach.

Also, the FD and FI students' knowledge levels did not show any difference in learning using a website developed based on the objectivist approach. For FI cognitive students, their knowledge levels were more outstanding in learning using a website developed with the constructivist approach than a website developed based on the objectivist approach, while FD students did not show any difference in terms of knowledge levels, through either of the websites developed based on the constructivist and objectivist approaches.

Overall, FD students also succeeded in improving their knowledge levels in learning through the website, but their knowledge levels were still low compared with FI

students in the said learning. Among the factors identified which caused the FD students', as well as the FI students', inability to improve their knowledge level in their learning, was that the said learning was conducted individually. Apart from that, this study finding also showed no significant difference in terms of retention and motivation among student groups who used the constructivist and objectivist approach websites. However, both groups showed high learning retention and motivation in their learning through both websites assigned to them.

It is hoped that this study result will be able to give a picture of the effectiveness of the website developed based on the constructivist approach, for improving students' knowledge levels and motivation in their learning. It is also hoped that these study findings can serve as a guide to those who are involved in developing educational websites in Malaysia. Other than that, to ensure the web-based instruction effectiveness, cognitive style differences are among the factors which should be considered and applied in the said learning material environment.

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Glossary of Terms

Field Independent (FI) Learner	A field independent learner is a student who can overcome the distracting effects of background elements when trying to isolate an aspect in a certain situation. They are also found to have the skills to develop structure for a non-structural situation. In this research, students achieving a GEFT score higher than the GEFT mean score for the sample group were categorised as FI students.
Field Dependent (FD) Learner	A field dependent learner is a student who cannot be free from environmental or distracting background elements when trying to isolate an aspect in a certain situation. It was also found to be difficult to use a structure on a non-structural situation. In this research, students achieving a GEFT score lower than the GEFT mean score for the sample group were categorised as FD students.
Cognitive Style	Cognitive style is the normal style of a person processing information or observing, assuming, thinking, memorising and solving problems.
Inquiry Based Learning	Inquiry based learning generally means seeking information, questioning and investigating certain phenomenon happening around us. Discovery is a major constructivist characteristic. Learning by discovery occurs when main concepts and principles are studied and discovered by the learners themselves. In learning, constructivists refer to various methods used by scientists in studying the nature, and the way in which they proposed explanations based on evidence acquired from their research.
Guided Inquiry Based Learning	Guided inquiry based learning is a learning process which receives basic guidance from teachers. Teachers provide basic elements in learning, and later ask the students to generalise. Teachers act as facilitators who start the questions, to encourage students to continue exploring. In this research, through the website developed based on the constructivist approach, the designer developed learning steps which allow users to explore, in order to solve various questions related to Business Management subject. Students will be guided to explore the links suggested, and then to develop certain concepts related to the topic discussed. The learning step in the said website is in an inductive form.

Tutorial Method	The teaching method presented is structured and follows a step-by-step approach, to obtain an objective defined by the teacher. The learning process is in a more deductive form. The web site developed based on the tutorial method begins with the explanation concerning objectives to accomplish and step-by-step tutorial, and is followed by exercises and reinforcements. Feedback for answers given by students will be provided. Its objective is to also evaluate whether or not the learning objectives were accomplished.
Achievement	Achievement is measured by knowledge test results given after learning. In this research, the achievement difference is determined based on the Post Test score mean difference between control groups who underwent learning through websites developed based on the objectivist approach, with the treatment group who underwent learning through websites developed based on the constructivist approach.
Cognitive Style Difference	Cognitive style difference explains that each learner has a different ability, faith, interest and learning style.
Motivation	Motivation is a drive and desire to acquire something. In this research, the motivational level towards educational web site based learning material provided was measured using a motivation test, the Instructional Materials Motivation Scale developed by John M. Keller. Through this test, students with a mean of more than 2.5 are considered motivated.
Educational Web Sites (EWS)	Websites which display information for the purpose of teaching and learning; in this research, two versions of EWS were developed: a) an educational web site developed based on the objectivist approach, and b) an educational web site developed based on the constructivist approach.
Learning Cycle	In this research, the learning cycle proposed in is a constructivist teaching method which consists of three phases, which are exploration, term introduction and concept application.
Retention	Retention in this research is to observe whether or not the understanding and knowledge gained by students through evaluation tests, after undergoing different web-based learning (constructivist and objectivist approach), will last according to a certain time series. This retention state will be observed by comparing the knowledge level test by students in Post 2 Tests conducted two weeks after learning (delayed post test), to the Post 1 Test conducted right after the students completed their learning (immediate post test).

Constructivist Approach	Is a model for learning based on the belief that students construct their own knowledge and understanding. The basis for learning is the set of all prior experience and the derived knowledge and understanding. As students learn, they constantly engage in the process of revising their prior learning based on new experience.
Objectivist Approach	Holds that meaning exists in the world separate from personal experience. The goal of understanding is to come to know the entities, attributes, and relations that exist in this objective reality. Frames instructional goals in specific, behavioural, observable terms. The behavioural approach is concerned with immediate, recognizable changes in behaviour.
GEFT	The Group Embedded Figures Test was developed for research into cognitive functioning, but it has become a recognized tool for exploring analytical ability, social behaviour, body concept, preferred defence mechanism and problem solving style as well as other areas. The GEFT is a twenty-five item assessment contained in a thirty-two page non-reusable booklet.
ANCOVA	Analysis of covariance is a general linear model with a continuous outcome variable (quantitative) and two or more predictor variables where at least one is continuous (quantitative) and at least one is categorical (qualitative). ANCOVA tests whether certain factors have an effect on the outcome variable after removing the variance for which quantitative predictors (covariates) account. The inclusion of covariates can increase statistical power because it accounts for some of the variability.

Appendix A

KNOWLEDGE TEST (PRE-TEST)

Instruction: Answer all questions by circling either A, B, C or D. This paper contains 25 questions. Good luck!

SECTION 1: Fundamental of Business

1. Among the following statements, which is TRUE about human needs?

A Human needs are too many and not limited to the present
B Human needs must be fulfilled for a comfortable and enjoyable life
C Physiological needs are more important than security, social and spiritual needs
D Basic human needs changed depending on income, age and tastes.

.....

	RM	RM
Total Income		2500
Expenses :		
Rent	400	
Food	600	
Transportation	200	
Utilities	180	
Recreational Club Fee	150	
Al-Quran Class Fee	50	
Life Insurance Premium	220	1800
Balance		700

2. The table above is Mr Roslee's monthly income and expenditure statement. How much did Mr Roslee spend to fulfill his security and spiritual needs?

A RM 270
B RM 420
C RM 1380
D RM 1800

.....

The next question is based on the passage below.

Tanjung Kepah is a recently developed fishing area. It is rather far from Pulau Pangkor, where fishermen usually docked. Because this place is newly developed, it is not known among fish mongers. Only a few of them came to buy the fish and transported it to their place of business themselves. The fishermen themselves have to take most of the fish back

home or to Teluk Intan market, located roughly 80 km from Tanjung Kepah.

Every day, more and more fish are caught by these fishermen, and often more than half of the catch turned bad due to lack of fish mongers and buyers who visited this beach.

3. Among the activities mentioned in the above passage, which one is a trading activity?

A Fishermen selling fish to fish mongers
B Fishermen selling fish in Teluk Intan market
C Fish mongers transporting fish to sell
D Fish mongers buying fish from the fishermen

.....

4. Which of the following describes the direct production process?

A Activities to produce goods
B Activities to add the value of certain products
C Activities to produce products for direct selling
D Activities to produce products for private needs

.....

5. *Mr Hambali began working his paddy field 15 years ago. His rice is sold to BERNAS factory.*

Mr Hambali is involved in what type of production?
I extractive
II manufacturing
III business
IV direct service

A I and III
B I and IV
C II and III
D II and IV

.....

6. The factor differentiating an entrepreneur from a businessman is

A an entrepreneur works to gain profit
B an entrepreneur works to elevate his standard of living
C an entrepreneur works to fulfill the needs and wants of a society
D an entrepreneur works to get ahead of his business competitors

.....

7. Mrs Rabiah is a famous instant food manufacturing factory operator. Last year, her operation's profit decreased due to emerging competitions. As the result of her hard work, Mrs Rabiah was successful in increasing her profit by introducing a new, more attractive product.

Based on the above statement, what is the entrepreneuer traits Mrs Rabiah has?

I visionary
II creative and innovative
III ready to face challenges
IV quick to grab an opportunity

A I and II
B II and III
C III and IV
D II and IV

.....

8. Which of the following is a TRUE statement about enterprenuers?

A Gain maximum profit from business
B Overcome competition to penetrate a market
C Use all resources to produce a product
D Involve themselves in speculative activities

.....

Below is Dato' Haji Salleh's information.

> *Dato' Haji Salleh is an entrepreneur who started a banana chip processing operation in Air Hitam, Johor. This operation managed to boost the locals income.*

9. Which of the following are his roles as an entrepreneur?

I Producing new products
II Create job opportunities
III Increase technology application
IV Fulfill human needs and wants

A I and II
C II and IV
B I and III
D III and IV

.....

SECTION 2: Elements of Business

10. Which statement is true about trade?

A. Activities producing goods or services
B. Sales activities conducted for the purpose of making profits
C. A process of obtaining raw materials and converting the raw materials into finished goods.
D. Goods and services distributing activities from its original producer to consumers.

.....

11. The diagram below shows the 2-way relationship between trade and business.

TRADE BUSINESS

What is their relationship in production process?

A. Achieve maximum production through specialization.
B. Creating utilities for human life.
C. Gaim profit through business transactions
D. Provide a place for business.

.....

12. Choose the correct combination

	TRADE	BUSINESS
A	Includes production activities	A process to produce goods and services
B	A part of business activities	The objective is to gain income
C	Includes goods distiribution activities from producers to consumers.	Involves goods and services selling and buying activities
D	Requires business assistance in goods distribution process.	Involves utilities creation activities.

.....

13. The following information is related to Mr Ramli.

Mr Ramli opened a grocery shop in Taman Mahkota. He gets his stock from Syarikat Wah Seng. His customers are local residents and those who live nearby Taman Mahkota.

Based on the information above, what form of business is conducted?

I. Import
II. Retail
III. Wholesale
IV. Export

A. I and II
B. II and III
C. III and IV
D. I and IV

.....

SECTION 3: Domestic Business

14 Which of the following are to domestic business?

I Rice transported in from Thailand
II Black pepper purchased from Sawarak by a wholesaler in Ipoh
III Sharil supplying belacan to supermarkets around Kulim
IV An engineer from India working at Perwaja Gurun factory

A. I and II
B. I and IV
C. II and III
D. III and IV

.....

15.. The information below relates to characteristics of a type of a large scale retailer.

- *Consisted of many branches*
- *Sharing a same name and logo*
- *Under headquarter's control and administration*

What sort of a retailer is it?

A. Department stores
B. Large supermarkets
C. Cooperative retailing
D. Chainstore

.....

16. Which statements describe the advantages of cooperative retailing?

I. Operating to secure members' welfare.
II. Managed by a board of directors and elected democratically

III. Have fixed customers in its members.
IV. Providing comfortable shoping facilities.

A. I, II and III
B. I, II and IV
C. I, III and IV
D. II, III and IV

.....

17. Which of the following are the influencing factors in choosing a sales method?

I Distribution channel
II Technology level
III Buyers ability
IV Cash flow requirement

A. I and II
B. I and IV
C. II and III
D. III and IV

.....

18. Puan Syarifah obtained sole agent rights from Indonesia to sell herbal health products all over Malaysia. She has good knowledge and experienced in information technology as well as owns her own website. What business form that best suit Puan Syarifah?

A. Catalog shop
B. Mail order
C. E-commerce
D. Franchise

.....

19. Which statements are the advantages of automatic vending machine?

I. Providing 24 hour service.
II. Having a wide market coverage.
III. Able to save on operating cost and wages.
IV. This machine can be placed anywhere.

A. I,II and III
B. I, II and IV
C. I, III and IV
D. II, III and IV

.....

SECTION 4: International Business

20. Which of the following statement is true about international business definition?

A Sales and purchasing activities by residents of a country
B Sales and purchasing activities among residents of own country
C Sales and purchasing activities among residents within borders
D Sales and purchasing activities among residents of a country with another country

.....

21. Which of the following are the reason for international business existance?

I Different currency
II Different natural resources
III Different technology level
IV Different population size

A. I and II
B. I and IV
C. II and III
D. III and IV

.....

22. The information below are international business document particulars received by an agent.

- *Price estimates*
- *Packaging and labeling descriptions*
- *Type and quantity of goods ordered*
- *Delivery date and payment term*
- *Producing company name stated*

What is that document?

A. Export invoice
B. Closed indent
C. Open indent
D. Consular invoice

.....

23. The statement below is related to the importance of international business.

Able to use the latest technology from overseas in production process.

What are its impact on local producers?

I. Improve product quality
II. Reduce product price.
III. Save production cost.
IV. Increase supply source.

A. I and II
B. I and III
C. II and IV
D. III and IV

.....

24. Below is a slogan of a campaign organized by the Malaysian government.

BUY MALAYSIAN PRODUCTS

What is the purpose of the campaign?

A. Increase import
B. Reduce import
C. Increase export
D. Reduce export.

.....

25. Below is information on Mr Amir.

Mr Amir wishes to export his craft products to the United States and Australia.

How will Mr Amir find a market for his craft products?

I. Appoint sales agents overseas
II. Distribute pamphlet house to house
III. Join a trade delegation group to overseas
IV. Appoint research groups to conduct market research.

A. I, II and III
B. I, II and IV
C. I, III and IV
D. II, III and IV.

.....

CONGRATULATIONS & Thank you for completing all questions!

Appendix B

GROUP EMBEDDED FIGURES TEST

By Philip K. Oltman, Evelyn Raskin, & Herman A. Witkin

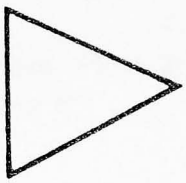
Name _____ Sex _____

Today's date _____ Birth date _____

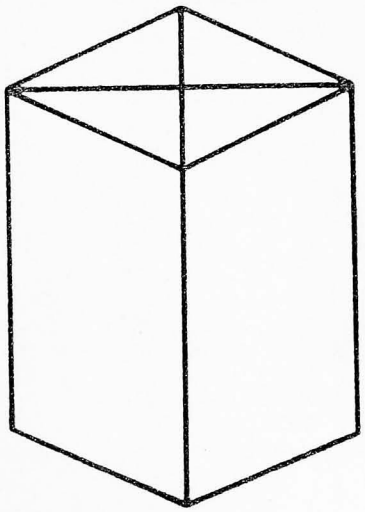
INSTRUCTIONS: This is a test of your ability to find a simple form when it is hidden within a complex pattern.

Here is a simple form which we have labeled "X":

X



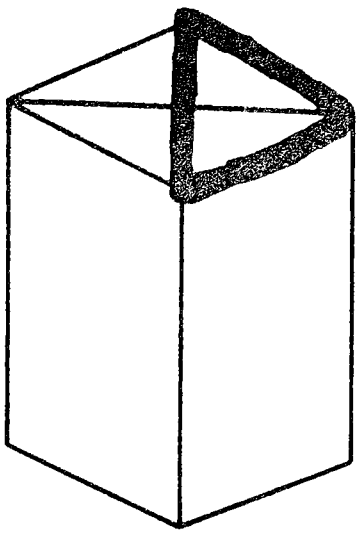
This simple form, named "X", is hidden within the more complex figure below:



Try to find the simple form in the complex figure and trace it *in pencil* directly over the lines of the complex figure. It is the SAME SIZE, in the SAME PROPORTIONS, and FACES IN THE SAME DIRECTION within the complex figure as when it appeared alone.

When you finish, turn the page to check your solution.

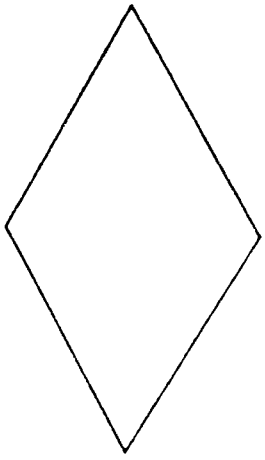
This is the correct solution, with the simple form traced over the lines of the complex figure:

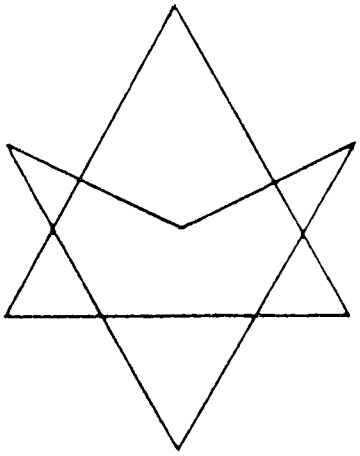


Note that the top right-hand triangle is the correct one; the top left-hand triangle is similar, but faces in the opposite direction and is therefore *not* correct.

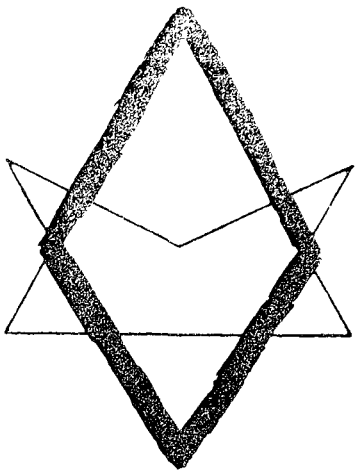
Now try another practice problem. Find and trace the simple form named "Y" in the complex figure below it:

Y





Look at the next page to check your solution.



In the following pages, problems like the ones above will appear. On each page you will see a complex figure, and under it will be a letter corresponding to the simple form which is hidden in it. For each problem, look at the BACK COVER of this booklet to see which simple form to find. Then try to trace it in pencil over the lines of the complex figure. Note these points:

1. Look back at the simple forms as often as necessary.

2. ERASE ALL MISTAKES.

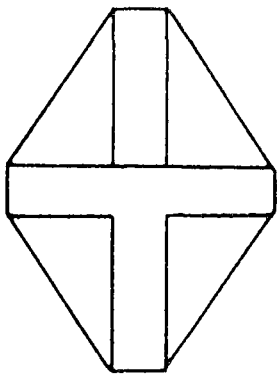
3. Do the problems in order. Don't skip a problem unless you are absolutely "stuck" on it.

4. Trace ONLY ONE SIMPLE FORM IN EACH PROBLEM. You may see more than one, but just trace *one* of them.

5. The simple form is always present in the complex figure in the SAME SIZE, the SAME PROPORTIONS, and FACING IN THE SAME DIRECTION as it appears on the back cover of this booklet.

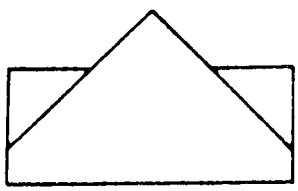
Do not turn the page until the signal is given

1



Find Simple Form "B"

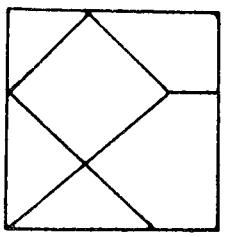
2



Find Simple Form "G"

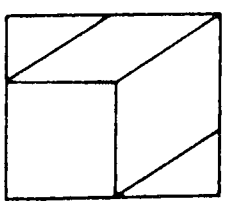
Go on to the next page

3



Find Simple Form "D"

4



Find Simple Form "E"

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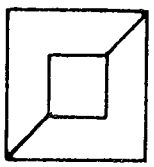
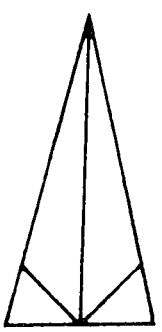
5



Find Simple Form "C"

6



Find Simple Form "F"

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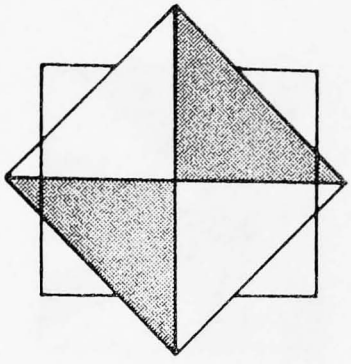
7 

Find Simple Form "A"

PLEASE STOP. *Wait for further instructions.*

SECOND SECTION

1



Find Simple Form "G"

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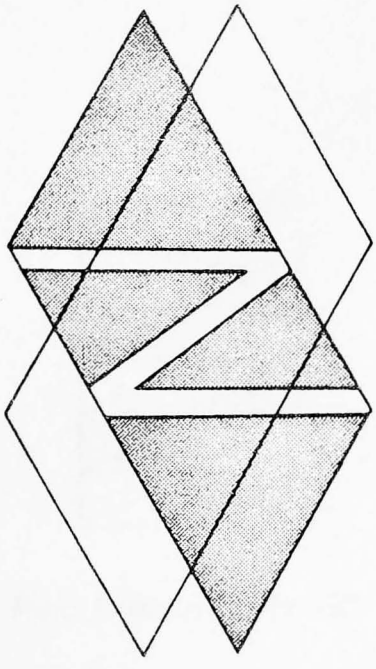

Find Simple Form "A"

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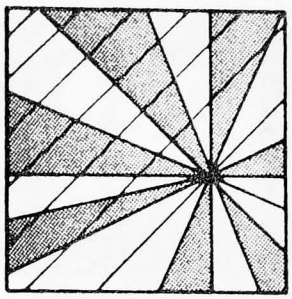

Find Simple Form "G"

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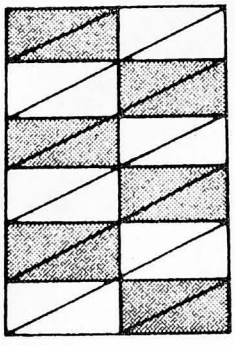

Find Simple Form "E"

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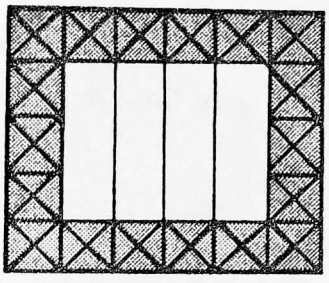
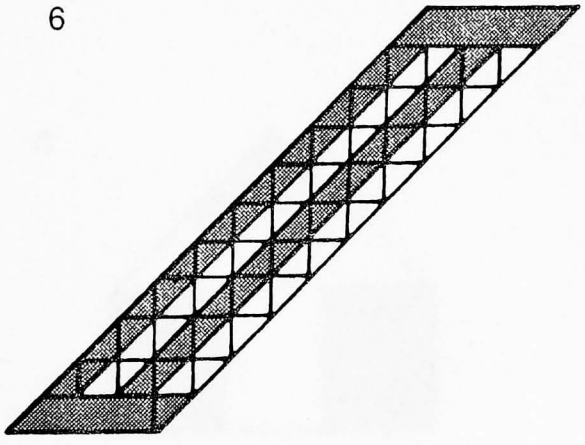


Find Simple Form "B"

6



Find Simple Form "C"

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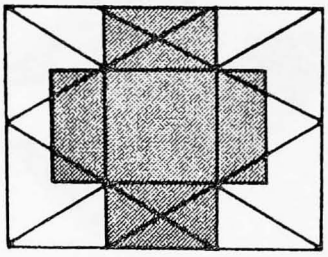
7



Find Simple Form "E"

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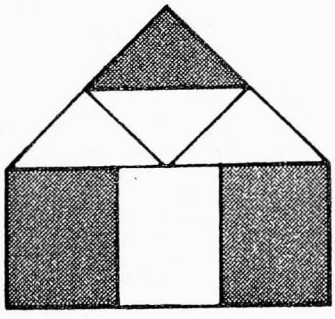

Find Simple Form "D"

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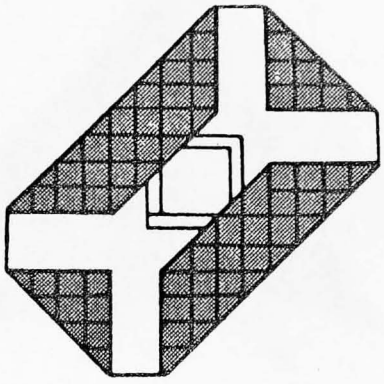
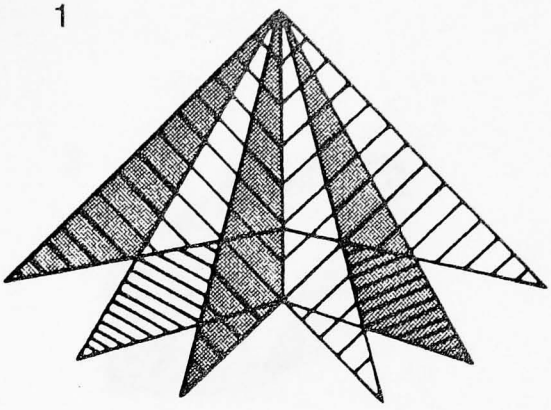
9



Find Simple Form "H"

PLEASE STOP. *Wait for further instructions.*

1



Find Simple Form "F"

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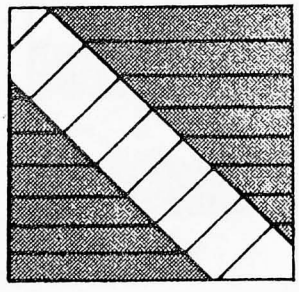

Find Simple Form "G"

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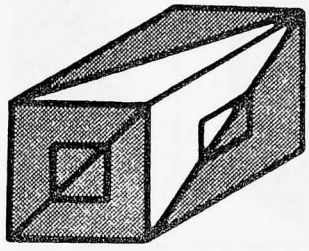
3



Find Simple Form "C"

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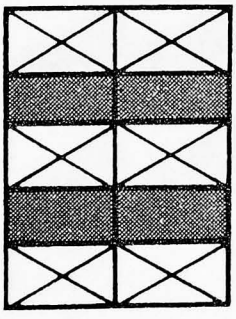

Find Simple Form "E"

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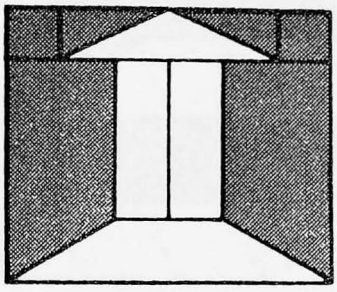

Find Simple Form "B"

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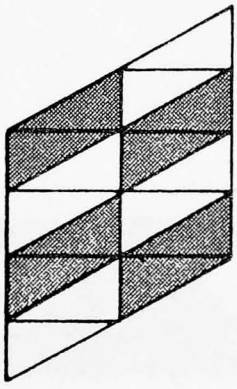

Find Simple Form "E"

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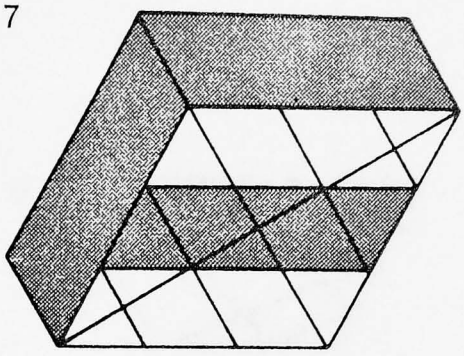
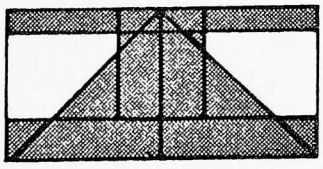
7



Find Simple Form "A"

8



Find Simple Form "C"

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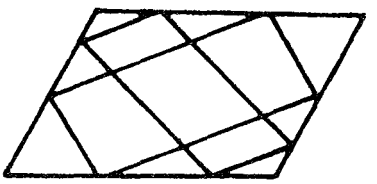
9

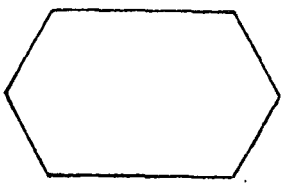


Find Simple Form "A"

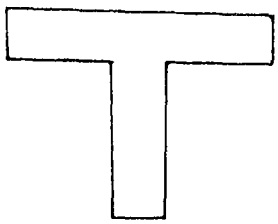
PLEASE STOP. *Wait for further instructions.*

SIMPLE FORMS

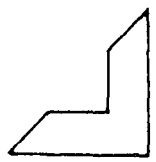
A



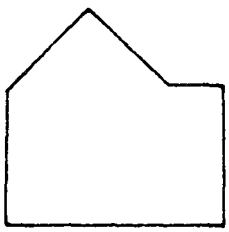
B



C



D



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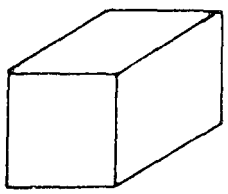

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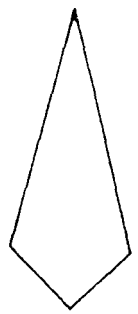

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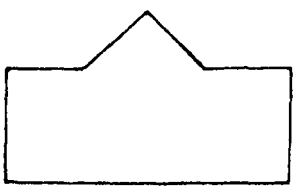

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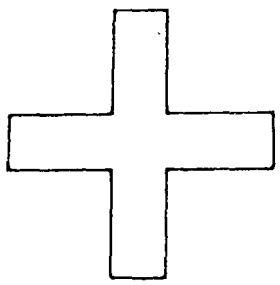

Appendix C

E-LEARNING MOTIVATION QUESTIONNAIRE

Instructional Materials Motivation Survey

INSTRUCTION: As you complete the survey, please base your responses exclusively on the e-learning course you took.

E-learning approach you took: ❑ Objectivist Approach
❑ Constructivist Approach

Did you complete the e-learning course? ❑ YES ❑ NO

Section I: Motivation

Please read the statement and check the response that most closely matches your attitude toward the statement.

1. When I first heard what the instruction would include, I thought it would be easy for me.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

2. There was something interesting at the beginning to the instruction or course that got my attention.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

3. This instruction or course was more difficult to understand than I would like for it to be.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

4. After reading the introductory information I felt confident that I knew what I was supposed to learn from the instruction.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

5. Completing the exercises in the instruction or course gave me a satisfying feeling of accomplishment.

- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

6. It is clear to me how the content of the instruction or course is related to things I already know.

- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

7. Many of the lessons had so much information that it was hard to pick out and remember the important points.

- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

8. The materials and lessons were eye-catching.

- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

9. There were stories, pictures, or examples that showed me how the instruction or course information could be important to some people.

- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

10. Completing the instruction or course successfully was important to me.

- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

11. The quality of the instruction or course helped to hold my attention.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

12. The instruction or course lessons were so abstract that it was hard to keep my attention on it.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

13. As I worked on the assignments, I was confident that I could learn the material.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

14. I enjoyed this lesson so much that I would like to know more about this topic.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

15. The instructions were dry and unappealing.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

16. The content of the instruction or course is relevant to my interests.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

17. The way the information was presented helped to keep my attention.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

18. There are explanations or examples of how to use the techniques presented.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

19. The exercises in the instruction or course were too difficult.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

20. The instruction or course had things that stimulated my curiosity.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

21. I really enjoyed studying the instruction or course information.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

22. The amount of repetition in the instruction or course caused me to get bored sometimes.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

23. I learned some things that were surprising or unexpected.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

24. After working on the instruction or course lessons for awhile, I was confident that I would be able to use some of the techniques in my class.

- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

25. The instruction or course was not relevant to my needs because I already knew most of it.

- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

26. The wording and type of feedback after assignments, or other comments in the course or instruction, helped me feel rewarded for my effort.

- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

27. The variety of exercises, materials, illustrations, etc., helped keep my attention on the lesson.

- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

28. The style of presentation and written information is boring.

- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

29. I could relate the content of this lesson to things I have seen, done, or thought about in my own work.

- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

30. There was so much information presented in lessons that it was irritating.

- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

31. It felt good to successfully complete the course or instruction.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

32. The content of the instruction or course will be useful to me.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

33. I could not understand quite a bit of the information in the content of the course or instruction.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

34. The good organization of the content helped me be confident that I would learn this material.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

35. It was a pleasure to work in such a well-designed instruction.
- Almost always true
- Often true
- Generally true
- Occasionally true
- Almost never true

Section II: Background Information

1. Have you taken computer-based or Web-based learning courses before? ❑ YES ❑ NO

2. Why did you take this e-learning course?

   ❑ I had to take this e-learning course

   ❑ It was mandatory to take a course, but I chose this course voluntarily

   ❑ I attended the e-learning course voluntarily.

3. What would enhance this learning experience?

4. What additional content would you like to see developed in the future?

Student's Name: _____

Class: _____

School: _____

Group: ❑ F.I ❑ F.D

Thank you for your contribution in this important research!

Appendix D

FOREWORD

Secondary School Integrated Curriculum bears our true and only wish, in line with the objectives of the National Education Philosophy. This curriculum revision is to establish the Education Act, meet the National Education Philosophy spirit, and to prepare the Nation in facing the education challenges in the 21st century.

Each pupil has his own individual abilities and learning method. A different and suitable teaching and learning approach should be used to help each pupil achieve his learning objectives. The knowledge transfer process and skill mastery in every field learnt can take place effectively if the correct and suitable teaching and learning method is used.

This is the challenge in teaching profession, where teachers have to be wise in choosing and using a suitable approach to ensure the teaching and learning process take place effectively.

This Business Management Subject Syllabus Manual is prepared for teachers to identify and use a suitable teaching and learning method in their efforts to help their pupils gain their knowledge and skills in business management field effectively. A mastery of principles and concepts in Business Management and emphasise on true values will help pupils to prepare themselves in being a responsible human being to manage businesses ethically and honestly.

The Ministry of Education wishes to thank every individual and institution for contributing their expertise, time and effort in producing this syllabus manual.

[Signature]
(HAJI IMRAN BIN IDRIS)
Technical and Vocational Curriculum Section
Technical Education Department
Ministry of Education, Malaysia

INTRODUCTION

Business Management is one of elective subjects for Form 4 and 5 in Secondary School Integrated Curriculum (KBSM) under the Professional Art Group. This subject can expand and improve the basic knowledge and skills learned in the Practical Skills at the Lower Secondary Level. Through this, the relevant true values and positive attitude will be able to be nurtured and enforced among the students.

This syllabus is formed based on a number of needs in Business Management education that exceeded the introductory level in order to:

i) develop the human resources and country through commerce;

ii) imbue true values and positive attitude in ensuring wellbeing through various commercial activities;

iii) know, understand and use the basic business principles and practices domestically and internationally;

iv) know and understand the use and usage of services that assist businesses;

v) expand knowledge and skills in business formally and informally; and

vi) identify job opportunities in commerce in hope of being able to make the decision wisely.

Hopefully, this Business Management subject will be able to meet the commerce education needs, not only in the commercial environment context, which is influenced by recent trends and developments, but also in efforts and commitments to provide students with a balanced and holistic general education from cognitive, psychomotor and affective aspects.

CURRICULUM ORGANISATION

The Business Management Curriculum was created based on trading and business practices that have been integrated into fifteen study topics. The said topics covered manufacturing, trading, business, business assistance, investment, business ownership, consumerism and business practice ethics areas. The teaching and learning approach beginning with concept understanding, existing knowledge as well as recent information development in the commercial world. This subject curriculum presentation is based on the concepts, rules and laws practiced in the actual business world.

The fact that commercial activities had, are and will continue to play a main role and an important contributor in economic development cannot be denied, particularly in creating various work opportunities and in generating income for individuals, society and country.

This syllabus is prepared after taking into consideration abilities and experience of the students, which are unique to its individual. Therefore, it is able to meet the needs of both upper secondary student categories, which are:

(i) The group of students who will leave school to be a part of the workforce, either as a self-employed or working for an employer; and

(ii) The group of students who will continue their formal education to a higher level, either in commercial field or other relevant fields.

This Business Management Subject will no longer emphasising only the theories or contents, but also put the practical exercises first, especially case studies to expand and enforce the students experience as well as skills in the commercial field. The infusion of true values are also emphasised in the hope to develop the appreciative attitude and to appreciate positive business practices.

THE SUBJECT PURPOSE

The Business Management subject aims to provide commercial education so that students know, understand and able to use the principles and positive practices in the business field and relevant services. This can assist students in becoming a responsible, forward-thinking, rational and wise citizen in any decision making, confident, independent and courageous in facing competition in any efforts they undertake with integrity and honesty as their foundation, for their own well being, family, society and country.

OBJECTIVES

The Business Management subject objectives are to enable students to:

(i) identify and describe the basic business structures and operations, domestic and international commerce;

(ii) know and understand the variety of sales methods in business;

(iii) know and understand the roles of Small and Medium Enterprises in manufacturing;

(iv) make a choice on the type of business ownership and the procedure to establish it;

(v) identify major investment opportunities in Malaysia and how to invest;

(vi) know and understand the importance and business assistance methods of assisting in the operation of certain businesses and consumers;

(vii) understand and evaluate ethics in business in the consumer protection aspect in order to create smart and rational consumers;

(viii) know and understand the importance of the government role in assisting businesses;

(ix) build the knowledge and basic skills as well as strengthen their interest for the purpose of continuing their commercial education in a higher level;

(x) identify work opportunities in commerce and to choose their profession wisely, either self-employed or working for an employer.

KBMS BUSINESS MANAGEMENT SUBJECT SYLLABUS SUMMARY

Contents		Time Allocation
1.0	**FOUNDATION FOR BUSINESS**	17
1.1	The human needs and wants	
1.2	Production	
1.3	Production factors	
1.4	Specialisation in production	
1.5	Barter system	
2.0	**ELEMENTS OF COMMERCE**	4
2.1	Commerce	
3.0	**DOMESTIC COMMERCE**	40
3.1	Domestic commerce	
3.2	Distribution channels	
3.3	Retail business	
3.4	Wholesale business	
3.5	Domestic commercial documents	
3.6	Sales methods	
4.0	**INTERNATIONAL COMMERCE**	16
4.1	International commerce	
4.2	Import, export and entreport businesses	
4.3	International commercial documents	

TOPIC 1: FOUNDATION FOR BUSINESS

LEARNING AREA/LEARNING UNIT	LEARNING OUTCOME	LEARNING ACTIVITIES SUGGESTIONS
1.1 Human needs and wants a. Needs definition b. Wants definition c. Maslow needs hierarchy 1.2 Production a. Production definition b. Types of production c. Branches of production 1.3 Production factors a. Land, labour, capital and entrepreneurs. b. Entrepreneurs and businessmen c. The roles of entrepreneurs 1.4 Specializations a. Specialization definition b. Specialization creation c. The effects of specialization in production 1.5 Barter system a. Barter system definition b. Barter system disadvantages	**Level 1** 1. Stating the definitions of: - needs - wants - production -barter system - production factors - specialization 2. Differentiate needs from wants 3. Illustrate the Maslow hierarchy of needs. 4. Identify production branches 5. Identify forms of specialization 6. Identify the disadvantages of Barter system. **Level 2** 1. Explain the needs higher priority compared to wants. 2. Explain the roles and contributions of entrepreneurs to the society and country. 3. Explain the effects of specialization in production. 4. Explain in details the disadvantages of the barter system. **Level 3** 1. Criticize barter system. 2. Interpret how needs and wants created production. 3. Making a mental image of the production activities basic structure.	Students list up examples of needs and wants. The Maslow Hierarchy of Needs model can be used in explanation. List up examples of production in forms of goods and services. List up business activities related to production branches. Study some of the production activities. Case study: Successful local entrepreneurs' profiles. Research: Choose a real localized situation that involves work specialization and business. Barter system simulation.

TOPIC 2: ELEMENTS OF COMMERCE

LEARNING AREA/LEARNING UNIT	LEARNING OUTCOME	LEARNING ACTIVITIES SUGGESTIONS
2.1 Commerce a. Commerce definition b. Business definition c. The relationship between production, commerce and business.	**Level 1** 1. Explain the definitions of commerce and business. 2. Explain types of business aid. 3. Categorizing the functions of business aid. **Level 2** 1. Explain with examples the relationship between production, commerce, business and business aids. 2. Explain in details the importance of business aids to the businesses. **Level 3** 1. Draw a flow chart of commerce elements. 2. Evaluate the requirements of a certain business aid to a certain business.	Prepare a flow chart of the commerce elements. Make a simple explanation based on a chart from the text book.

TOPIC 3: DOMESTIC COMMERCE

LEARNING AREA/LEARNING UNIT	LEARNING OUTCOME	LEARNING ACTIVITIES SUGGESTIONS
3.1 Domestic commerce a. Domestic commerce definition 3.2 Distribution channels a. Types of distribution channels 3.3 Retail businesses a. The roles of retailers in the distribution channel b. Types of retail business i. Small scale retailers ii. Large scale retailers iii. Retailing in other forms 3.4 Wholesale business a. The roles of wholesalers in the distribution channel b. Types of wholesale business i. Full function wholesalers ii. Limited function wholesalers iii. Agents and brokers c. Wholesalers functions takeover	**Level 1** 1. Explain the meaning of: - domestic commerce - retailers 2. Identify the functions of retailers and wholesalers. 3. State the types of retail business. 4. Explain the types of wholesale business. 5. Explain the forms of distribution channel. 6. Compare the retail business to wholesale business. 7. Identify other forms of retailing: - automatic vending machine - mail orders - franchise - direct selling - E-commerce - interactive television - catalog shop **Level 2** 1. Explain through examples the types of small and large scale retails. 2. Explain through examples the types of full and limited function wholesalers. 3. Explain in details the activities of agents and brokers. 4. Identify types of business that can takeover the functions of wholesalers. 5. Choosing the appropriate distribution channel in marketing the goods. 6. Explain in details the characteristics of small scale and large scale retailing. 7. Explain in details the characteristics of full and limited function wholesalers. 8. Explain using examples the characteristics of other forms of retailing. 9. Categorize and compare the types of retail business. **Level 3** 1. Evaluate the importance of wholesalers to the retailers and producers. 2. Criticize the roles of wholesalers.	Study on a retail shop operation. Complete the distribution channel flow chart. Surf the Internet to acquire webpages of commercial companies' webpages who are involved in e-commerce. A study to identify goods being marketed through wholesalers. Prepare a goods flow chart from producers to consumers. Generate ideas on how wholesalers control the flow of goods within a certain area. *Including cash and carry wholesalers as well as brokers. List types of goods the consumers and retailers obtained directly from producers.

LEARNING AREA/LEARNING UNIT	LEARNING OUTCOME	LEARNING ACTIVITIES SUGGESTIONS
3.5 Domestic commercial documents a. Documents involved before, during and after the transaction.	**Level 1** 1. List types of documents. 2. Identify the usage of domestic commercial documents. 3. Identify types of discounts, delivery terms and payment terms. **Level 2** 1. Calculate discounts, payment amount and commission. 2. Categorize types of documents according to the sequence of the business. 3. Explain in details the functions of each domestic commercial document. **Level 3** 1. Summarized the use of the documents in operating businesses.	Fill in and complete the domestic commercial documents. Draft domestic commercial documents. The production of business documents folio.
3.6 Selling methods a. Cash sale i. Cash sale definition ii. Advantages and disadvantages of cash sale b. Credit sale i. Credit sale definition ii. Types of credit sale - Hire purchase - Delayed payment iii. Advantages and disadvantages of credit sale c. Prepaid sale i. Prepaid sale definition ii. Advantages and disadvantages of prepaid sale d. Consignment sale i. Consignment sale definition ii. Advantages and disadvantages of consignment sale	**Level 1** 1. State the definitions of: - Cash sale - Credit sale - Prepaid sale - Consignment sale 2. List the advantages and disadvantages of each selling method. **Level 2** 1. Calculate the hire purchase interest, mark-up price, price margin and installment payment amount. 2. Explain with examples the practiced selling methods. 3. Explain in details the difference of each selling method. **Level 3** 1. Making a rational decision when selecting a selling method.	Explanations include comparing each method. Buying and selling transaction simulation suited to the product. A scrap book on products and selling method. Sale planning. Serving customers simulation.

TOPIC 4. INTERNATIONAL COMMERCE

LEARNING AREA/LEARNING UNIT	LEARNING OUTCOME	LEARNING ACTIVITIES SUGGESTIONS
4.1 International commerce a. International commerce definition b. The reasons for the existence of international commerce c. The importance of international commerce to consumers, producers and country 4.2 Import, export and entreport business a. Import, export and entreport business definitions b. Import and export procedures c. Obstacles in international commerce 4.3 International commercial documents a. Types of international commercial documents	**Level 1** 1. Explain the definitions of: - international commerce - import, export and entreport business. 2. Identify international commercial documents. 3. Explain the import and export procedures. **Level 2** 1. Explain in details the importance of international commerce. 2. Explain in details the comparison between domestic and international commerce. 3. Explain the difference in import, export and entreport activities. 4. Explain the obstacles in international commerce. 5. Explain the use of import and export documents. **Level 3** 1. Evaluate the implication of import and export on the country. 2. Suggest ways to overcome the problems in international commerce.	Visits to Importers and Exporters. Import and export procedure chart. Import and export business document folio. 1. Business documents: indent, export invoice, consular invoice, certificate of origin 2. Transportation documents: bill of lading, airway bill, 3. Insurance documents: insurance policy 4. Customs documents: customs declaration form 5. Payment documents: bill of exchange.

Appendix E

Newcastle University

21st May 2009

School of Computing Science
Newcastle University
Newcastle upon Tyne
NE1 7RU
Head of School
Professor P A Lee

To Whom It May Concern

Dear Sir,

CERTIFICATION OF RUNNING THE PILOT PROJECT

This is to certify that Mohd Hafiz Yusoff will run a pilot project within education institutions in Malaysia. This pilot project will take place from ***1st September 2009 till 30th October 2009.***

The main purpose of the pilot project is to obtain real data about usability and efficiency of the web-based constructivism approach to develop new knowledge among users.

A well-structured testing, evaluation and analysis process will be implemented during the specified period. However, the materials collection phase will begin a few months before the pilot project.

I hope that this provides sufficient information for you, but do not hesitate to contact me if anything is unclear.

Thank you.

Yours sincerely;

Dr Chris Phillips
Head of Supervisory Team
PhD Research Project for M.H.Yusoff

Senior Lecturer
School of Computing Science
Newcastle University
Newcastle upon Tyne, NE1 7RU
United Kingdom
Email: chris.phillips@ncl.ac.uk
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Selangor State Education Department
Jalan Jambu Bol, 4/3E, Seksyen 4,
40604 Shah Alam, Selangor.
Tel: 03-55166500 Fax: 03-55102133
http://www.moe.gov.my/jpnselangor

To;

Mohd Hafiz Yusoff
118 Dilston Road,
Newcastle upon Tyne,
NE4 5AB,
United Kingdom.

18 SEPTEMBER 2009

Dear Sir,

E-LEARNING PILOT PROJECT

Respectfully, your letter and our discussion on 3rd July, 2009 is referred.

2. We are happy to inform you that we do not have any problems in participating and assisting you to conduct this pilot project. However, because the year end examination period, which is around October 2009, we hope that this pilot project can be carried out after November 2009.

3. In addition, we also agreed to assist you in the following aspects;

i) Prepare and verify the content for the e-learning website being developed. The content will be modified according to the Ministry of Education syllabus and the agreed upon topics.

ii) Prepare and verify the proficiency test paper to students.

iii) Provide student groups selected randomly totalling approximately 150 students, from 2 schools in the vicinity of Ampang, Selangor. (a list of names of the students involved is enclosed)

iv) Provide basic equipments such as a computer lab, classrooms and lab assistant during the testing process.

v) Provide an instructor/teachers service who have the expertise in computerization and website application.

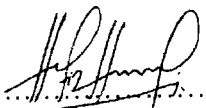
4. As agreed, we hope the outcome of this research can be shared for the purpose of improving our instruction and learning programme.

5. Finally, we hope this pilot project can be completed successfully, for our common benefit and interest. In addition, you may contact and inform us if there are any changes and requirements in this project.

Thank you.

"SERVING FOR THE COUNTRY"

Sincerely Yours,

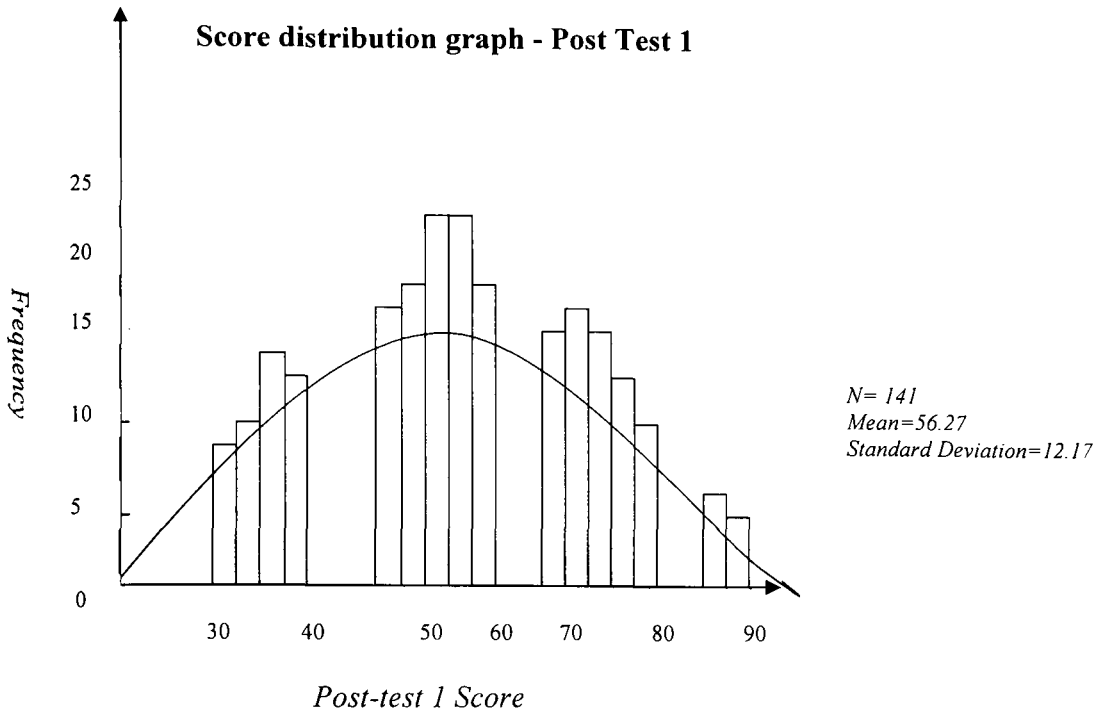


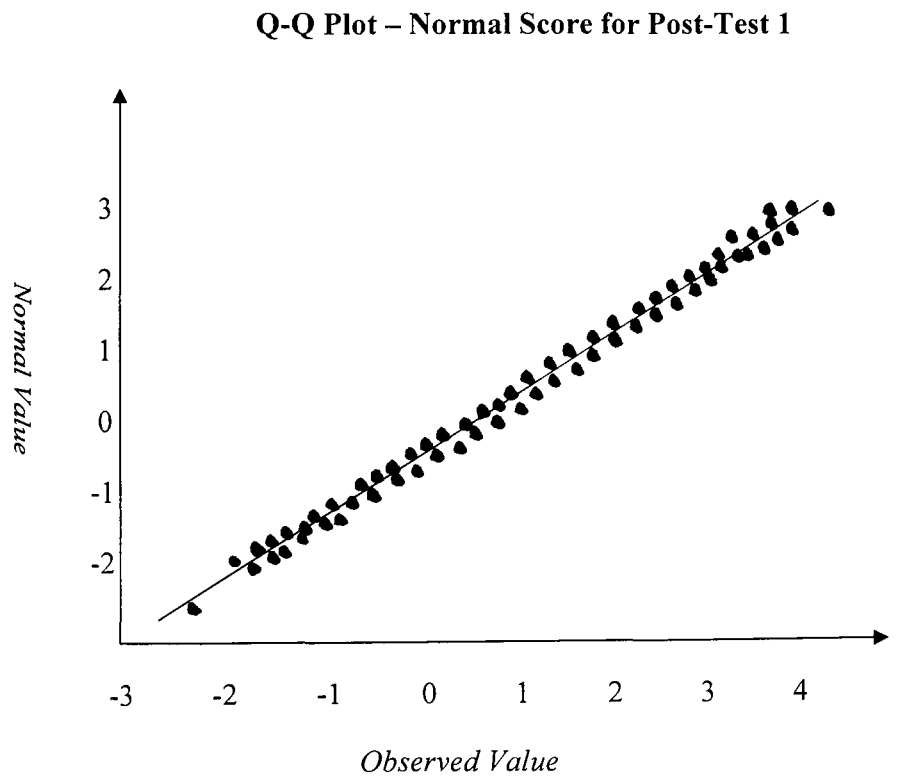
(NOR HARTINIE CHE ABDULLAH)
Co-ordinator
Pilot Project for Business Management E-learning,
Ampang Zone Region, Selangor.

Head of programme,
Business Management Subject,
District of Hulu Langat, Selangor.

Encl:
1) List of students, instructors and lab assistants.

Appendix F


Score distribution graph - Post Test 1
Frequency
25
20
15
10
5
0
30
40
50
60
70
80
90
Post-test 1 Score
N= 141
Mean=56.27
Standard Deviation=12.17


Q-Q Plot – Normal Score for Post-Test 1
Normal Value
3
2
1
0
-1
-2
-3
-2
-1
0
1
2
3
4
Observed Value