# THE EFFECT OF INSTRUCTIONAL DESIGN OF ENGLISH SUBJECT BASED ON COMPONENT DISPLAY THEORY ON STUDENT'S ACHIEVEMENT

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**By**

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## ABSTRAK

Kajian ini merupakan usaha untuk mengaplikasikan *Component Display Theory (CDT)* sebagai dasar pengetahuan tentang mereka bentuk pengajaran bertulis. Kajian in bertujuan untuk menyelidik pengaruh persembahan (pembentangan, penyampaian) sekunder ke atas; (1) pencapaian keseluruhan pelajar, (2) enam sasaran pembelajaran: *mengingat konsep, mengingat prosedur*, *mengingat prinsip* atau *hukum*, dan *menggunakan konsep, menggunakan prosedur,* dan *menggunakan prinsip,* (3) setiap tahap prestasi *mengingat* dan *menggunakan* secara serentak.

*CTD* merujuk kepada dua dimensi objektif pengajaran dan menyediakan "persembahan primer" dan "persembahan sekunder." "Persembahan primer" mencerminkan mesej pengajaran yang utama, yang mengandungi empat komponen strategi persembahan yang berdasarkan kedalaman dan kaedah persembahan. "Persembahan sekunder" mengembangkan lagi "persembahan primer" untuk menjadikannya lebih senang bagi pelajar-pelajar untuk menerima, memproses, dan merekodkan maklumat. *CTD* menetapkan bahawa bagi setiap objektif pengajaran akan ada satu kombinasi komponen strategi pengajaran "persembahan primer" dan "sekunder" yang berusaha untuk membolehkan pencapaian objektif pembelajaran. Skop kajian ini terbatas kepada penggunaan; (1) "persembahan primer" yang terdiri daripada hukum, contoh, mengingat, latihan, dan (2) "persembahan primer" bersama-sama dengan "persembahan sekunder" yang berkaitan hukum, contoh, mengingat, serta memberikan pengenalan dan maklum balas.

Populasi kajian ini adalah pelajar tahun dua Sekolah Menengah Umum di Bekasi, Jakarta Timur, Indonesia. Sampelnya terdiri daripada 342 responden yang dipilih mengikut kaedah pensampelan rawak. Analisis kuantitatif menggunakan analisis kovarians (ANCOVA) dan analisis varians multivariat (MANCOVA) telah digunakan untuk menganalisis data. Soal selidik telah digunakan untuk mengumpul maklumat tentang motivasi intrinsik akademik pelajar-pelajar, manakala ujian soalan aneka pilihan telah digunakan untuk mengukur pencapaian pelajar.

Dapatan daripada analisis ANCOVA menunjukkan; (1) pelajar-pelajar yang diajar menggunakan "persembahan primer" bersama-sama "persembahan sekunder" memperoleh skor pencapaian purata yang lebih tinggi dalam pencapaian keseluruhan mereka daripada pelajar-pelajar yang diajar menggunakan "persembahan primer" semata-mata, dan (2) penambahan "persembahan sekunder" telah meningkatkan pencapaian pelajar terhadap sasaran pembelajaran berkaitan *mengingat konsep*, *menggunakan konsep* dan *menggunakan prosedur*. Pencapaian pelajar untuk sasaran pembelajaran *mengingat prosedur*, *mengingat prinsip*, dan *menggunakan prinsip* tidak mengalami peningkatan.

Dapatan daripada analisis MANOVA menunjukkan; (1) perbezaan yang signifikan tahap prestasi bagi *mengingat* dan *menggunakan* (secara serentak), berbezaan bererti di antara pelajar-pelajar yang diajar menggunakan "persembahan primer" bersama-sama "persembahan sekunder" dan mereka yang diajar menggunakan "persembahan primer" sahaja kelihatan hanya pada sasaran pembelajaran *mengingat konsep*, tidak pada sasaran pembelajaran *mengingat prinsip*, dan (2) perbezaan bererti telah dikesan pada sasaran pembelajaran *menggunakan konsep* dan *menggunakan prosedur*, tidak pada sasaran *menggunakan prinsip*.

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## ABSTRACT

This study constitutes an attempt to apply the Component Display Theory (CDT) as a knowledge base on designing written instruction. It aims to investigate the effect of "secondary presentation" on; (1) students' overall achievement, (2) the six learning targets: *remember concept, remember procedure, remember principle* or *rule,* and *use concept, use procedure, use principle,* (3) each level of performance of *remember* and *use* simultaneously.

CDT refers to two dimensions of instructional objectives and provides "primary" and "secondary presentations." The "primary presentation" reflects the main instructional messages comprising four components of presentation strategies based on the depth and the method of presentation. The "secondary presentation" elaborates the "primary presentation" to make it easier for learners to receive, process, and record the information. CDT postulates that for every instructional objective there is a combination of instructional strategy components of "primary" and "secondary presentations" that effectively strive for the achievement of the learning objectives. The study limits its scope to the use of (1) "primary presentation" consisting of rules, examples, recall, and practice, and (2) "primary presentation" with "secondary presentation" consisting of rules, examples, recall, practice, and giving introduction and feedback.

The population of this study are second year students of Public Junior High School in Bekasi, Eastern Jakarta, Indonesia. The sample consists of 342 respondents, selected by random sampling. Quantitative analysis using Analysis of Covariance (ANCOVA) and Multivariate Analysis of Variance (MANOVA) was used to analyse data. Questionnaires were administered to gather information on student's academic intrinsic motivation, while multiple choice questions test were used to measure the students' achievement.

The ANCOVA finding showed; (1) students taught using "primary presentation" together with "secondary presentation" obtained higher mean gain scores on overall achievement than those taught using "primary presentation" only, and (2) the addition of the secondary presentation increases students' achievement on learning targets of *remember concept, use concept* and *use procedure*. No increases were observed in students' achievement for the learning targets of *remember procedur*e, *remember principle*, and *use principle*.

The MANOVA finding showed; (1) based on the level performances of *remember* and *use* (simultaneously), the significant differences between students taught using "primary presentation" together with "secondary presentation" and those taught using "primary presentation" were observed only on the learning targets of *remember concept*, *remember procedure*, not on learning target of *remember principle*, and (2) the significant differences are found on learning target *use concept* and *use procedure*, not on learning target of *use principle*.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background of the Study

In accordance with the Educational Law Number 20, National Education Department (Depdiknas, 2003) which was formed in relation to the National Educational System, declared that the development of the educational system was an effort to enlighten the nation as well as to improve the quality of the human resource in Indonesia, for the purpose of realizing a just and welfare society. It also aims to make it possible for the people of Indonesia to develop, both in terms of physical and mental aspects, based upon the five basic Indonesian principles (Pancasila) and the 1945 Constitution. Thus, it is manifested that the endeavour to achieve a better quality of human resources that can only be realized through advancement in education.

In the government regulation Number 28, Education and Cultural Department (Depdikbud, 1991) mentioned that primary education seems to be very important in providing knowledge to students, shaping their attitude, and preparing them with the basic skills required for their survival in the society, apart from preparing students to meet the requirements necessary to proceed to the secondary level of education. The Indonesian primary education was designed with two main goals: (a) as a preparatory step towards secondary education, and (b) as a preparatory stage to live in the society, among others, for the preparation of earning a living, in the case of those who do not wish to continue pursuing formal education. In relation to the second

goal, primary education is also expected to contribute or help in the development of students' self-respect and help them create a better quality of life in the future.

In achieving the above mentioned goals, mastery of English is necessary (Sipay, 2006). This is a prerequisite to the development and advancement of students' ability to cope with the rapidly changing technology in the market place and to enable them to utilize their skills and talents in various fields and disciplines. To implement this task, the Indonesian government decided that English language should be taught as the first foreign language in the classroom and that it should be made a compulsory subject to be studied in Indonesian schools from the level of junior high school and senior high school up to the university level (GBPP, 2004).

The objective of the English education in the junior high school (SMP) is to provide the students with the basic knowledge of reading, speaking, writing, grammar, and the mastery of a sufficient number of vocabulary (more or less 1000 words). As stated in the English language curriculum, the six core English language skills are reading, vocabulary, structure or grammar, dialogue, integrated writing and pronunciation (Depdiknas, 2004).

With respect to the speaking skills, Warriner (2001) described that speaking constitutes making a sentence that comes from a group of words to form a unitary meaning, sentence or word order that is used by everyone to communicate. Warriner explained further that a sentence should consist of a subject, a predicate, and a complement. According to its structure, a sentence may be classified into four types as follows:

1. A simple sentence which has one main clause and no subordinate clause.
2. A compound sentence which has two or more main clauses, but no subordinate clause.
3. A complex sentence that has one main clause and one or more subordinate clauses.
4. A compound-complex sentence that contains two or more main clauses and one or more subordinate clauses.

From the explanation mentioned, to be able to communicate effectively, it is necessary for the students to understand and master the structure of the language. At the same time, if these skills can be studied by students, it means that their ability to master the grammar skills for communicative ability can be achieved. Thus, This study is concerned with the effectiveness of the grammatical skills in the formation of sentences.

The 1994 curriculum for primary and secondary education was transformed into the 2004 curriculum covering all subjects. This took effect as of the 2004/2005 school year. Generally speaking, this curriculum change applies to all school subjects, be it totally or partially. Initially this change was a direct consequence of the passing of law number 2 of the year 1989 pertaining to the National Educational system, which calls for the review and reorganization of the National Education System, requiring all relevant aspects of the curriculum to be reviewed.

The English curriculum of secondary education underwent a total transformation in both content and the organization of materials (Maskur, 1996). The

Competency Based Curriculum suggests that the function of the teacher in the teaching and learning process is strategic and decisive. The teacher dictates the depth and the width of learning materials, and enjoys a creative role, unlike that in the 2004 English curriculum of junior high school. This places the responsibility on the teacher to gather their own learning materials and to choose appropriate techniques. Based on the 2004 curriculum, the teaching and learning process requires the teachers to (a) master the learning material, (b) design a learning program, (c) execute the program, and (d) evaluate learning results. However, a problem encountered in every educational reform does not lie on the planning aspect, but with the execution of the plan.

As the English curriculum of secondary education has changed in both the content and the organization of the materials, innovation in the curriculum constitutes an educational reform. The implementation of the 2004 curriculum involved several aspects such as teachers' readiness, the value system, interaction of perceptions, facilities, and infrastructure. Among all these, the teacher's factor was the most important element which required greater emphasis (Davis, 2009). Teacher's unreadiness leads to the curriculum being improperly interpreted; consequently, the utilization of the curriculum would be dictated by the teacher's own interpretation, which would then lead to a weakness in the implementation.

The English curriculum for the junior high school only contained the teaching objectives and did not contain the material presentation. Therefore, it was necessary to examine what teachers' needs were in an effort to translate this curriculum into a teaching program. In the implementation of the 2004 curriculum, teachers were then

required to be able to design their own teaching. Thus, to improve the quality of teaching, the teachers were required to have relevant knowledge in designing their own instruction (Dennis et al., 2000). Ultimately, the purpose of instructional design is to improve the quality of teaching. This is accomplished by selecting, determining and developing optimal instructional methods so as to obtain the desired learning outcomes. An instructional design with a set of combined components of strategies would enable teachers to develop their creativity which is important for the teachers in upgrading their quality of teaching.

The quality of learning acquisition is a sign of the effectiveness of instruction. The more effective the instruction is, the higher would be the quality of the acquisition of learning (Reigeluth, 2009). Therefore, based on the quality of learning acquisition, the urgent need for improved instructional effectiveness becomes apparent.

There are two variables that affect the effectiveness of instruction, namely, the condition and the method. The instructional condition variable cannot be manipulated and, therefore, must be accepted as such by the instructional designer. On the other hand, the method variable can be manipulated. Therefore, the instructional designers should give their attention in connection with the efforts to improve the quality of the learning acquisition by focusing on improving the instructional method. There are three components of the method, namely, organizational strategy, delivery strategy, and management strategy (Reigeluth, 2009).

Organizing instructional strategy is an approach method component to organize the learning contents. The strategy can be divided into two levels: macro and micro. The macro-level organizing strategy, which is also called structural strategy refers to how to select, sort, synthesize, and summarize a number of content-related field of study. Meanwhile, the micro-level organizing strategy, also known as the presentation strategy, refers to how to combine and sort the components of the strategy presented in connection with the contents of the field units of study to achieve specific objectives (Reigeluth, 1999).

Components of presentation strategy have been developed to facilitate students to receive, manage, and store information. For example, Smith et al. (2005) has developed mathemagenic information, which is a form of guidance that helps students understand new knowledge or acquire new skills. Forms of exercises and optimal feedbacks have also been developed by Davis (2009). However, all of these are still disconnected. To obtain the optimal learning requires a combination of effective, efficient, and attractive components of the strategy. This is the concern of instructional science (Branch, 2007).

In terms of the purpose of learning English in junior high school, there is one question that needs to be answered. Is the learning process that was developed based on Component Display Theory (Merrill, 1999), capable of reaching the highest achievement of these goals?

Theoretically, the advantages of Component Display Theory (CDT), can support the achievement of learning objectives. The ability of CDT to present the

content of lessons in effective, efficient, and attractive manner according the type of learning objectives, will greatly help students achieve a full understanding of each of the learning contents. Learning developed using the CDT will escort students to understand the concepts, procedures, and principles more clearly, so that it will strengthen students' knowledge structure in understanding the lessons. For that, the presentation of each learning objective, with a view to clarify students' understanding, should be emphasized using the components of secondary presentation.

As a microstrategy, CDT does not lead students to understand a single goal in each type of learning that is disconnected from other learning objectives. Microstrategy is intended for each learning goal to be achieved. As emphasized by Merrill et al., (1997), "...there are different kinds of instructional strategies to promote these different necessary kinds of learning outcomes."

## 1.2 Statement of the Problem

The teachers may encounter many problems when designing their lessons: (a) the scope of learning material, which have been prescribed based on the specific objectives, and (b) the students who bring a set of attitude, current ability, and other individual characteristics into the learning situation. It means that each student in one class has different learning style. Thus, the English curriculum for the junior high school should only contain the subtopic of materials based on the specific objectives and should not contain the complete material presentation style, basic knowledge, and motivation. Thus, the teacher will only be able to manipulate learning strategies and methods under restrictions posed by his students' characteristics, learning

objectives as well as the students themselves. Reigeluth (1999) argued that in principle, it is the teaching method that provides rooms for manipulation by the teacher, and the instructional designer agrees upon this claim.

Furthermore, Gregory and Chapman (2007) stated that a learning outcome requires a certain learning condition. In line with this, Gagne et al. (2005) stated that often, a certain teaching method is only suitable for a certain teaching and learning materials under a certain condition. It means that to learn a different type of content under another condition, the teacher may need a different instructional method.

Nowadays, many Indonesians realize that it is beneficial to acquire the ability of learning English, which is considered an international language, to get better jobs or to further their study. Nevertheless, most of them are frustrated when they find that learning English is not that easy. This is because the grammar of the English language is very different from that of the Indonesian language, apart from other differences such as in pronunciation, writing, and reading. Therefore, Indonesians are faced with the challenge of finding solutions so that learning the English language is not perceived as difficult by students.

The mastery of English in SMP and SMA (Junior and Senior High School, respectively), which was mostly measured based on grammatical proficiency through multiple choice question test, is still far below the stated target. According to the reports on the results of EBTANAS (National Final Exam) of SMP in the school year of 2008/2009, English was among the subjects registering the worst results (Kompas, 2009). According to the EBTANAS data for East Jakarta, the average score for

English for the 2008/2009 school year was 4.60 (0 – 10 scale) among a population of 2500 students coming from 28 schools. The latest data of SMP "pure grade" (NEM) for the 2008/2009 school year for Jakarta Special District was recorded at 5.64.

These data suggest that the student's mastery of English at both SMP and SMA, was very unsatisfactory; yet they are the ones about to continue their study at the University level. Meanwhile, even those who are already at the University also faced difficulty understanding English, whereas English references remain the main resource of various kinds of knowledge. Those who dropped out of University education also faced difficulty to communicate in English at their workplaces (Syahbana A. 1990).

Indonesia, like other developing nations, has faced the same problems in the implementation of its educational reform (Arief, 2004). The problems are related to the execution of educational policy in terms of management and methodology. The general problems are built in the educational system and management, as well as the practice of wrong methodologies in education. These have resulted in the ineffective teaching. The following problems particularly deserved to be mentioned:

1. **Achievement in education is only measured through acquisition of knowledge.**

Most of the time teachers are more concerned with the transfer of knowledge and do not stress the importance of moral values which could shape the formation of student personality. Thus, the use of examination grade is the only means in measuring educational achievement.

An educational process is a transfer of knowledge, attitudes, and skills. Achievement in education should emphasize on attitudes and skills development as well as knowledge acquisition. As a consequence, in the teaching of English, teachers only teach English to fulfil the process of knowledge acquisition, emphasizing more on grammar, rather than fulfilling the aspect of a skill acquisition emphasizing on speaking and writing involving culture of the language taught.

**2. Students are treated as the object rather than the subject of teaching.**

Most of the time, the teacher and his teaching materials are the focus during teaching and learning, while the students are considered as objects. Moreover, student's personality is not taken into account in the teaching and learning process, where rightly, they should be the centre of the teaching and learning process. Therefore, student's imagination, innovation, and creativity are not evaluated; and teachers would just focus on student's achievement. Besides, students' learning styles are not given proper recognition. Students are assumed to have the same ability, interests, and the same learning styles as well as motivation.

**3. Educational process is focused on the teaching process which is not relevant to the real world.**

Learning materials and skills provided to the students do not match the learning needs of students and they do not respond to the world of work, so that there is no link between education and the world of work. Hence, in teaching of English, teachers should provide learning materials that meet the student's learning needs and interest, as well as those that conform to the world of work.

4. **Mastering of knowledge is processed mostly on theories and less on the enjoyment of learning so that students are not well-motivated.**

Teachers concentrate on teaching theories as part of knowledge acquisition and request the students to memorize them. Therefore, in the teaching of English students are drilled to remember the sentences, while having to memorize the sentences without the teacher providing them with contextual learning, for which students could see the real situation where English is used. Students are not motivated to learn because they are removed from real life situation.

5. **The management of education emphasized that the responsibility of education lies with the government rather than with members of the community and stakeholders, such as parents, teachers, and the students themselves.**

The government always involves itself too much in the school management as well as in the final examination, in spite of the fact that the new law of education has placed the school within the responsibility of its own community. In the teaching of English, the school together with parents and the community should identify what to be achieved in learning English, what is the best method to achieve it, and how it could be achieved, especially in looking for partnership within its community or outside community to achieve its objects.

In response to Ariel's recommendations, there should be some changes and innovation in the educational policy and system to make teaching more suitable to the learner's needs using the best possible approaches. It is well recognized that

teachers are the most important agent of change that would take up this challenge (Maher et al., 2001).

However, one of the constraints faced by the teachers in producing an effective instructional method or instructional model is the fact that the teacher often encounters the lesson material with a very complex scope. This may make it difficult for the teacher to structure and develop instructional materials carefully based on the lesson's objectives. Structuring and developing instructional material in accordance with the instructional target is not an easy task. It requires basic knowledge about instructional design. Unfortunately, the ability of the teacher to design and implement the curriculum is far from satisfactory (Gustafson et al., 2002).

A study revealed that the insufficient success in learning, especially in learning English (that is currently being taught as a foreign language at junior high school) is not so much because of its ineffective instruction in schools, but is more due to the lack of understanding of the teachers in preparing their lesson materials for the teaching and learning process (Pratitis, 1994). The experience of the researcher in teaching the subject of "English Lesson Planning" at the English Department of Faculty Teaching and Educational Science of As-Syafi'iyah Islamic University Jakarta and Islamic Faculty of Jakarta Islamic University found that in designing instruction, 90% of the students (who were already English Teachers at SMP and SMA) still do not grasp the way to organize instructional materials prescribed in the curriculum. In fact, the teacher plays a very important role in the success of the learning process; this is because the main function of the teacher is to design, to manage, and to evaluate teaching (Morrison et al., 2009), apart from the teacher also

being responsible for the transferring a set of organized knowledge to the student's knowledge system (Demsey et al., 2007).

The success of the aforementioned idea is related to the ability of teachers to design his teaching presentation. Therefore, it is necessary for the teacher to have scientific knowledge that can be used in designing instruction. It is known that the nature of educational technology is the use of scientific knowledge in solving the problems of education (including instructional design problem). Thus, it is necessary that teachers should have the foundation of scientific knowledge. Without referring to the domain of this scientific knowledge, the efforts to improve the teaching will be running with an intuitive approach as well as based on trial and error through experience, with results far from satisfactory (Fink, 2003).

Based on the problems already stated previously, the conclusion is that knowledge of instructional design is vital for teachers. Gustafson et al. (2002) stated that the knowledge of instructional design, which is focused on what should be done by teachers, could be used as an effective way to solve problems in educational practice. Clearly, the aim of educational technology is to solve educational problems (such as problem of the instructional design). Thus, the basic knowledge about instructional science is a basic requirement.

In teaching, there is an approach known as the Component Display Theory (CDT) which is both a theory and a set of guidelines in designing an instruction (Reigeluth, 1999). CDT instructional design is the most complete and comprehensive presentation compared with other similar presentations based on instructional

theories (Snelbecker, 1999). As a series of guidelines, CDT proposed to present a series consisting of combinations of instructional presentation strategy components, which makes it possible for teachers to achieve their learning objectives optimally.

Merrill and Tennyson (1997) had developed the Component Display Theory (CDT) in the field of instructional theory. According Reigeluth (2000), CDT is the most comprehensive instructional theory. In terms of theory, this level of comprehensiveness makes the CDT superior to other instructional theories.

A valuable characteristic of CDT is in its high ability and accuracy in achieving learning objectives. Through an accumulation of the mastery of a number of learning targets, which are carefully designed, students will be assisted in thinking systematically and critically in facing a social phenomenon. In addition, through instructional programme developed through CDT, teachers will be guided in selecting and utilizing the appropriate method.

It is expected that the instructional programme developed using the CDT can enhance the quality of instruction, narrow the discrepancy between demand of curriculum 1994 and teacher's ability, and especially prevent the teacher from selecting or utilizing other teaching methods. Theoretically, CDT possesses a number of advantages that could overcome those problems that have already mentioned. This study will look into the effectiveness of instructional programmes for the teaching of English that has been designed using the principles of CDT.

## 1.3 Purpose of the Study

The purpose of this study is to develop instructional materials for the English instruction based on CDT and to examine whether the instruction based on Component Display Theory can enhance the student's achievement. The examination is carried out by comparing the effect of Primary presentation together with Secondary presentation and with only the Primary presentation.

## 1.4 Research Objectives

With this purpose in mind, the objectives designed for this study are as follows:

**Objective 1:**

To examine the effect of "Primary presentation" together with "Secondary presentation" compared with that of "Primary presentation" only in enhancing students' opportunities to achieve better learning results, with student's motivation as covariate.

**Objective 2:**

To examine the effect of "Primary presentation" together with "Secondary presentation" compared with that of "Primary presentation" only in enhancing students' achievement of *remember concept, procedure and principle*, with students' motivation as covariate.

**Objective 3:**

To examine the effect of "Primary presentation" together with "Secondary presentation" compared with that of "Primary presentation" only in enhancing

students' achievement of *use concept, procedure and principle,* with students' motivation as covariate.

**Objective 4:**

To examine the effect of "Primary presentation" together with "Secondary presentation" compared with the effect of "Primary presentation" only in enhancing students' achievement of *remember and use concepts* simultaneously, with students' motivation as covariate.

## 1.5 Research Questions

This study is conducted to address these Research Questions:

**Research Question 1:** Related to Research Objective 1

Is there any significant difference between the overall achievement of students who were taught using the "Primary presentation" together with "Secondary presentation" and the overall achievement of students who were taught using only "Primary presentation," with students' motivation as covariate?

**Research Question 2**: Related to Research Objective 2

Do students who were taught using "Primary presentation" together with "Secondary presentation" obtain significantly higher achievement on learning target of *remember concept* than students who were taught using only "Primary presentation," with students' motivation as covariate?

**Research Question 3:** Related to Research Objective 2

Do students who were taught using "Primary presentation" together with "Secondary presentation" obtain significantly higher achievement on learning target of *remember procedure* than students who were taught using only "Primary presentation," with students' motivation as covariate?

**Research Question 4:** Related to Research Objective 2

Do students who were taught using "Primary presentation" together with "Secondary presentation" obtain significantly higher achievement on learning target of *remember principle* than students who were taught using only "Primary presentation," with students' motivation as covariate?

**Research Question 5:** Related to Research Objective 3

Do students who were taught using "Primary presentation" together with "Secondary presentation" obtain significantly higher achievement on learning target of *use concept* than students who were taught using only "Primary presentation," with students' motivation as covariate?

**Research Question 6:** Related to Research Objective 3

Do students who were taught using "Primary presentation" together with "Secondary presentation" obtain significantly higher achievement on learning target of *use procedure* than students who were taught using only "Primary presentation," with students' motivation as covariate?

**Research Question 7:** Related to Research Objective 3

Do students who were taught using "Primary presentation" together with "Secondary presentation" obtain significantly better achievement on learning target of *use principle* than students who were taught using only "Primary presentation," with students' motivation as covariate?

**Research Question 8:** Related to Research Objective 4

Is there any significant difference in achievement on learning targets of *remember concept, procedure* and *principle* simultaneously, between students who were taught using the "Primary presentation" together with "Secondary presentation" and students who were taught using only "Primary presentation," with students' motivation as covariate?

**Research Question 9:** Related to Research Objective 4

Is there any significant difference in achievement on learning targets of *use concept, procedure* and *principle* simultaneously, between students who were taught using the "Primary presentation" together with "Secondary presentation" and students who were taught using only "Primary presentation," with students' motivation as covariate.

## 1.6 Research Hypotheses

This research was conducted to compare two types of presentation strategies, first, the "Primary presentation" together with "Secondary presentation" and second, "Primary presentation" only. Two types of learning acquisition will be observed: first, the students' level of performance, that is, *remember and use*, and second, the

level of content delivered, that is, *concept, procedure, and principle*. Both of this learning acquisition is taken as indication of the effectiveness of both types of presentation strategies. In this study, the covariate (students' motivation) is not in any way influenced by the treatments. To achieve this, the covariate was measured before the treatments, so that it would not be influenced by the treatment.

Research study finding had confirmed that the use of different presentation strategies can lead to differences in the acquisition of learning outcomes (Dick et al., 2004). Therefore, the acquisition of learning outcomes of students who are taught with different presentation strategies based on the CDT is expected be different.

The effectiveness of "Primary presentation" together with "Secondary presentation" in improving the learning outcomes have been supported by theoretical studies and research findings (presented in Chapter 2). Therefore, it underlies the formulation of hypotheses of this study.

The research null hypotheses of this study are listed as follows:

**Hypothesis 1** ($H_0$ 1):

Students who were taught using "Primary presentation" together with "Secondary presentation" would not obtain significantly higher overall achievement than those who were taught using only "Primary presentation," with students' motivation as covariate.

**Hypothesis 2** ($H_0$ 2):

Students who were taught using "Primary presentation" together with "Secondary presentation" would not obtain significantly higher achievement on learning target of *remember concept* than those who were taught using only "Primary presentation," with students' motivation as a covariate.

**Hypothesis 3** ($H_0$ 3):

Students who were taught using "Primary presentation" together with "Secondary presentation" would not obtain significantly higher achievement on learning target of *remember procedure* than those who were taught using only "Primary presentation," with students' motivation as covariate.

**Hypothesis 4** ($H_0$ 4):

Students who were taught using "Primary presentation" together with "Secondary presentation" would not obtain significantly higher achievement on learning target of *remember principle* than those who were taught using only "Primary presentation," with students' motivation as covariate.

**Hypothesis 5** ($H_0$ 5):

Students who were taught using "Primary presentation" together with "Secondary presentation" would not obtain significantly higher achievement on learning target of *use concept* than those who were taught using only "Primary presentation," with students' motivation as covariate.

**Hypothesis 6** ($H_0$ 6):

Students who were taught using "Primary presentation" together with "Secondary presentation" would not obtain significantly higher achievement on learning target of *use procedure* than those who were taught using only "Primary presentation," with students' motivation as covariate.

**Hypothesis 7** ($H_0$ 7):

Students who were taught using "Primary presentation" together with "Secondary presentation" would not obtain significantly higher achievement on learning target of *use principle* than those who were taught using only "Primary presentation," with student's motivation as covariate.

**Hypothesis 8** ($H_0$ 8):

Students who were taught using "Primary presentation" together with "Secondary presentation" would not obtain significantly higher achievement on learning target of *remember concept, remember procedure* and *remember principle* than those who were taught using only "Primary presentation," with students' motivation as covariate.

**Hypothesis 9** ($H_0$ 9):

Students who were taught using "Primary presentation" together with "Secondary presentation" would not obtain significantly higher achievement on learning target of *use concept, use procedure* and *use principle* simultaneously than those who were taught using only "Primary presentation," with students' motivation as covariate.

## 1.7 Conceptual Framework

In the science teaching, there is a theory of instruction which, according to Driscoll (2007), was developed based on a blend of behaviouristic, cognitive and humanistic theories. Behaviouristic theory which was advocated by Skinner (1988) assumes that learning can be shaped by the environment through a series of habit-forming treatment. The structure of the learning process and what is going on in the student's brain is irrelevant with the effort to form behaviour. This point of view states that learning results are a new set of behaviour as a result of the stimuli habitually applied. The analysis on behaviour change provides the basis for the method of instructional design. The development of Component Display Theory adopts this principle of instruction, such as the use of the feedback and reinforcement strategies.

Cognitive theory refers to an effort to promote learning process, besides focusing on the output of the process. Driscoll (2007) had also emphasized the improvement of cognitive capability as an instructional objective. These theories proposed the instructional method, which is especially focused on the development of the learning process instead of focussing only on the learning result. They also assumed that the instructional method can be manipulated such as to activate or develop cognitive capabilities. Mayer et al. (2003) states that instructional technique and media can be utilized to activate or develop learner’s internal learning process. In this domain, Component Display Theory adopts the utilization of presentation strategy component that refers to the effort to increase internal process.

In humanistic theories, the student's characteristic plays a very important role on the process as well as the result of learning. The instructional method should ideally refer to the student's characteristic such as motivation and focus on the individual differences of learners. Learners ideally should be able to manage their own learning activities. They can decide what, when, and the reason why they learn something. This learning control is a special section developed by Merrill (2000), in the Component Display Theory.

The conceptual framework developed as a guideline in this study was designed based on the theory of Component Display Theory (Merrill et al., 1994). The reason for using CDT as knowledge in written design instruction and written arrangement (in this research, the written design instruction is called "lesson material") is based on the appropriateness between the CDT model and the characteristic of structured activity, as set out in the following paragraph.

First, learning content on the certain time of structured activity can be part of the topic; it can be in the form of microlevel. That upgrades the organization to be features of special CDT model. Second, lesson topic on the structured activity can be in form of knowledge in cognitive domain. This idea goes along with the CDT model Third, the CDT model tends to focus on written instructional design for self-study. This idea goes along with the ideas proposed in this research. Fourth, the CDT model proposed an instructional design which would be easier for teacher to apply in the classroom.

CDT presents a theory which is related to the principles of instructional design, which includes an activity to choose and find the appropriate combination of an optimal presentation component strategy to support the learning activity. This is different from other instructional designs because CDT has several characteristics. First, there is taxonomy of instructional objective which not only refers to the level of performance, but also the type of content. Merrill et al. (1994) grouped the performance into three levels: remember, use, and find. Meanwhile Merrill et al. divides the type content into fact, concept, procedure and principle, as shown on Figure 1.1

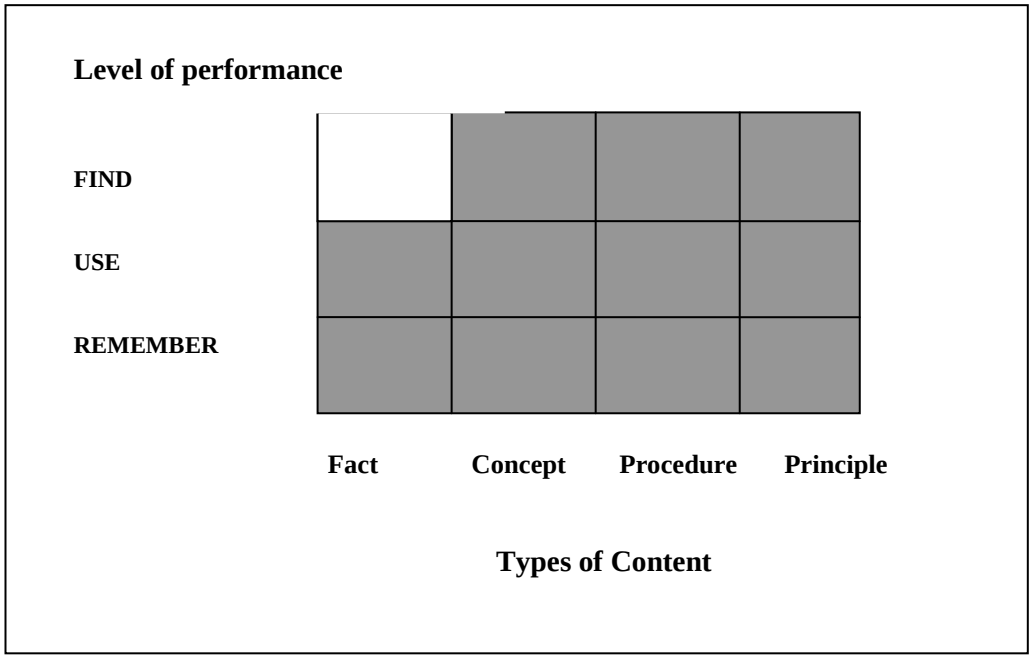


Figure 1.1 Performance-Content Matrixes

The matrix diagram in Figure 1.1 shows that content is related to level of performance and content type. This becomes the basis of instructional objective taxonomy model of CDT (in this research it is called learning target). Thus, the CDT model of learning's target is the aim of teaching, which refers to performance and

type of learning. How far can the CDT design increase the learning result? This is the main issue that shall be investigated in this study.

The second special characteristic of CDT model is related to instructional presentation taxonomy. CDT divided the presentation into two: primary presentation and secondary presentation. The primary presentation is the main strategy for delivering the learning content. It consists of four strategy component forms: (1) rules (expository presentation of generality), (2) examples (expository presentation of instances), (3**)** recall (inquisitory generality), and (4) practice (inquisitory instance). Secondary presentation forms include prerequisites, objectives, helps, mnemonics, and feedbacks.

This study proposes to demonstrate that the secondary presentation is an instructional design which enables teachers to differentiate the CDT from other instructional designs. The function of secondary presentation is to collaborate with the primary presentation in helping students to receive and process the information. The secondary presentation may consist of one or various combinations of secondary strategy component, such as feedbacks and introductions.

The third special characteristic of CDT model is that there is a correlation matrix between of learning target and type of instructional presentation component strategy. To enhance the optimal learning process, different learning targets need a different instructional condition (type of component instructional strategy).