A STUDY OF THE EFFECTS OF DIRECT INSTRUCTION AND INDIRECT INSTRUCTION ON STUDENTS' ACHIEVEMENT IN GEOMETRY

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Abstract

The main purpose of this study is to investigate the achievement differences in geometry between Grade Six students those who are taught by using indirect instruction and those who are taught by using direct instruction. It is an experimental research and the design adopted in this study was posttest only control group design. Yankin and South Okkalapa townships were randomly selected from four strata in Yangon City Development Area. One high school from each township was also randomly selected. The participants in this study were (120) Grade Six students and they were randomly selected from each school. Sixteen lesson plans and posttest were developed based on Chapter (7), Area and Volume, from Grade Six Mathematics Textbook Volume (II). Level of posttest items were based on the four levels of Bloom Taxonomy: knowledge, comprehension, application and analysis. During the study period, the experimental groups were provided instruction with indirect instruction and control groups were provided instruction with direct instruction. The duration of the study period was two weeks. The posttest scores were analyzed by using independent samples *t*-test to examine the differences in achievement result between experimental and control groups. The result of the study showed that there was a significant difference in the achievement in geometry between the experimental and control groups in each selected school. This finding pointed out that using indirect instruction is significantly better on students' achievement in geometry than using direct instruction. It can be suggested that teachers who teach geometry should use indirect instruction to improve in students' achievement result.

Keywords: Direct Instruction, Indirect Instruction, Achievement in Geometry

Introduction

Education is the basic part of everyone's life and it is required for holistic development of individual. The main objective of education is to bring behavioral change in terms of cognitive, skill and attitude and the purpose of teaching is to facilitate learning. All students do not learn the same way and they learn in various ways. Therefore, teachers should vary their use of instructional strategies in order to relate students' learning style and needs (Flender & Brent, 2005, cited in Kipper, 2011).

Students need to know how to turn formal instruction into solving real life problems. Geometry is a branch of mathematics and it has had a great importance in people's lives. Geometry helps students to acquire abilities such as making new discoveries, analyzing problems and making connections between mathematics and real life situations. To be effective in teaching geometry, the two most widely accepted instructional methods are direct instruction and indirect instruction.

Direct instruction is primarily teacher-centered. It is typically large-group, teacher-directed, highly structured expository teaching focus on academic content. The teacher is the major provider of information and the procedures of direct instruction are closely fit on the behaviorism (Borich, 2007). Indirect or experiential teaching is mainly student-centered and it includes approaches in which students dig out their own learning. It seeks a high level of students

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involvement in observing, investigating, drawing inferences from data and forming hypotheses. Borich (1990) stated that learning at the lower level of cognitive domain (knowledge, comprehension, application) relies heavily on direct instruction and the teaching functions associated with indirect instruction are applied in the context of higher level of cognitive domain (analysis, synthesis, evaluation). Although both methods can be used effectively in teaching geometry, there could be some differences in students' achievement result. Therefore, this study is mainly aimed to investigate the achievement differences in geometry between students who are taught by using indirect instruction and those who are taught by using direct instruction.

Aims

1. To investigate the achievement differences in geometry between Grade Six students who are taught by using indirect instruction and those who are taught by using direct instruction.
2. To give suggestions to improve teaching geometry based on the data obtained from the study.

Hypotheses

1. There is a significant difference in the achievement in geometry between students who are taught by using indirect instruction and those who are taught by using direct instruction.
2. There are significant differences in performing knowledge, comprehension, application and analysis level questions between students who are taught by using indirect instruction and those who are taught by using direct instruction.

Scope of the Study

- This study is geographically limited to Yankin and South Okkalapa Townships in Yangon City Development Area.
- No (1) Basic Education High School, Yankin and No (2) Basic Education High School, South Okkalapa are selected for this study.
- Participants in this study are Grade Six students from the selected schools in (2017 - 2018) Academic Year.
- This study is limited to the content area of Chapter (7), Area and Volume from Grade Six Mathematics Textbook Volume (II) prescribed by the Ministry of Education, Curriculum and Textbook Committee.

Definition of Key Terms

Direct Instruction: An instructional approach to teaching basic skills and sequential materials in which lessons are highly goal-directed and learning environments are tightly structured by the teacher (Arends, 2007).

Indirect Instruction: An instructional approach where a teacher plays a facilitator role with helping students to find out solutions by posing questions, guiding, indicating sources of information, sharing ideas and problems (Demoze, 2002).

Achievement in Geometry: The measure (scores) obtained on the geometry unit test constructed based on Bloom Taxonomy of Cognitive Domain.

Review of Related Literature

Theoretical Perspective of Learning

Behaviorism is a learning theory that only focuses on objectively observable behaviors and discounts any independent activities of the mind. Behavior theorists define learning as nothing more than acquisition of new behavior based on environmental conditions. They believe Learning is accomplished when a proper response is demonstrated following the presentation of a specific environmental stimulus.

Specific assumptions and principles of behaviorism in the teaching learning process are an emphasis on producing observable and measurable outcomes in students, pre-assessment of students to determine where instruction should begin, emphasis on mastering early steps before progressing to more complex level of performance and use of reinforcement to impact performance.

Constructivism is a theory of learning that equates learning with creating meaning from experience. Two permanent versions of constructivism are cognitive constructivism and social constructivism. Cognitive constructivist considered learning is the product of an internal cognitive activity and learners actively construct knowledge. Social constructivist viewed knowledge as the product of learning whereby individuals engage socially through conversations or shared problem-solving tasks and activities (Merriam, Caffarella & Baungartner, 2007, cited in Churchill, 2013).Constructivism puts the learner at the center of the educational stage. Constructivism asserts that knowledge cannot be handed from one person to another but must be constructed by each learner through interpreting and reinterpreting a constant flow of information. The learning environment encourages social networks and experiential opportunities where individuals are encouraged to make sense of information for themselves. In a constructivist classroom, the teachers build knowledge on students' prior knowledge and understanding, then carefully manage cues, penetrating questions, and instructional activities that challenge and extend the students' insight.

Bloom Taxonomy of Cognitive Domain

The taxonomy of educational objectives is a framework for classifying statements of what expect and intend students to learn as a result of instruction. Bloom Taxonomy of educational objectives has three domains: Cognitive domain (Knowledge), Effective domain (Attitude) and Psychomotor domain (Skill). Six major categories in the cognitive domain are knowledge, comprehension, application, analysis, synthesis and evaluation. The categories are ordered from simple to complex and lower to higher order types of thinking.

Knowledge is the ability to recognize and recall information. Comprehension includes the ability to translate or explain knowledge or information, to interpret it and to extrapolate it to new situations. Application is the ability to use the information. Once student can understand the information presumably they should be able to apply it. Analysis is the ability to divide the knowledge into component parts and see their relationships. According to Bloom, this skill includes analysis of elements, analysis of relationships and analysis of organizational principles. Synthesis is the ability to put the parts together to form new ideas. This level includes such skills as producing a unique communication, producing a plan or a proposed set of operations or deriving a set of abstract relations. The highest cognitive level of taxonomy, according to Bloom

is Evaluation. This includes the ability to make judgment according to internal criteria and external criteria.

Importance of Mathematics

The American Heritage Dictionary of the English Language (2000) defines mathematics as the study of the measurement, properties, and relationships of quantities and sets, using numbers and symbols. Mathematics is a leading logical science upon other sciences like Chemistry, Physics, Biology and Geography and it encompasses number sense, estimation skills, ability to analyze data intelligently, knowledge of two and three dimensional geometry and knowledge of probability.

Geometry is the part of mathematics and the study of the relationships among points, lines, angle, surfaces and solids. Geometry can provide a more complete appreciation of the world and it plays a key role in the study of other areas of mathematics. Problem solving skill is one of the major reason for studying mathematics and geometry can develop that skill. The function of the teaching geometry is to systematize the information received by the pupils from the nature and practical works. The emphasis will be on the understanding of fundamental concepts and techniques. Therefore, the objective of teaching geometry is not to teach the students to know geometry but rather to lead them to think geometry.

Teaching Strategies for Direct Instruction

Direct instruction is basically teacher-centered that usually serves to address large group of students. In this model, facts, rules and action sequences are presented to students in the most direct way possible. Direct instruction usually takes place presentation and recitation format with explanations, examples and opportunities for practice and feedback are provided by the teacher.

According to Borich (2007), direct instruction has the following six teaching strategies.

- Daily Review and Checking the Previous Day's Work
- Presenting and Structuring
- Guided Student Practice
- Feedback and Correctives
- Independent Practice
- Weekly and Monthly Review

Review and checking at the beginning of the lesson emphasizes the relationship between lessons, so the students remember previous knowledge and see new knowledge as a logical extension of content already mastered. Daily review and checking at the beginning of a lesson can be easily accomplished by instructing to correct each other's homework at the beginning of class, by identifying especially difficult homework problems in a question and answer format, by sampling the understanding of a few students who are good indicators of the range of knowledge and by reviewing the task- relevant information necessary for the day's lesson.

In Presenting and structuring, lesson must be served in small portions that are consistent with the previous knowledge, ability level and experience of the students. The key is to focus the material on one idea at a time and to present it so learners master one point before the teacher introduces the next point. Techniques for presenting and structuring new content include establishing part-whole relationship, identifying sequential relationship, finding combinations of relationship and drawing comparative relationship (Borich, 2014).

Guided students practice includes recalling from the structure of a lesson plan. The presentation of stimulus materials is followed by eliciting practice with the desired behavior. Prompting is an important part of eliciting the desirer behavior because it strengthens and builds learners' confidence by encouraging them to use some aspects of the answer that have already been given in formulating the correct response (Gagne et al., 1997, cited in Borich, 2014). Three kinds of prompting are verbal prompts, gestural prompts, physical prompts. Another guided students' practice is modeling. Modeling allows students to imitate from demonstration or infer from observation the behavior to be learned. Four processes need to occur for the learners to benefit from modeling are attention, retention, production and motivation (Borich, 2014).

Providing appropriate feedback and correctives involves knowing how to respond to answers. Rosenshine & Stevens (1986) advised some points to respond to answers: For a correct, quick and firm response, acknowledge the correct response and either ask another question of the same student or move on to another student. For correct but hesitate response, provide a reinforcing statement and restate the facts, rules or steps needed for the right answer. For an incorrect response due to careless, indicate that the response is incorrect and quickly move on to the next students without further comment. For incorrect response, that is due to lack of knowledge, engage the students in finding the correct response with hints, probes or related but similar questions (cited in Borich, 2007).

After the students have given the correct answers, the teacher continues the independence practice. The purpose of providing independence practice is to develop automatic responses in students. Teacher should circulate around the classroom while students are engaged in independence practice to provide feedback, ask questions and give brief explanations (Emmer et al., 2006, cited in Borich, 2007)

Weekly and monthly review is the sixth and final direct instruction strategy. Periodic review ensures that all task relevant information needed for future lessons and identified areas that require re-teaching of key facts, rules and sequences. Weekly and monthly reviews determine whether the pace is right or should be adjusted before covering too much content.

Teaching Strategies for Indirect Instruction

Indirect instruction is an instructional strategy that allows and encourages students to analyze their experience actively in the classroom to become self-directed and self- responsible for their own learning (Withall, 1987, cited in Demoze, 2002). Indirect instruction is more complex than direct instruction and classroom activities are less teacher-centered. This brings students' ideas and experiences into the lesson and lets students to evaluate their own responses.

According to Borich (2007), indirect instruction has the following seven teaching strategies.

- Content Organization
- Conceptual Movement: Induction and Deduction
- Using Examples and Nonexamples
- Using Questions
- Learners Experience and Use of Students Ideas
- Student Self-Evaluation
- Use of Group Discussion

According to indirect instruction, the lesson must be introduced with a framework or structure that organizes the content into meaningful parts. One way of providing this framework

is to use advance organizers and these set the groundwork for focusing the lesson topics. Advanced organizers can be presented orally, charts and diagrams. An advance organizer gives learners a conceptual preview of what is to come and helps them store the content for retention and later use.

The next teaching strategy for indirect instructions is conceptual movement: induction and deduction. Induction is a form of reasoning used to draw a conclusion or make a generalization from specific instants (Stadler, 2011, cited in Borich, 2014). It is a process in which students observe specific facts and then generalize them to other circumstances. Deduction is reasoning that proceeds from principles or generalizations to their application in specific instances. The teaching of concepts with the indirect instructional models uses inductive and deductive thinking to develop initially crude and overtly restrictive concepts into more expansive and accurate understandings.

Providing examples and nonexamples helps to define the essential and nonessential attributes needed for making accurate generalizations. Examples represent the concept being taught by including the attribute essential for recognizing that concept. Nonexamples fail to represent the concept being taught by purposely. Borich (2014) stated that examples and nonexamples can be used by providing more than a single example and nonexample, by using examples that vary in ways that are important to the concept being defined, by including nonexamples that do not represent the important dimensions of concept and by explaining why nonexamples have some of the same characteristics as examples.

The fourth indirect instruction strategy is using questions. In indirect instruction, the role of questions is to guide students into discovering new dimensions of a problem or new ways of resolving a dilemma and not to get the correct answer quickly. Some uses of questions during indirect instruction include refocusing, presenting contradictions to be resolved, probing for deeper thought and responses, extending the discussion to new areas and passing responsibility to the class.

The use of students' ideas was considered the centerpiece of indirect instruction. Using students' ideas mean incorporating student experiences, points of view, feelings and problems into the lesson by making the student the primary point of reference. This approach is intended to heighten students' interest, organize content around student problems, tailor feedback to individual students and encourage positive attitudes and feelings toward the subject.

The sixth strategy for indirect instruction is to engage students in evaluating their own responses and thereby take responsibility for their own learning. One way to accomplish this is by allowing students to provide reasons for their answers so teacher and other students can suggest needed changes. The teacher's role is to maintain the momentum by offering hints or focusing statements that students can use to evaluate their previous responses.

A group discussion involves student exchanges with successive interactions among a large number of students. During these exchanges, teachers may intervene only occasionally to review, summarize and evaluate each group's progress and redirect the discussion when necessary. Teacher tasks are orienting students to the objective of the discussion, providing new or more accurate information when needed, reviewing, summarizing and relating opinions and facts, redirecting the flow of information and ideas back to the objective of the discussion and combining ideas and promote compromise to reach a conscious.

Method

Procedure

The design adopted in this study was one of the true experimental designs namely, the posttest only control group design. The sample students were selected randomly. The students were grouped randomly for experimental group and control group. In both schools, the experimental groups were taught by using indirect instruction and control groups were taught by using direct instruction. Learning materials were selected from chapter (7), Area and Volume, Grade Six Mathematics Textbook Volume (II). Lesson plans and posttest were validated by (5) expert teachers. To establish the reliability of the instruments, a pilot study was conducted for one week at No (4), Basic Education High School, Kamaryut. Pilot data were analyzed by using Cronbach's Coefficient Alpha and got the reliability level of (0.702).

The allocated time for posttest was (45) minutes and total score was (25) marks. Posttest data were analyzed by using independent samples *t*- test.

Subject

All participants in this study were Grade Six students. Two Basic Education High Schools were randomly selected from Yangon City Development Area. In each school, (60) students were also selected by using simple random sampling method from the population. The selected students were grouped randomly such as experimental group and control group.

Table 1 Population and Sample Size

No	Township	School	Population	Number of Students		
				Experimental Group	Control Group	Total
1	Yankin	BEHS(1)	165	30	30	60
2	South Okkalapa	BEHS (2)	277	30	30	60

Note: BEHS= Basic Education High Schoool

Instrumentation

In order to study the achievement differences in geometry, a posttest was developed. There were two sections in posttest and total score was (25) marks and time allocation was (45) minutes. Level of items was based on the four levels of Bloom Taxonomy: knowledge, comprehension, application and analysis. Lesson plans for direct instruction and indirect instruction were developed by using the seven stages: Gaining attention, informing the objectives, stimulating the recall of perquisite learning, presenting the stimulus material, eliciting the desired behavior, providing the feedback and assessing the behavior (Borich, 2014) (see Appendix A & B).

Data Analysis

The data obtained from posttest were analyzed by using the independent samples *t*-test to compare the mean differences between the experimental and control groups.

Findings

The findings of experimental groups and control groups are as follows.

Table 2 *t*-Values for Posttest Score on Students' Achievement in Geometry

School	Group	N	M	SD	MD	*T*	*df*	Sig.
S1	Experimental	30	19.90	2.74	3.63	4.567	58	.000***
	Control	30	16.27	3.39				
S2	Experimental	30	20.03	3.49	4.20	5.067	58	.000***
	Control	30	15.83	2.82				

Note: ****p* < .001 S1 = BEHS (1) Yankin S2 = BEHS (2) South Okkalapa

The results showed that the mean scores of experimental groups were significantly higher than the mean scores of control groups in two selected schools. It indicated that there was a significant difference between the experimental and control groups on students' achievement in geometry in both schools.

Table 3 *t* -Values for Posttest Scores on Knowledge Level Questions

School	Group	N	M	SD	MD	*t*	*df*	Sig.
S1	Experimental	30	2.80	0.40	0.17	1.433	58	.157 (ns)
	Control	30	2.63	0.49				
S2	Experimental	30	2.67	0.47	0.07	0.528	58	.599 (ns)
	Control	30	2.60	0.49				

Note: ns = no significant S1 = BEHS (1) Yankin S2 = BEHS (2) South Okkalapa

The mean scores of experimental groups were slightly higher than the control groups. It indicated that there was no significant difference between the experimental groups and control groups in performing knowledge level questions in both selected schools.

Table 4 *t* -Values for Posttest Scores on Comprehension Level Questions

School	Group	N	M	SD	MD	*t*	*df*	Sig.
S1	Experimental	30	2.97	0.61	0.24	1.381	58	.173 (ns)
	Control	30	2.73	0.69				
S2	Experimental	30	3.10	0.75	0.33	1.637	58	.107 (ns)
	Control	30	2.77	0.81				

Note: ns = no significant S1 = BEHS (1) Yankin S2 = BEHS (2) South Okkalapa

The mean scores of experimental groups were not much higher than the control groups. It showed that there was no significant difference between the experimental groups and control groups in performing comprehension level questions in each selected schools.

Table 5 *t* -Values for Posttest Scores on Application Level Questions

School	Group	N	M	SD	MD	*t*	*df*	Sig.
S1	Experimental	30	7.93	1.17	1.03	2.799	58	.007**
	Control	30	6.90	1.64				
S2	Experimental	30	7.53	1.40	1.19	3.045	58	.004**
	Control	30	6.34	1.58				

Note: ***p* < .01 S1 = BEHS (1) Yankin S2 = BEHS (2) South Okkalapa

The mean scores of experimental groups were higher than the control groups. It showed that there was a significant difference between the experimental groups and control groups in performing application level questions in both schools.

Table 6 *t* -Values for Posttest Scores on Analysis Level Questions

School	Group	N	M	SD	MD	*t*	*df*	Sig.
S1	Experimental	30	6.20	1.69	2.20	5.024	58	.000***
	Control	30	4.00	1.70				
S2	Experimental	30	6.73	2.01	2.50	5.668	58	.000***
	Control	30	4.23	1.33				

Note: ***$p < .001$ S1 = BEHS (1) Yankin S2 = BEHS (2) South Okkalapa

At the analysis level, the mean scores of experimental groups were quite higher than the control group. It was found that there was a significant difference between the experimental group and control group in performing analysis level questions in both schools.

Summary of Quantitative Findings

- There was a significant difference in the achievement in geometry between students who were taught by using indirect instruction and those who were taught by using direct instruction.
- There was no significant difference in performing knowledge and comprehension level questions between students who were taught by using indirect instruction and those who were taught by using direct instruction.
- There was a significant difference in performing application level questions between students who were taught by using indirect instruction and those who were taught by using direct instruction.
- There was a significant difference in performing analysis level questions between students who were taught by using indirect instruction and those who were taught by using direct instruction.

According to the summary of the quantitative findings from this study, the application and analysis level questions can be used to perform for the different achievement.

Discussion

Different teaching methods draw attention to different learning outcomes (Vygotsky, 2002, cited in Mawlese, 2014). This study provided support for this view. According to the results, there was a significant difference on the overall mean scores between the experimental groups and control groups in each selected school. This finding pointed out that using indirect instruction is significantly better on students' achievement in geometry than using direct instruction. This finding is consistent with Jahr (2011) who found that the indirect instruction stresses the importance of student involvement and student centered learning and can promote more achievement result than the direct instruction.

At the comparison of mean scores on knowledge level and comprehension levels, there were no significant differences between the experimental groups and control groups in both schools. The result showed that not only indirect instruction but also direct instruction could bring the same achievement result in performing knowledge and comprehension level questions. This result supports the findings of Rosenshine (1997) who found that direct instruction

strategies are among those that correlate highest with student achievement as measured by tests, which tend to emphasize facts, rules and sequences (cited in Borich, 2014).

Concerning the application level, the comparison of mean scores between experimental groups and control groups in both schools pointed out that there was a significant difference between two groups in performing application level questions. This finding is not consistent with Borich (2007) who found that learning at the lower level of cognitive domain (knowledge, comprehension, application) relies heavily on direct instruction.

For the comparison of analysis level, the finding showed that the mean sores of experimental group was significantly higher than the control group in both schools. This result indicated that the use of indirect instruction could encourage more achievement result and higher order thinking ability than the direct instruction. This finding is consistent with Borich (2007) who pointed out that direct instruction is applied in the context of lower level skills (knowledge, comprehension, application) and the teaching functions associated with indirect instruction are best suited in the context of higher level skills (analysis, synthesis, evaluation) objectives.

Geometry is a network of concepts, ways of reasoning and representation systems used to explore and analyze shape and spaces (Battista, 2007, cited in Walle, 2013). Therefore, geometry teaching should focus on how to think and investigate the geometric concepts. According to the result of the research, it can be concluded that indirect instruction can provide more achievement result in geometry than direct instruction. Therefore, teacher should use indirect instruction in teaching geometry to promote students' higher order thinking skills.

In indirect instruction, teacher should consider specific time allocation for each stage of the lesson since lesson planning. In group discussion, teacher should be ensured that students have solid background of information before conducting discussion. Before giving group work, teacher should explain the activity by using short and clear instruction. After giving instruction, teacher should use instruction check questions (ICQ) to check students' understanding what they are going to do. By doing this, teacher could save the time and group work could be done within the time limit. In addition, teacher should not allocate resources before giving instruction what students are going to do. While students are doing group work, teacher should monitor the group works and take the role of facilitator. Sometimes, students are difficult to get the generalization in group discussion within the time limit. At that time teacher should change the role of moderator and orient students to the objective of the discussion, provide more accurate information where needed. In addition, teacher should review, summarize the opinions and facts into meaningful relationship and adjust the flow of information and ideas.

Sometimes, students need to be familiar with basic skills to be able to find concepts, pattern and abstraction. Direct instruction is useful to give the basic knowledge of the lesson within the limited period. Thus, teacher should not exclude the direct instruction. While using direct instruction, teacher should begin the lesson with a short review of previous prerequisite learning. Scaffolding lesson should be presented with detail instruction and explanations. Moreover, teacher should control the pace of the lesson, should provide systematic feedback and corrective.

Direct and indirect instructions have proven to be the most commonly accepted and best approaches to teaching geometry. Both methods have their respective advantages. Therefore, in teaching geometry, teacher should adjust using these two methods according to the time, space and circumstances.

Conclusion

The main purpose of this study is to investigate the achievement differences in geometry between Grade Six students who are taught by using indirect instruction and those who are taught by using direct instruction. Quantitative study was conducted to obtain the required data. The design adopted in this study was one of the true experimental designs, namely the posttest only control group design. After the experimental period, the independent samples *t*-test was used to compare the students' achievement result in geometry between experimental and control groups. The result showed that that there was a significant difference between the experimental and control groups on students' achievement in geometry in both schools. According to the result, teachers should use indirect instruction in teaching geometry to promote students' achievement result.

In the 21st century, an important goal of education is to develop individuals with high level of mathematical proficiency to support future participation in employment and citizenship (Battista, 2007, cited in Walle, 2013). Geometry teaching should focus on how to think and investigate the geometric concepts. Teaching of geometry should be dynamic and should be approached through meaningful explorations. Learning becomes more meaningful and challenging when each student explore, estimate, experiment, question and hypothesize through learner centered activities. Through direct instruction alone, students can learn how to perform tasks in a way that their instructor asks them to. If the education system truly wants all students to succeed, the students need to be taught how to solve problems with their own thoughts .Therefore, to be able to adapt in 21st century technology, mathematics teachers should give more emphasis on indirect instruction in teaching geometry.

Due to time limitation, this study was conducted about two weeks in two sample schools from Yangon City Development Area and based on only one content area of geometry in Grade Six Mathematics Textbook Volume (II). Therefore, further studies should be carried out in different areas by taking longer duration and using wider content areas to recommend the result of this study.

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Appendix A

Sample Lesson Plan for Indirect Instruction

Sample Lesson Plan (1)

၁။ ဘာသာ – သင်္ချာ

၂။ အတန်း – ဆဋ္ဌမတန်း

၃။ သင်ခန်းစာခေါင်းစဉ် – အနားပြိုင်စတုဂံ၏ဧရိယာရှာခြင်း

၄။ အချိန် – ၄၅ မိနစ်

၅။ သင်ယူမှုဦးတည်ချက်များ

(က) အနားပြိုင်စတုဂံ၏အခြေနှင့်အမြင့်ကိုခွဲခြားတတ်ရန်။

(ခ) အနားပြိုင်စတုဂံ၏ဧရိယာပုံသေနည်းကိုဖော်ထုတ်တတ်ရန်။

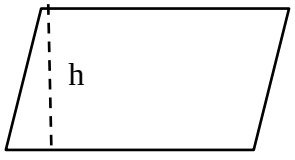
(ဂ) ပုံသေနည်းကိုအသုံးပြု၍အနားပြိုင်စတုဂံ၏ဧရိယာကိုတွက်ထုတ်တတ်ရန်။

၆။ သင်ထောက်ကူပစ္စည်းများ

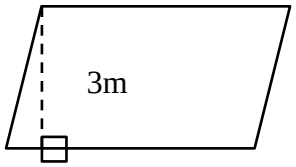
ရောင်စုံစာရွက်၊ ပေတံ၊ ကော်၊ ခဲတံ၊ကတ်ကြေး၊ သင်ပုန်း၊လုပ်ငန်းပေးစာရွက်၊ ရောင်စုံဆော့ပင်၊ ပြဋ္ဌာန်းစာအုပ်။

၇။ သင်ကြားသင်ယူမှုလုပ်ငန်းအဆင့်ဆင့်

လုပ်ငန်းစဉ်	**ဆရာ၏လုပ်ငန်း**	**ကျောင်းသား၏လုပ်ငန်း**	**အချိန်**
နိဒါန်းပျိုးခြင်း (Gaining Attention)	–အောက်ပါမေးခွန်းများကိုမေးမြန်းခြင်းဖြင့်သင်ခန်းစာကိုနိဒါန်းပျိုးပါမည်။ –ဧရိယာကိုမည်သို့နားလည်ပါသနည်း။ –သင်ပုန်း၏ဧရိယာကိုမည်သို့ရှာမည်နည်း။ (တစ်ဦးချင်းစဉ်းစားစေမည်၊ နှစ်ယောက်တွဲဆွေးနွေးစေမည်။အတန်းကိုပြန်လည်ဝေမျှစေမည်)	–တစ်ဦးချင်းစဉ်းစားသည်နှစ်ယောက်တွဲဆွေးနွေးသည်။ –အတန်းကိုပြန်လည်ဝေမျှသည်။ –ဧရိယာသည်မျက်နှာပြင်အကျယ်ဖြစ်သည်။ –သင်ပုန်းဧရိယာကိုအလျား× အနံဖြင့်ရှာနိုင်သည်။	၃ မိနစ်
သင်ယူမှုဦးတည်ချက်ကိုအသိပေးခြင်း (Informing the Objectives)	–သင်ကြားမည့်သင်ခန်းစာခေါင်းစဉ်ကိုပြောကြား၍သင်ပုန်းပေါ်တွင်ရေးသားပါမည်။ –သင်ယူမှုဦးတည်ချက်ရေးသားထားသောစာရွက်ကိုသင်ပုန်းထောင့်တွင်ကပ်ပါမည်။	–ကျောင်းသားများကြည့်ရှုလေ့လာပါမည်။	၂ မိနစ်
အခြေခံအသိသညာကို	–သင်ပုန်းပေါ်တွင်တြိဂံပုံနှင့်အနားပြိုင်စတုဂံပုံကိုဆွဲသားပါမည်။		၅ မိနစ်

လုပ်ငန်းစဉ်	**ဆရာ၏ လုပ်ငန်း**	**ကျောင်းသား၏ လုပ်ငန်း**	**အချိန်**
စစ်ဆေးခြင်း (Stimulating the Recall of Prerequisite Learning	–တြိဂံ၏ အခြေနှင့်အမြင့်သတ်မှတ်ပုံ –အနားပြိုင်စတုဂံ၏ဂုဏ်သတ္တိများကို မေးမြန်းပါမည်။	–ကျောင်းသားများအဖြေများကို ပြောကြားပါသည်။	
သင်ကြားသင်ယူမှု လုပ်ငန်းစဉ် (Presenting the Stimulus Material)	(တစ်ဖွဲ့လျှင်၅ယောက်ဖြင့်အုပ်စုဖွဲ့ပါမည်) – အနားပြိုင်စတုဂံများပါသောလုပ်ငန်းပေးစာရွက်ကိုအုပ်စုအသီးသီးကိုဝေမျှပါမည်။ – အုပ်စုတွင်းဆွေးနွေးတိုင်ပင်စေမည်။ ပုံများကိုလေ့လာစေ၍အနားပြိုင်စတုဂံ၏ အခြေနှင့်အမြင့်သတ်မှတ်ပုံကိုဖော်ထုတ်စေမည်။ (ကျောင်းသားများဆွေးနွေးနေစဉ် အဖွဲ့တွင်းလှည့်လည်ကြည့်ရှုရှုလိုအပ်ချက်များကိုပံ့ပိုးကူညီမည်) –တွေ့ရှိချက်ကိုတင်ပြစေမည်။ –လက်တွေ့လုပ်ငန်းဆောင်ရွက်ရန် အောက်ပါပစ္စည်းများကိုဝေပေးသည်။ (ရောင်စုံစာရွက်၊ပေတံ၊ကော်၊ခဲတံ၊ ကတ်ကြေး) –အောက်ပါလုပ်ငန်းများကိုလွယ်ကူချောမွေ့စွာဆောင်ရွက်နိုင်ရန်လိုအပ်သည် များကိုကူညီပံ့ပိုးမှုများပြုလုပ်မည်။	–အုပ်စုဖွဲ့သည်။ –လုပ်ငန်းပေးစာရွက်များကိုလက်ခံသည်။ –အုပ်စုတွင်းဆွေးနွေးသည်။ ပုံများကိုလေ့လာသည်။ (အောက်ပါအချက်များကိုဖော်ထုတ်သည်) –အနားပြိုင်စတုဂံတွင် အနားလေးနားရသည်။ –အနားအားလုံးအခြေဖြစ် နိုင်သည်။ –အနားတစ်ဖက်မှမျက်နှာချင်းဆိုင်အနားပေါ်သို့ထောင့်မတ်ကျဆွဲသောမျဉ်းသည် အမြင့်မျဉ်း၊ –တွေ့ရှိချက်ကိုတင်ပြသည်။ –ကျောင်းသားများလက်တွေ့လုပ်ငန်းလုပ်ဆောင်ပါ သည်။  	၁၀ မိနစ်

လုပ်ငန်းစဉ်	ဆရာ၏ လုပ်ငန်း	ကျောင်းသား၏ လုပ်ငန်း	အချိန်
	(စာရွက်ပေါ်တွင်အနားပြိုင်စတုဂံဆွဲရန်၊ အမြင့်မျဉ်းကိုဆွဲရန်၊အမြင့်မျဉ်း တစ်လျှောက်ကတ်ကြေးဖြင့်ညှပ်ရန်၊ ဖြတ်ထားသောအပိုင်းကိုအနားပြိုင် စတုဂံ၏တစ်ဖက်တွင်ကပ်ရန်)		၁၀ မိနစ်
	– အနားပြိုင်စတုဂံ၏ပုံစံမည်သို့ပြောင်းလဲသည်ကိုလေ့လာစေ၍ထိုပုံမှတဆင့် ဧရိယာရှာသောပုံသေနည်းကိုဖော်ထုတ်စေမည်။	–အနားပြိုင်စတုဂံနှင့် ထောင့်မှန်စတုဂံကို နှိုင်းယှဉ်၍ အနားပြိုင် စတုဂံ၏ဧရိယာ ပုံသေ နည်းကိုဖော်ထုတ်မည်။	
		အနားပြိုင်စတုဂံဧရိယာ= ထောင့်မှန်စတုဂံ ဧရိယာ	
	(ကျောင်းသားများဆွေးနွေးနေစဉ်အဖတွင်း လှည့်လည်ကြည့်ရှုလမ်းညွှန်ချက်များကို ပံ့ပိုးကူညီမည်)	ထောင့်မှန်စတုဂံအလျား= အနားပြိုင်စတုဂံအခြေ ထောင့်မှန်စတုဂံအနံ= အနားပြိုင်စတုဂံအမြင့် ထောင့်မှန်စတုဂံဧရိယာ= အလျား × အနံ အနားပြိုင်စတုဂံဧရိယာ	
		A = အခြေ × အမြင့်	
		A = b x h	
	–အုပ်စုလုပ်ငန်းကိုတင်ပြစေမည်။	–အုပ်စုလုပ်ငန်းကိုတင်ပြကြသည်။	
	–အောက်ပါဥပမာပုစ္ဆာကိုကျောင်းသားများအားမည်သို့တွက်မည်ကိုစဉ်းစားစေမည်။		

လုပ်ငန်းစဉ်	**ဆရာ၏ လုပ်ငန်း**	**ကျောင်းသား၏ လုပ်ငန်း**	**အချိန်**
	–ပုံပါပေးထားချက်များအရအနားပြုင် စတုဂံ၏ဧရိယာကိုရှာပါ။  –အဖြေကိုတင်ပြစေမည်။လိုအပ်ချက်ရှိပါက ဖြည့်စွက်ဆွေးနွေးပေးမည်။	–ကျောင်းသားများမည်သို့ တွက်မည်ကိုဆွေးနွေး၍ အဖြေရှာသည်။ b = 5m, h=3m A= b x h = 5x3 = 15 m^2 –အဖြေကိုတင်ပြသည်။	
အသိသညာ ရရှိမှုအခြေ အနေကို ဖော်ထုတ်ခြင်း (Eliciting the Desired Behavior)	–လုပ်ငန်းပေးစာရွက်ကိုအုပ်စုများကိုဝေမည်။ –စာရွက်တွင်ရှိသောပုစ္ဆာများကိုအုပ်စုတွင်း တိုင်ပင်၍တွက်စေမည်။ (ကျောင်းသားများပုစ္ဆာများကိုတွက်နေစဉ် အဖွဲ့တွင်းလှည့်လည်ကြည့်ရှု၍လအပ်ချက် များကိုပံ့ပိုးကူညီမည်)	–ကျောင်းသားများတိုင်ပင် ဆွေးနွေး၍ပုစ္ဆာများ တွက်ကြသည်။	၅ မိနစ်
ကျောင်းသား၏ လုပ်ဆောင်မှုကို မှတ်ချက်ပေး ခြင်း (Providing the Feedback)	–လုပ်ငန်းပေးစာရွက်များကိုအုပ်စု အချင်း ချင်းဖလှယ်စေမည်။ –သင်ပုန်းပေါ်တွင်ရေးသားထားသော အဖြေများနှင့်တိုက်ဆိုင်၍စစ်ဆေးစေမည်။ –ထူးခြားချက်များ၊မတူညီမှုများရှိပါက တင်ပြစေမည်။ (အပြုသဘောဆောင်သောမှတ်ချက်များ ပေးမည်)	–လုပ်ငန်းပေးစာရွက်များကို အုပ်စုအချင်းချင်း ဖလှယ်သည်။ –အဖြေများကို စစ်ဆေး သည်။ –ရှင်းလင်းမှုမရှိသော အချက်များကို တင်ပြသည်။	၅ မိနစ်
တတ်မြောက်မှု စစ်ဆေးခြင်း (Assessing the Behavior)	–အောက်ပါမေးခွန်းများကိုမေးပါမည်။ –အနားပြုင်စတုဂံတွင်အခြေနှင့်အမြင့်ကို မည်သို့ခွဲခြားသနည်း။ –အနားပြုင်စတုဂံ၏ဧရိယာပုံသေနည်းမှာ အဘယ်နည်း။ (ကျွမ်းကျင်မှုအတွက်လေ့ကျင့်ရန်ပြဋ္ဌာန်း စာအုပ်မှပုစ္ဆာအချို့ကိုတွက်စေမည်)	–ကျောင်းသားများအဖြေ များကိုပေးကြသည်။	၅ မိနစ်

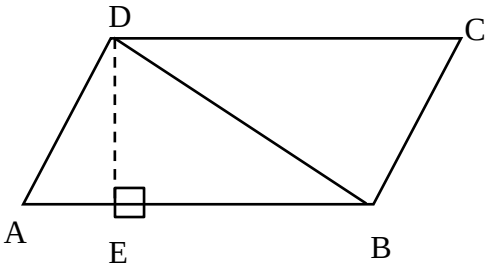
Appendix B

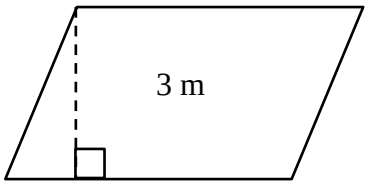
Sample Lesson Plan for Direct Instruction

Sample Lesson Plan (1)

၁။ ဘာသာ – သင်္ချာ
၂။ အတန်း – ဆဋ္ဌမတန်း
၃။ သင်ခန်းစာခေါင်းစဉ် – အနားပြိုင်စတုဂံ၏ဧရိယာရှာခြင်း
၄။ အချိန် – ၄၅ မိနစ်
၅။ သင်ယူမှုဦးတည်ချက်များ
(က) အနားပြိုင်စတုဂံ၏အခြေနှင့်အမြင့်ကိုခွဲခြားတတ်ရန်။
(ခ) အနားပြိုင်စတုဂံ၏ဧရိယာပုံသေနည်းကိုဖော်ထုတ်တတ်ရန်။
(ဂ) ပုံသေနည်းကိုအသုံးပြု၍အနားပြိုင်စတုဂံ၏ဧရိယာကိုတွက်ထုတ်တတ်ရန်။
၆။ သင်ထောက်ကူပစ္စည်းများ
ကားချပ်၊ သင်ပုန်း၊ ပြဌာန်းစာအုပ်။
၇။ သင်ကြားသင်ယူမှုလုပ်ငန်းအဆင့်ဆင့်

လုပ်ငန်းစဉ်	ဆရာ၏လုပ်ငန်း	ကျောင်းသား၏လုပ်ငန်း	အချိန်
နိဒါန်းပျိုးခြင်း (Gaining Attention)	–သင်ပုန်းပေါ်တွင်အနားပြိုင်စတုဂံပုံကိုဆွဲ၍ ၄င်း၏ဂုဏ်သတ္တိများကိုမေးမြန်းခြင်းဖြင့်နိဒါန်းပျိုးပါမည်။ (တင်ပြချက်များကိုသင်ပုန်းမှတ်ချက်ရေးသားသည်)	–ကျောင်းသားများအဖြေများပေးသည်။ (မျက်နှာချင်းဆိုင်အနားတစ်စုံပြိုင်သည်၊ ထောင့်ဖြတ်မျဉ်းများထောင့်မတ်ကျသည်။ ပြိုင်နေသော မျဉ်းနှစ်ခုကြားအကွာအဝေးတူသည်)	၃ မိနစ်
သင်ယူမှုဦးတည်ချက်ကိုအသိပေးခြင်း (Informing the Objectives)	–သင်ကြားမည့်သင်ခန်းစာခေါင်းစဉ်ကိုပြောကြား၍သင်ပုန်းပေါ်တွင်ရေးသားပါမည်။ –သင်ယူမှုဦးတည်ချက်ရေးသားထားသောစာရွက်ကိုသင်ပုန်းထောင့်တွင်ကပ်ပါမည်။	–ကျောင်းသားများမှတ်စုစာအုပ်ထဲတွင်ခေါင်းစဉ်ကိုရေးသားကြမည်။	၂ မိနစ်
အခြေခံအသိသညာကိုစစ်ဆေးခြင်း	–တြိဂံ၏ဧရိယာရှာသောပုံသေနည်းကိုမေးမည်။	–ကျောင်းသားများအဖြေပေးမည်။	၅ မိနစ်

လုပ်ငန်းစဉ်	**ဆရာ၏လုပ်ငန်း**	**ကျောင်းသား၏လုပ်ငန်း**	**အချိန်**
(Stimulating the Recall of Prerequisite Learning)	(ပုံသေနည်းကိုသင်ပုန်းမှတ်ချက်ထား ရှိမည်)	A= ½ x အခြေ x အမြင့်	
သင်ကြား သင်ယူမှု လုပ်ငန်းစဉ် (Presenting the Stimulus Material)	–အနားပြိုင်စတုဂံပုံ လေးခု ပါဝင်သော ကားချပ်ကိုသင်ပုန်းတွင်ကပ်မည်။ –အနားပြိုင်စတုဂံ၏အခြေနှင့်အမြင့် သဘောကိုဆရာကရင်းလင်းမည်။ (အနားပြိုင်စတုဂံ၏ အနားအားလုံးသည် အခြေဖြစ်နိုင်သည်။အနားတစ်ဖက်မှ မျက်နှာချင်းဆိုင်အနားပေါ်သို့ ထောင့်မတ်ကျဆွဲသောမျဉ်းသည် အမြင့်မျဉ်းဖြစ်မည်)	–ဆရာ၏ရှင်းလင်းမှုကို နားထောင်မှတ်သားသည်။	၁၀ မိနစ်
	–သင်ပုန်းပေါ်တွင်အနားပြိုင်စတုဂံ ဆွဲသား၍ဧရိယာပုံသေနည်းဖော်ထုတ် ပုံကိုအဆင့်ဆင့်ရှင်းလင်းသင်ကြားမည်။  အနားပြိုင်စတုဂံ ABCD ၏ဧရိယာ = ΔABD ဧရိယာ + ΔBCD ဧရိယာ = 2ΔABD ဧရိယာ = 2x ½ bh စတုရန်းယူနစ် A = b x h – မှတ်စုစာအုပ်တွင်ရေးသားရန် ညွှန်ကြားသည်။ –သင်ပုန်းပေါ်တွင်ပုစ္ဆာတစ်ပုဒ်ကိုရေး၍ ဧရိယာ တန်ဖိုးရရန်တွက်ပုံအဆင့်ဆင့်ကို ရှင်းမည်။	–ကျောင်းသားများရှင်းပြ ချက်ကိုသေချာစွာ နားထောင်သည်။ –အနားပြိုင်စတုဂံပုံ ဆွဲသည်။ ပုံသေနည်းတွက်ပုံ အဆင့်ဆင့်ကို ရေးမှတ်သည်။	၁၀ မိနစ်

လုပ်ငန်းစဉ်	ဆရာ၏ လုပ်ငန်း	ကျောင်းသား၏ လုပ်ငန်း	အချိန်
	 b = 5m, h=3m A= b x h = 5 x 3 = 15 m^2	–ပုစ္ဆာကိုလေ့လာသည်။ –ရှင်းလင်းချက်ကို နားထောင်သည်။ –မှတ်စုစာအုပ်ထဲတွင် ရေးသားသည်။	
အသိသညာ ရရှိမှု အခြေအနေကို ဖော်ထုတ် ခြင်း (Eliciting the Desired Behavior	– အောက်ပါပုစ္ဆာကိုဖြေရှင်းစေမည်။ (အနားပြိုင်စတုဂံABCDတွင် CD= 5m ဖြစ်၍ ABနှင့် CDတို့ကြားအကွာအဝေးသည် 3mဖြစ်လျှင်အနားပြိုင်စတုဂံ၏ ဧရိယာကိုရှာပါ) – ပုစ္ဆာကိုဖတ်စေမည်။ – ပုစ္ဆာ၏ပေးချက်၊ မေးချက်များကိုမေးမည်။ မည်ကဲ့သို့ပုံဆွဲရမည်ကိုမေးမည်။ (ကျောင်းသားများပုစ္ဆာများကိုတွက်နေစဉ် အတန်းတွင်းတွင်လှည့်လည်ကြည့်ရှု၍ လိုအပ်ချက်များကိုလမ်းညွှန်မည်)	–ကျောင်းသားများပုစ္ဆာကို ဖတ်သည်။ –ပေးချက်၊မေးချက်များကို ပြောကြားသည်။ –ပုံဆွဲ၍အဖြေကိုရရန် တွက်သည်။	၅ မိနစ်
ကျောင်းသား၏ လုပ်ဆောင်မှုကို မှတ်ချက်ပေး ခြင်း (Providing the Feedback)	–ပုစ္ဆာ၏အဖြေကိုမေးမည်။ –ထူးခြားချက်များ၊မတူညီမှုများရှိပါက ဆရာမှရှင်းပြမည်။ (အပြုသဘောဆောင်သောမှတ်ချက်များ ပေးမည်)	–ကျောင်းသားများအဖြေကို တင်ပြသည်။ –မရှင်းလင်းသောအချက် များကိုမေးသည်။	၅ မိနစ်
တတ်မြောက်မှု စစ်ဆေးခြင်း (Assessing the Behavior)	–အောက်ပါမေးခွန်းများကိုမေးပါမည်။ –အနားပြိုင်စတုဂံတွင်အခြေနှင့်အမြင့်ကို မည်သို့ခွဲခြားသနည်း။ –အနားပြိုင်စတုဂံ၏ဧရိယာပုံသေနည်းမှာ အဘယ်နည်း။ (ကျွမ်းကျင်မှုအတွက်လေ့ကျင့်ရန် ပြဋ္ဌာန်းစာအုပ်မှပုစ္ဆာအချို့ကိုတွက်စေမည်)	–ကျောင်းသားများအဖြေ များကိုပေးကြသည်။	၅ မိနစ်