TEACHER GUIDEBOOK SERIES-C

LEARNING LAB

INVENTING CAN BE LEARNED

Index

Preface

Dear teachers, thank you for choosing Gigo Learning Lab curriculum, which is a theme-oriented teaching product. We integrate our curriculum with life experiences to give full play to children's creativity and enable them to further use what they have learned to care for the society and obtain problem-solving skills.

Materials design of the Gigo Learning Lab has three orientations:

1. Knowledge Integration
   Due to technology advances, knowledge acquisition and accumulation have been increasingly rapid and focused, but also caused the phenomenon of discrete disciplines. Although this discipline categorization makes academic research convenient, it is not conducive to children's' learning. For knowledge integration of learners, instructors should help them understand the correlation between knowledge framework and the concepts among academic disciplines.

2. Experience Integration
   By combining children's knowledge and living experience together, they can apply knowledge, and the growth of their sense structure will be promoted. For example, after the course, learners should be able to tell the application of the infrared remote control in life.

3. Social Integration
   Social integration, also known as social relevance, refers to curriculum contents and activities, which must be linked with social life. Social integration is to foster children's life adaptability through the curriculum and enable them to recognize and practice resolving social problems.

Before implementing the curriculum, teachers should grasp the following five principles:

Ideal principles	What is the main purpose of teaching? What do we expect students to learn through the curriculum? Select appropriate materials so that teachers are ready to supplement with extra knowledge, maintain articulateness, cultivate patience, and conduct teaching objectively.
Pragmatic principles	Consider the feasibility of the curriculum, the restrictions in implementation (time, equipment, space, resources, etc), and whether the teachers, students and parents adapt to this curriculum.
Accuracy principles	Study the curriculums carefully before giving the lecture and deliver correct theories and concepts to the students.
Long-term principles	The curriculum, for students, features short-term and immediate learning efficacy, while Gigo Learning Lab itself also has long-term objectives. The curriculum planned from kindergarten to high school enables students to study a set of textbooks systematically, completely and profoundly, to apply the knowledge immediately in life and to positively change their behavior in an obvious way. Therefore, how to propose a curriculum for children in a timely manner is very important.
General principles	In addition to whether there are association and cooperation between knowledge, human resources and equipment resources needed for implementation (including teachers, parents, equipment, software, space, etc.), everything should be integrated to enhance the overall effect.

Package Summary Table

1. Robot

◆ Part No.: #1244R ◆ Series: Technology Explorer ◆ Target Age: 10+

Unit Objective	Behavioral Objective
1-1 Through teaching, guide learners to know about infrared rays.	1-1-1 Learners should be able to tell the features of infrared rays such as wave band and direction.
1-2 Make learners learn and grasp how to control a motor.	1-2-1 Learners should be able to explain the control method of positive and reverse rotation of DC motors. 1-2-2 Learners should be able to independently improve and make at least one model of a single motor, bi-motor and tri-motor.
1-3 Utilize the model to make learners understand the application of robot technology.	1-3-1 Utilize the learned contents to make learners learn the application of a robot in common life and list at least 3 other applications. 1-3-2 In the class, learners should be able to independently finish the experiment. 1-3-3 After completion of the course with a cycle of 4 classes, learners should be able to finish the subject according to the content of the course

2. Smart BT Controller

◆ Part No.: #1300 ◆ Series: Technology Explorer ◆ Target Age: 10+

Unit Objective	Behavioral Objective
2-1 Teach learners about Bluetooth remote control.	2-1-1 After the course, learners should be able to tell the difference between Bluetooth and infrared ray technology as well as the advantages and disadvantages of Bluetooth. 2-1-2 In each class, learners should be able to take the remote control of the model to use intelligent devices with Bluetooth
2-2 Utilize the model to make learners understand the method of program control.	2-1-3 In class, learners should be able to independently finish the experiment. 2-2-1 Learners can make a remote control of the finished model in each class through manual control and time control.
2-3 Teach learners about the application of program control through experiments.	2-2-2 After the course, learners should be able to independently improve and make at least one model. 2-3-1 Learners should be able to list at least 3 examples of program control in common life. 2-3-2 After completion of the course with a cycle of 4 classes, learners should be able to finish the subject according to the content of the course.

3. S4A Programming Bricks

◆ Part No.: #1247R ◆ Series: Technology Explorer ◆ Target Age: 10+

Unit Objective	Behavioral Objective
3-1 Teach learners about Arduino.	3-1-1 After the course is finished, learners should be able to tell input or output signals of each foot position of Arduino. 3-1-2 After the course, learners should be able to tell the type and function of sensors on the Sensor Board.
3-2 Utilize experiments and Q&A to make learners know about the program operation of S4A.	3-1-1 In each class, learners should be able to independently finish programming to operate the model. 3-2-2 Learners should be able to make at least 2 kinds of shape changes through Scratch. 3-2-3 Learners should be able to use Bluetooth connection control to finish at least 1 model.
3-3 Teach learners about programming.	3-3-1 Before the program is executed in class, learners should be able to tell the logic of programming and the model motion after execution. 3-3-2 In each class, learners should be able to finish revising and reprogramming to control the model. 3-3-3 Learners should be able to utilize learned methods to finish 4 subjects of the course program.

Teaching Process

- Learning Lab is a theme-oriented STEAM learning product, which emphasizes the combination of theories with everyday life application and teach science education step by step to learners of all ages.
- Learning Lab's core value lies in learning innovation ability. The curriculum is designed with five lessons as one cycle, and the first four lessons provide students with instructions on the model building method while the 5th one is a monograph course which kids need to use what they have learned to create a model to meet the target objective.

Ideal State

Learning Lab C series contains 80 lessons of four subjects, suitable for children aged 10 years old and above. The course mainly focuses on robot technologies, making learners understand the structural establishment and power source of the robot, as well as the control methods such as IrDA, Bluetooth, gyroscope, Scratch for Arduino, that makes the robot intelligent. It not only trains the learners to use logic, but also makes them learn the application scope of forward-looking technology.

Learning environment	• A quiet, spacious room • Avoid items that could reduce their learning attentiveness (e.g. opening TV)
Learning tools	• Learning Lab C series of building blocks- Individual package, including one set of building blocks, is designed for personal, family, or after school club. School set, including 13 sets of building blocks, is designed for the class size around 30 students (3 students sharing one set of building blocks; one set for teacher and two sets for backup). • Basic stationery (e.g. pen and paper, scissors, colored pens, etc.) • Tools (e.g. AA battery, AAA battery, etc.) • Special requirements: #1300 Smart BT Controller: Android tablets or phones or iPad/iPhone #1247R S4A Interactive Bricks: Computer
Teaching materials	• Learning Lab C series of Student Workbook • Special requirements: #1300 Smart BT Controller: Please go to Google Play or App Store to download application of "Gigo Commander II" suitable for Android system and iPad / iPhone. #1247R S4A Interactive Bricks: Please go to http://s4a.cat to download application of S4A.
Equipments	• Tablet PC • Computer, projectors (recommended in large classes)

Subject Learning- Basic Learning Procedures and Steps

Basic Step	Basic Procedure	Teaching Event Description
Step 1	Subject Course	1. Prepare the number of building blocks, student workbook, and basic stationery used in the unit. 2. Prepare teaching knowledge and be familiar with the materials of the unit to perform the following teaching process.
Step 2	Story Guide (10%)	1. Instructors use images and building blocks to attract learners and guide learners to combine knowledge and experience and then extend them into the learning environment. 2. Instructors can use pictures, videos, or question-and -answer interactive teaching methods to attract learners, improve their concentration and give timely guidance when learners have problems. 3. Introduce examples in life to further make learners understand the principles. 4. The section of Quiz, matching with story guidance and mathematics topic, is added in the packages of #1244R Robot. Instructors should make preparation in advance and integrate the above materials into their teaching. 5. Instructors need to observe whether learners are distracted during the course.
Step 3	Cognitive Association (10%)	1. In order to confirm whether learners have mastered the knowledge, conduct a discussion, “Brainstorming”. 2. Through the discussion, “Brainstorming”, instructors can make learners be creative as possible to answer the questions and observe whether learners are clear about the course focus in the unit. 3. If learners cannot answer the questions correctly, instructors should guide them to answer the questions and explain the focus of the course to enhance their impression.
Step 4	Building Blocks Collection (5%)	1. Select the building blocks to be used in the course. 2. Train learners’ cherishing concept.
Step 5	Teaching Demonstration (5%)	1. Instructors can first use actual assembly assistance for demonstration. 2. Instructors guide learners to combine knowledge and life experience and conduct assembly teaching. 3. The packages of #1247R S4A Programming Bricks are combined with programming, instructors should utilize practical principle teaching and questions and answers as well as practice to check whether learners were able to absorb the lesson. 4. The assembly tips of blocks can refer to the tip videos.
Step 6	Model Assembly (20%)	1. Learners operate practically as taught by instructors. 2. Instructors are required to sit beside learners and assist them. 3. Develop learners’ good habits of asking questions immediately. 4. If learners cannot assemble the set goal, instructors should conduct assembly teaching again. 5. For the programming sessions, instructors should check whether the learners’ model can connect with the programmed ones. If learners cannot achieve the target, instructors should teach programming again.

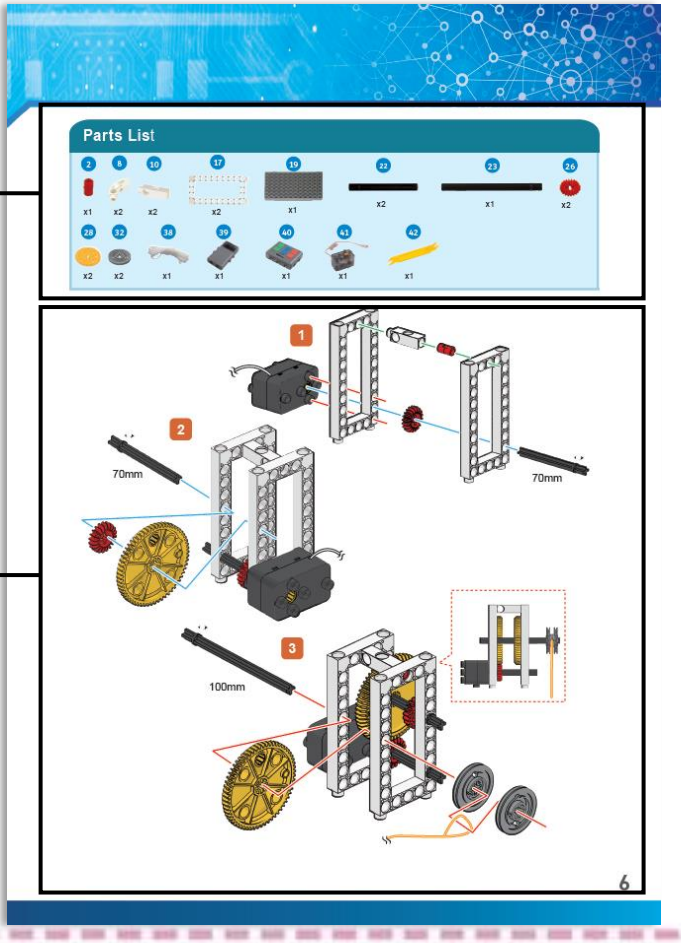
Basic Step	Basic Procedure	Teaching Event Description
Step 7	Activity Discussion (5%)	1. Only after learners finish assembling the model can the part be executed. 2. The part includes an “Hands-on Experiment”, which is a simple experiment matching with the model established by learners (for example, Make a reel on your own. How heavy of a weight can it reel?), and instructors can explain the focus of the course again to strengthen its impression on the learners.
Step 8	Hands-on Experiment (15%)	1. Instructors can utilize the interactive teaching method. In addition to improving the attention of learners, the instructors should give timely instruction when learners have questions. 2. If learners cannot finish the activity, instructors should guide learners on the learning blind spots and make learners practice to complete the activity.
Step 9	Advanced Activity Discussion (5%)	1. Only after the learning (Hands-on Experiment) is finished can the part be executed. 2. The part is “Hands-on Creativity”, which is improved through matching with the model established by learners (for example, Give it a try. Use a gear set to change the spinning speed and the pulling power of the reel.). 3. Instructors should emphasize key reassembly principles to deepen its impression on learners.
Step 10	Hands-on Creativity (15%)	1. Instructors can make learners be creative to make their own model, but should pay special attention to whether their model can reach the minimum standards of the unit. 2. If learners cannot finish the activity, instructors should guide learners to find out the learning blind spots and make learners practice to complete the activity 3. Instructors need to review the focus of this unit course once again before the end of the course to confirm that learners have absorbed the knowledge
Step 11	Course Evaluation (10%)	1. Only implement this section after confirming that learners have completed learning the content of this unit. 2. Instructors use the evaluation form of the teaching manual and give learners rating stars as a reward; if learners obtain the first star upon completion of the course, they can obtain the second star upon completion (extension / review) of the Activity and finally get the third star after learners share their works.
Step 12	Course End	1. Collect and return the course supplies. 2. Encourage learners to learn autonomously and cultivate kids’ interest in model assembly.

Subject Learning- Student Workbook Sample

Subject Course

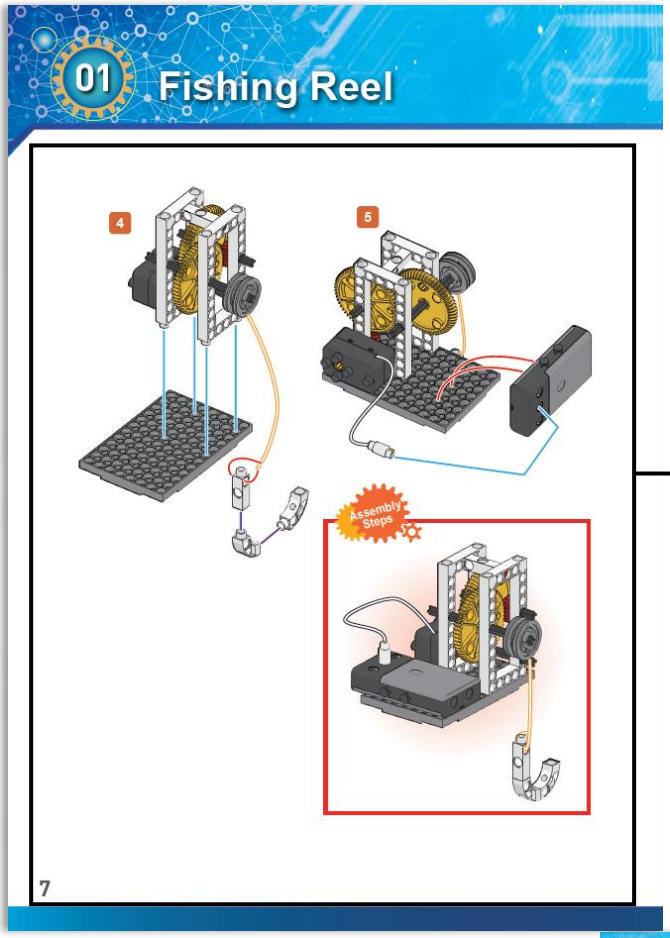
Story Guide

Cognitive Association

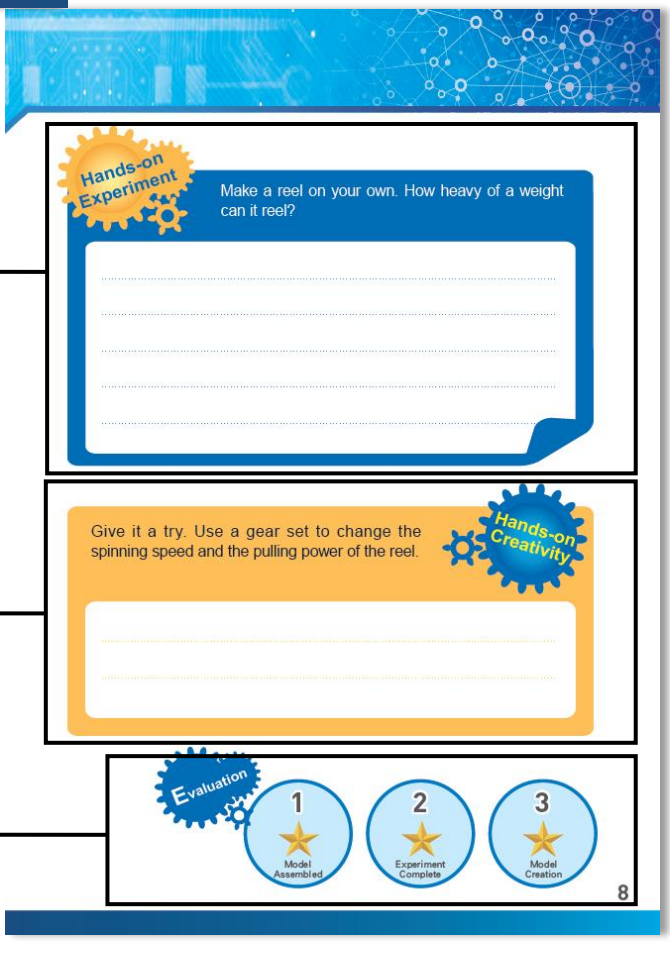


Building Blocks Collection

Teaching Demonstration



Teaching Demonstration

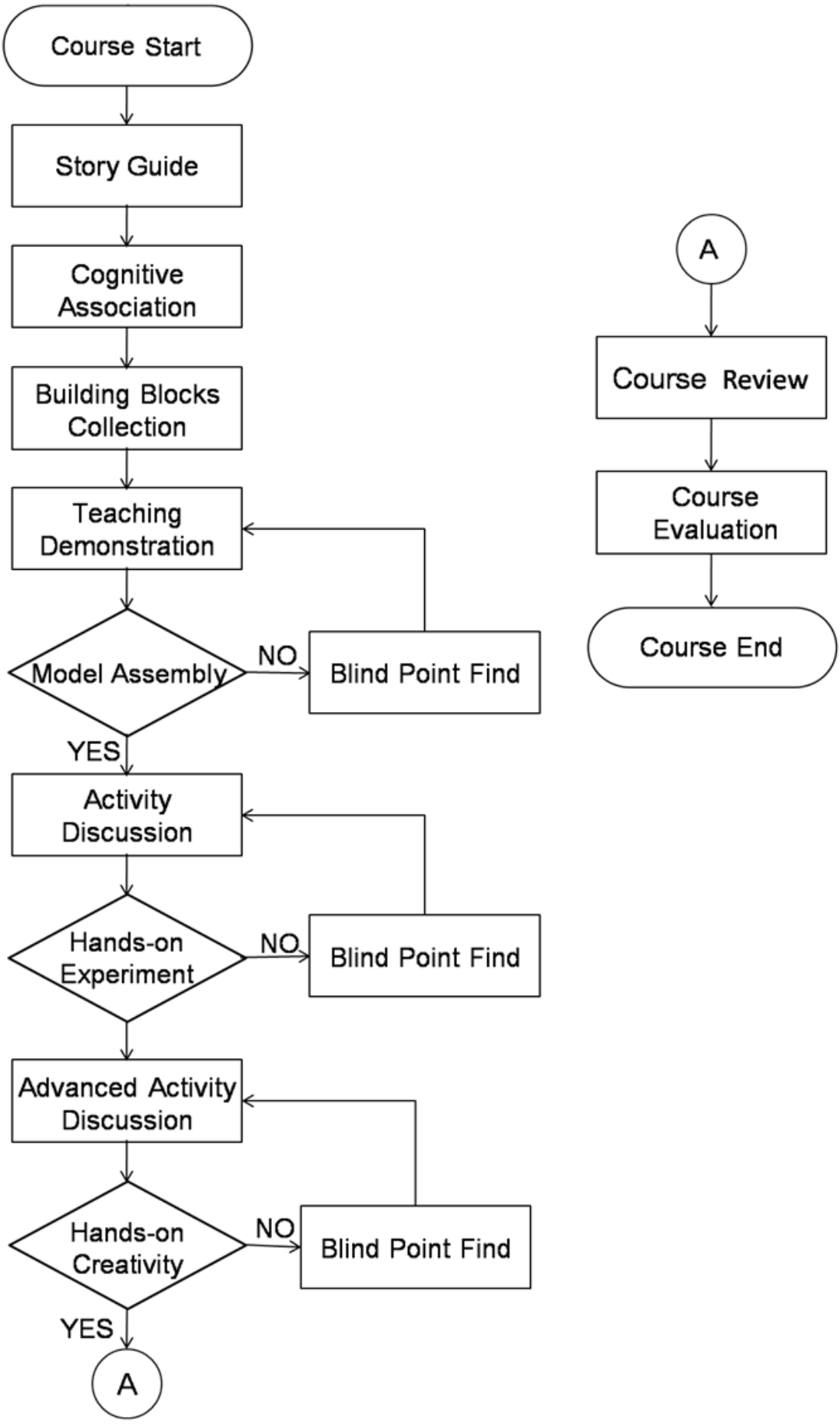


Hands-on Experiment

Hands-on Creativity

Course Evaluation

Subject Learning- Teaching Flowchart (Course Work Analysis)



Creativity Contest- Basic Learning Procedures and Steps

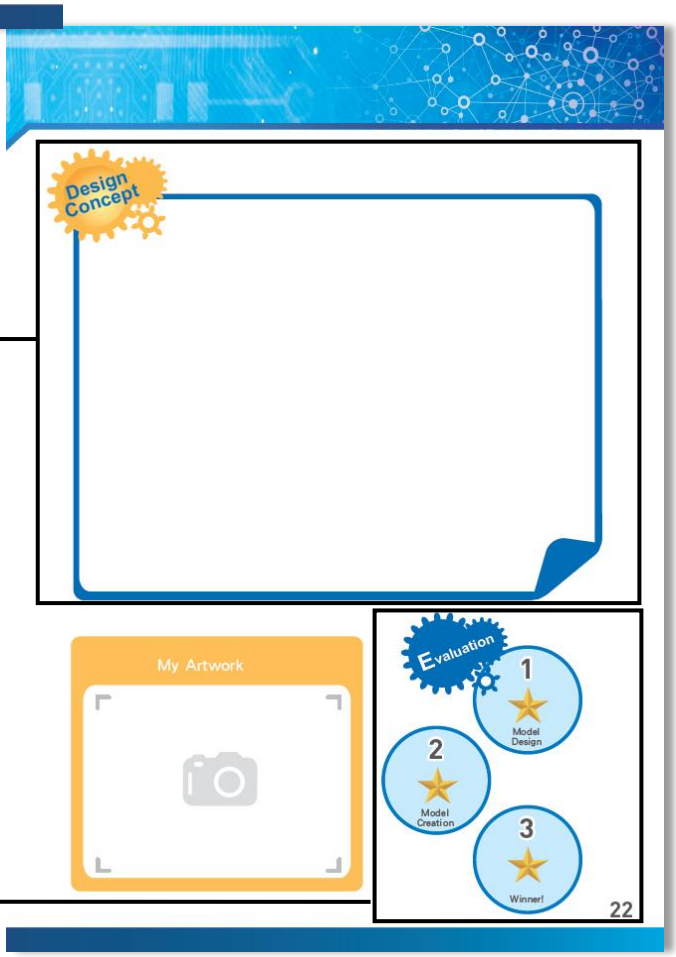
Basic Step	Basic Procedure	Teaching Event Description
Step 1	Preparation	1. Prepare the number of building blocks, student workbook, and basic stationery used in the unit. 2. Prepare teaching knowledge and be familiar with the materials of the unit to perform the following teaching process.
Step 2	Model Review (10%)	1. Recall the first four lessons and make the integration review. 2. Instructors can use question-and-answer method to confirm whether learners have absorbed knowledge.
Step 3	Topics Discussion (20%)	1. Use one-on-one quiz method to guide learners to learn objective-related features; if learners cannot give correct answers, instructors can give direct tips. 2. According to the lesson (example: Please make a drum beating robot based on the learned models and principles.), find the focus of building blocks assembly (for example: Motors, Gears) and then remind learners to pay attention again before assembling.
Step 4	Creative Development (30%)	1. Instructors inspire learners' imagination through images or story scenarios and provide timely assistance to learners. 2. Learners are required to record the process of creative development on the student workbook. 3. The packages of #1300 Smart BT Controller and #1247 S4A Programming Bricks are combined with programming, instructors should lead the learners and correct the misunderstanding immediately, if any.
Step 5	Model Assembly (30%)	1. Learners should assemble building blocks creatively on their own. 2. Develop learners' good habits of asking questions immediately. 3. The packages of #1300 Smart BT Controller and #1247R S4A Programming Bricks are combined with programming, instructors should check the program made by the learners can control the model. If the model movement is different from the original design, instructors should help the learners to clarify the reasons and fix them. 4. If learners cannot assemble the set goal, instructors can give them tips.

Basic Step	Basic Procedure	Teaching Event Description
Step 6	Course Evaluation (10%)	1. Only implement this section after confirming that learners have completed learning the content of this unit. 2. After completion of the work, instructors can hold a contest to test whether the learners' models meet the minimum standards. 3. Instructors use the evaluation form of the student workbook and give learners rating stars as a reward; learners obtain the first star upon completion of the course; they can obtain the second star upon completion of model creation and finally get the third star after instructors assess the outstanding works. 4. Instructors are required to encourage learners to share their model works, build learners' self-confidence, and give feedback and recognition after sharing.
Step 7	Course End	1. Collect and return the course supplies. 2. Encourage learners to learn autonomously and cultivate children's interest in model assembly.

Creativity Contest- Student Workbook Sample

Topics Discussion

Model Review



Creative Development

Course Evaluation

Creativity Contest- Teaching Flowchart (Course Work Analysis)