

# **Bud Green Action—The Aerosol Cultivation System**

## **Project Diary**

### **Determination of the Project Theme**

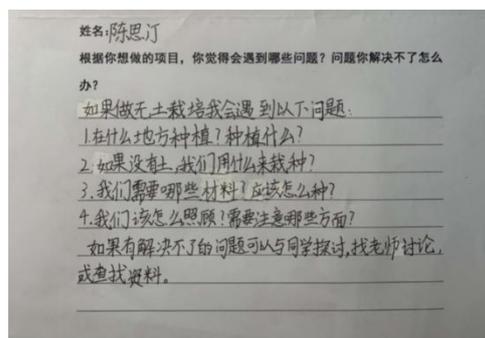
**October 9, 2020    Friday    Sunny**

After the 2019-2020 academic year began, the students of Wen Tianxiang Elementary School visited the Project "Sponge City" Mini-Garden in the Sky created last year, and they were deeply attracted by various plants and insects in the garden. Zhang Xinrun, Li Xitong, Chen Xiaoxi and other students who have participated in this project confidently and generously introduced to others how we have built up such a beautiful garden. The other students also learned the new environmental protection concept of "Sponge City". At the same time, the students' enthusiasm was ignited and they all said that they would also add a touch of green color to the campus.

Then, the students formed a team by themselves and began to comprehensively and carefully observe the campus. It was found that the campus, located in the downtown area of Shenzhen, had relatively few land resources and limited space. After learning that a new science teacher, Dr. Tu, majored in environmental engineering and came to our school this term, the students took the initiative to request Dr. Tu tell them about the planting and cultivation modes of modern agriculture. It turns out that soil-less cultivation is a mature technology in agricultural planting, that not only complies with the current situation of limited land resources in our school, but also agrees with the characteristics of the urban environment.

Therefore, the teacher of the project team left a small task for the students: to learn various ways of plant planting by searching information on the Internet and try to find a solution to the challenge: "add a touch of green color to the campus under the conditions of limited land resources and space". During the presentation, the teachers were surprised by the rich and diverse survey results given by the students. Soil-less cultivation includes not only hydroponic culture but also substrate cultivation and aerosol cultivation. At the sharing meeting, the students compared the advantages and disadvantages of these soil-less cultivation technologies. After heated discussion, they decided to exclude hydroponic cultivation which has low water resource utilization rate as well as the time-consuming and labor-consuming substrate cultivation. Thus, they chose the aerosol cultivation planting method which has the features of water saving, fertilizer saving and zero pesticide residue, in order to solve the land and environmental problems faced by traditional soil cultivation in cities.

In this process, the students had a lot of ideas about the project topics at first, but with the deepening of their investigation and research, they finally chose a creative idea to be practiced on campus: aerosol cultivation.



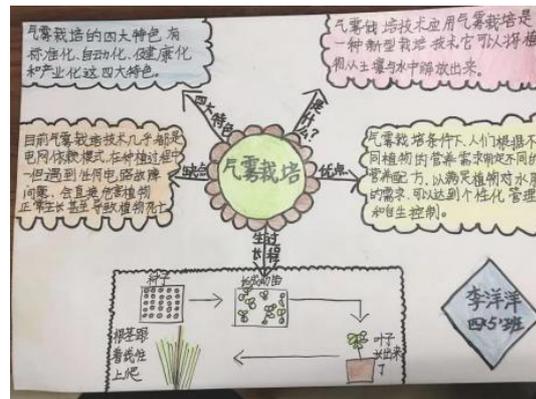
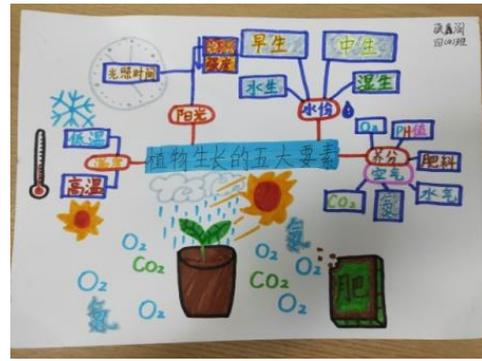
## Understanding the Aerosol Cultivation System

Tuesday, October 13, 2020 Tuesday Cloudy

Based on the idea of "adding a touch of green color to our campus with aerosol cultivation technology" put forward by students, the teachers and students of the project team determined the research direction of the aerosol cultivation system. They set up the "Bud Green Action" project team to conduct research and practice of the aerosol cultivation project by taking advantage of the science class and STEM community. After discussions, the students also worked out some provisions of the team convention, such as having communication and cooperation, voting for disagreement, solving problems together, consulting teachers actively, and so on.

Dr. Tu, the science teacher, also provided students with special trainings on aerosol cultivation. He started with the five elements of plant growth (sunshine, air, temperature, humidity and soil) and guided the students to understand various parts of the aerosol cultivation system and its working principles. Thanks to the information they independently searched on the Internet, the students soon understood that "aerosol cultivation" actually changed the element of soil, replacing it with a nutrient solution to help plants grow.

Students also sorted out the five elements of plant growth and the professional knowledge on "aerosol cultivation" by making mind maps and themed posters with them. From the students' works, we find that they have a deep understanding of aerosol cultivation and that the learning mode which combines the students' autonomous learning and teachers' guidance is of more profound significance to the cognition and growth of students.

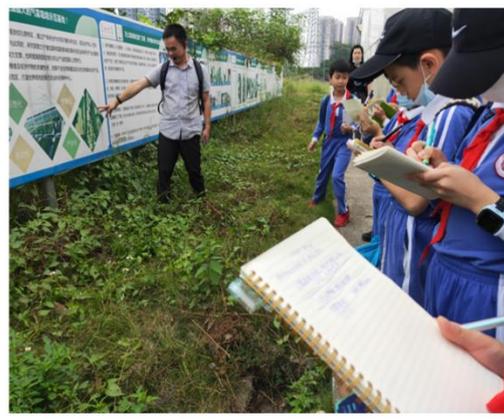


Tuesday, October 20, 2020 Tuesday Cloudy

In order to leave students with a deeper impression, teachers and students of the project team visited the Guanlan Base of Longhua Biological Industry Innovation Research Institute of Shenzhen University, and saw with their own eyes the operating state of the aerosol cultivation systems there. They felt personally that science and technology can change our way of life. Students learned that the aerosol cultivation system consists of a cultivation system and a liquid supply system, as well as that the cultivation system includes a pipe rack, incubator, planting basket and planting cup while the liquid supply system includes nutrient solution, atomizing nozzle, water pump, pipeline and power supply. When the system works, the roots of plants hang and grow in a closed, opaque environment. To provide the water and nutrients needed for plant growth, nutrient solution is intermittently sprayed on the roots of plants by special equipment, under the control of the automatic control system. In the research institute, the students also communicated further with researchers, and asked them about what details they should pay attention to when using the aerosol cultivation system to cultivate plants.

After the study, research and on-the-spot investigation in this period, the students already acquired some knowledge on aerosol cultivation, the new soil-less culture technology. By means of thematic sharing sessions, we learned about the students' understanding and feelings about the aerosol cultivation system. Seen from the effect of the sharing sessions, students have a deep understanding of the aerosol cultivation system in terms of concept, principle and function.

Visiting the research base is also a form of comprehensive practice for the students. It is a valuable opportunity for them to enrich their emotional cognition of science and provides them with valuable experience to carry out similar activities in the future.



## Exploratory Scientific Experiments

Tuesday, November 3, 2020 Tuesday Cloudy

Students know that the essential nutrient elements of plants are necessary for the growth and development of plants, and indispensable for the growth and development of higher plants. Therefore, it is necessary for them to deeply understand and master the influence of various elements on plants. Nutrient solution is the core of aerosol culture. However, due to different compositions and concentrations of various nutrient solutions, their effects on the quality and yield of plant crops are different, and so is their applicability to different crops. For the above reasons, the optimal selection of nutrient solution formula is the core of aerosol cultivation systems.

Students prepared nutrient solutions with total nutrition, nitrogen deficiency, phosphorus deficiency, potassium deficiency and calcium deficiency, respectively, to study the effects of different nutrient elements on the growth of plants (by taking pepper seedlings as an example). Students put the seedlings in the test tubes with different nutrient solutions, which are about 3cm in depth, labeled them, and then took an empty centrifuge tube and added the same amount of water as the control group. They transferred the centrifuge tube to the test tube rack, and placed it on the windowsill with sufficient sunlight, and kept the temperature at 25-30°C. They observed and recorded the growth of seedlings every day, and recorded the changes of temperature and sunlight every day. In each experiment, the three steps must be completed in parallel.

This course takes the scientific knowledge in textbooks as the starting point of students' experiments. It not only fully displays the knowledge points related to nutrient solution, but also keeps students' strong curiosity and thirst for knowledge, restoring them to life. It also creates an environment that simulates scientists solving problems, so that students can feel that they can also solve practical problems in life and production, while even having a sense of pride and accomplishment in the process. Those senses further enable them to gain

the ability to solve problems, and obtain certain innovative ability from the solution of problems.



**Tuesday, November 10, 2020    Tuesday    Sunny**

After reading the instructions for nutrient solution, and in order to determine the most suitable concentration of nutrient solution for plant growth, the students designed a comparative experiment of different concentrations of nutrient solutions under the guidance of the teacher. The students prepared nutrient solutions with different concentrations at the ratio of 1:50, 1:100, 1:150 and 1:200, respectively, to study the effects of different concentrations of nutrient solution on plant growth (by taking the scindapsus seedlings as an example).

Today, I gave the students an example of adding salt to cooked dishes, demonstrating that it is not the more salt you add, the better the dishes, so that they can understand that knowledge comes from life, but it is higher than life.

After observations in this period, the students found that if the nutrient solution lacks any of the elements of: nitrogen, phosphorus, potassium or calcium, the pepper seedlings could not grow normally, and their leaves would turn yellow and wither. The specific experimental phenomena are as follows:

Symptoms of N deficiency: Older leaves will turn yellow from green at first, and sometimes the color of purple appears on the stems, petioles or old leaves of the plants. It is because that when the plants are deficient in N, the nitrogen in the old leaves is transferred to the new tissue to meet the needs of the tissue for nitrogen. For that reason, the symptoms of N deficiency are first shown in the old leaves (to turn yellow from green).

Symptoms of P deficiency: The leaves turn to dark green, and the color of red and purple appears on the stems and leaves. It turns out that the metabolism of phosphorus in plants has the characteristics that it can be transferred and reused. For that reason, the symptoms of phosphorus deficiency are first shown in the old leaves.

Symptoms of K deficiency: The tips and edges of leaves wither first, and gradually become a scorched state. It turns out that potassium can be transferred and reused within the plants. For that reason, the symptoms of potassium deficiency first appear on the old leaves.

Symptoms of Ca deficiency: The growing points are dead, the plants are clustered, and the tips and edges of leaves turn yellow, scorched and dead. It turns out that calcium cannot be easily transferred within the plants. For that reason, the symptoms of calcium deficiency are first shown in the blades of leaves.

To summarize, even though the elements of N, P, K, Ca are all indispensable nutrient elements in the growth process of pepper seedlings, the period of their deficiency is not the same, which shows that the pepper seedlings have different demands for these elements in their growth period. This also reflects the characteristics that the pepper seedlings have different requirement for fertilizers in their growth period. According to these characteristics, students may work out a set of nutrient solution formula schemes suitable for the growth of pepper seedlings. In order to meet the requirements of plants for fertilizers in their different growth period, a set of perfect nutrition management system for aerosol cultivation of peppers should be established.



**Tuesday, November 17, 2020    Tuesday    Cloudy**

During the scientific experiments, a new question suddenly occurred to student Xiao Wei: 'We saw the seedlings grow up gradually, but where did they come from?'. To answer this question, the teachers of the project team decided to add a new task to the project — the Seed Adoption Program.

Dr. Tu first showed the students the process of how plants grow from seeds to seedlings,

and the students could not help marveling at the process. Under the guidance of Dr. Tu, all the students were very active in the seed adoption program. Dr. Tu distributed the seeds of amaranth, lettuce, garlic and spring vegetables to the students. Each student took two kinds of plant seeds home and put them on a wet sponge pad for cultivation. Children are very active. When they go home every day, the first thing they do is to see whether the seeds have sprouted or not and measure how much the buds have grown.

Although various situations occurred in this process, the students insisted on completing the observation plan and gained a precious experience.



种子领养计划之 大蒜 种子观察记录表

班级： 四（5）班 姓名： 陈昱汀

11月19日	11月20日	11月21日	11月22日	11月23日	11月24日	11月25日
11月26日	11月27日	11月28日	11月29日	11月30日	12月1日	12月2日
12月3日	12月4日	12月5日	12月6日	12月7日	12月8日	12月9日
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# The Design of the "Aerosol Cultivation System"

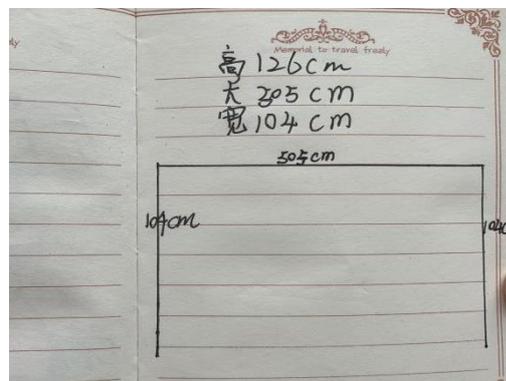
Thursday, November 19, 2020 Thursday Weather Condition: Sunny

In this session, our task is to request the science teacher and the math teacher to instruct the students to determine the appropriate location for setting up the aerosol cultivation system on campus.

At the beginning of class, students had a heated discussion on how to choose the location. During the discussions, we found that the students were able to combine the "five elements of plant growth" with their practical experience gained from the on-the-spot investigations, since they put forward that sufficient light is very important for the photosynthesis of plants. The three favorite places they preliminarily selected are: the playground, the stairs and the platform on the third floor.

Later on, the students began to conduct practical observations and measurement in groups. After observing and recording the sunshine every 45 minutes in the same place, each group calculated and compared the sunshine duration in each location. The students finally determined that it is most suitable to set up the aerosol cultivation system on the platform on the third floor. Students measured the size of the location with a measuring tape, and drew the project location in proportion to the study sheet.

In this process, the teacher gave a brief introduction to the measuring tools and methods, and reminded the students of the matters needing attention when recording the measurement. Students participated actively in the observation and measurement, and completed every step in cooperation.



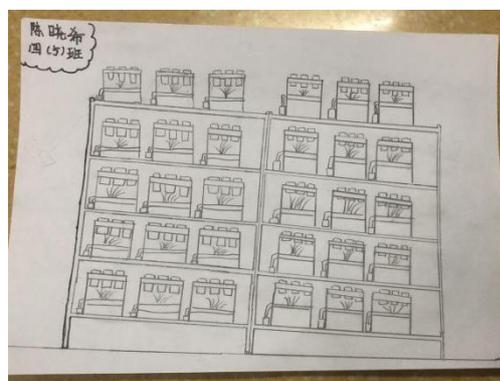
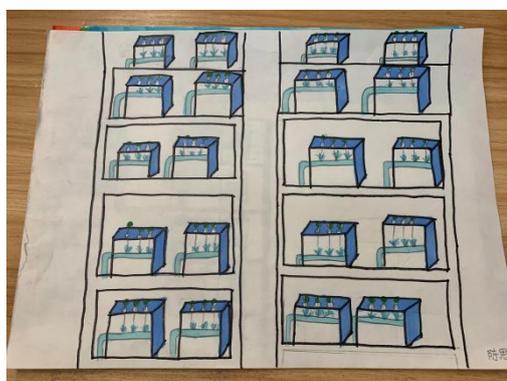
Friday, November 20, 2020 Friday Weather Condition: Sunny

Today, the course group science teacher led the children to design and sketch the design drawing of the "aerosol cultivation system". On the basis of having full access to information and conducting field research in the early stage, each student has his own

idea in mind of the "aerosol cultivation system". Now let's take a look at the children's design ideas!

First of all, the students discussed which type of aerosol incubator they should choose. After drawing on the guidance given by the teachers and what they have seen and heard during the field visit to Longhua Biological Industry Innovation Research Institute of Shenzhen University, students proposed mainly the box-type, pipeline-type and pyramid-type aerosol incubators. After comparing the advantages and disadvantages of these kinds of incubators, and upon heated discussion, the students decided to exclude the pipe-type incubator and the pyramid-type incubator, both of which are too high in size, and chose the box-type incubator which is more convenient to operate in the case of limited space, as in our school. In order to cultivate more plants and add more green color to the campus, and based on the site selection characteristics, the project team determined the design scheme of the three-layer box-type incubator.

According to the design scheme, the students drew their own design drawings of the "aerosol cultivation" devices carefully, they consulted the teachers modestly and communicated with their teammates enthusiastically. After all these efforts, some pieces of exquisite design drawings were completed!



**Monday, November 23, 2020    Monday    Weather Condition: Sunny**

In order to set up the aerosol cultivation system successfully, the students in this session have, under the guidance of the science and mathematics teachers of the project team and after discussions by group, jointly listed out the purchasing list of the tools and materials needed to set up the system.

Then, after learning how to screen plants, the students discussed the suitable growth conditions, growth cycle and other characteristics of their favorite plants one after another. They expressed their opinions enthusiastically and finally determined the plants to be cultivated in this project by following the growth rules of various plants: lettuce, garlic, cherry tomato, celery, water spinach, cabbage, eggplant, pepper, etc.

In the preparatory work, the students solved the problems in the actual situation with the help of knowledge of mathematics and science, successfully realizing the integration of science and mathematics.



第1组  
小组成员: 李彤彤(组长), 陈皓希, 李洋洋, 李瀚宇, 柯宇成

搭建工具材料清单

序号	名称	数量	单价	总价
①	塑料箱	35个	220元	7700元
②	黄漆液	7瓶	29.8元	208.6元
③	架子	6个	538元	3228元
④	宽植杯	950个	0.46元	437元
⑤	插头	15个	2.6元	39元
⑥	海绵	950个	2.4元	2280元
⑦	颜料	15盒	30元	450元
⑧	鱼胶	45瓶	0.1元	4.5元
⑨	超轻粘土	7盒	20元	140元
⑩	彩带	5卷	15元	75元
⑪	手套	50双	1元	50元
⑫	气球	15包	10元	150元
⑬	画笔	30支	2.5元	75元
			合计:	13082.1元

第1组  
小组成员: 李彤彤(组长), 陈皓希, 柯宇成, 李瀚宇, 李洋洋

植物采购清单

序号	名称	数量	单价	总价
①	青菜	100棵	2元	200元
②	大蒜	40棵	2元	80元
③	小番茄	100棵	2元	200元
④	芹菜	100棵	2元	200元
⑤	空心菜	100棵	2元	200元
⑥	土豆	100棵	2元	200元
⑦	茄子	100棵	2元	200元
⑧	辣椒	100棵	2元	200元
			总计:	1680元

## Setting up the "Aerosol Cultivation System"

**Wednesday, November 25, 2020    Wednesday    Weather Condition: Sunny**

Today, after the tools and materials on the list were purchased, the students began to assemble the aerosol cultivation device according to the instructions. The setting up process failed to go as smoothly as expected. At first, as they were unskilled and failed to study the instructions carefully, they set up the racks upside down and had to dismantle and rework them. Soon, under the guidance of the teacher, the students reflected and found out the problems and solutions. As three racks had to be set up, the students are divided into three groups, one group for one rack. According to the drawing, the students set up the racks from the top to the bottom, layer by layer. After three days of hard work, the students set up the racks.

Then, they began to set up the aerosol incubator. Though looking simple in structure, the aerosol incubator is difficult to assemble. This is because they have small parts; some of the parts are not as big as a finger. There are 36 incubators in total, and every six incubators are equipped with a pump, which is connected to the incubators with black pipes.

After the racks and incubators are assembled, the students put the incubators on the racks, so they could transplant plants next. They carefully transplanted the seedlings that they have cultivated with hard work into the planting cups, and put the planting cups with seedlings on the incubators.

Finally, the students learned from the electrician in our school how to carry out power connection and wiring. They designed a control mode of installing a main switch and three sub-switches to control three sets of devices respectively. With the joint efforts of teachers and students, the system is set up successfully!

The moment when the "Aerosol Cultivation System" ran successfully, the students cheered spontaneously and they were full of joy. In this process, the children are not afraid of hardship or tiredness, and they are never discouraged when they encounter any problems. Instead, they overcome all the difficulties by actively searching information, consulting the teachers and even seeking help from the school hands. This is an unforgettable and wonderful process and a memorable one as well!





2020年11月20日 星期六 小雨  
在社团项目课程中，李老师和李老师带领我和同学们一起搭建架子，搭建架子，搭建架子，搭建架子。我们班的同学团结合作，很快就把架子搭建好了。下面就来谈谈你们分享一下我们种植和搭建的过程吧！

首先我们一起到五楼去搭建架子。一开始我觉得很难，可是在李老师和同学们的帮助下，我们很快就搭建好了三层架子。我们特别开心。按照这样的速度，我们很快就把第三层，第一层也搭建完了。然后我们齐心协力把架子又互摆摆到三层。把第一层，第二层和第三层摆到了一起。然后我们画了一张大合影，我们脸上洋溢着灿烂的笑容。

然后，我们第二天在三楼平台上搭建架子。我们先要把架子上的管子固定好，然后把管子

子都安装起来，其中两个管子要放在上端。然后把所有的管子都固定成一个大的架子。

最后，我们和老师一起种植物。首先我们要把土壤准备好，然后把土壤装进大黑塑料袋。最后要把植物的泥土，在厚薄均匀的根包上，然后放在定植杆上，就完成了。

我做花，"花过几天的项目课程学习中，我们学会了团队合作，乐于助人。"

三(3)班  
谢佳妮

2020年11月20日 星期五 晴  
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三(3)班  
陈思汀



## Displaying the "Aerosol Cultivation System"

Monday, November 30, 2020 Monday Weather Condition: Cloudy

The "aerosol cultivation system" which was newly set up has attracted the attention of the teachers and students of our school. The students in the project group suggested, "Why don't we make name plates for the plants? This can not only serve as a decoration, but also facilitate other students to know about the plants!" Students all think it makes sense. Then, students began to make the name plates: some students were good at drawing, and they drew the plants, a feast to the eye, while others write well, and they wrote the introduction vividly, true to life. With everyone's sincere cooperation, the students have successfully produced some well-illustrated name plates for the plants.

After production, the students found that if the name plates were only made of paper, it might be soaked by rain water. Then, they asked the teacher for advice, and the science teacher suggested that they should make plastic name plates so as to be waterproof. Later, the students posted the nameplates of the plants made by themselves on the outside of the incubator one by one, which is really beautiful and helpful to increase their knowledge.

In this process, we can see that the affirmative attitude of the teachers and students of the whole school have greatly encouraged the students of the project team and inspired them to improve the system constantly. It can be seen that timely evaluation and feedback have an important influence on students' enthusiasm for participation, which enables them to generate the internal driving force of learning and creation.



# Observation Record Data

Friday, December 4, 2020 Friday Weather Condition: Sunny

In the period of stable operation later, students collected data by observing and recording the change of height in the growth of plants, as well as the sunshine duration, temperature and humidity of the environment every day. Students also complete the recording form through data collection. I believe that they can truly cultivate their good habit of recording experimental data in this practical task.



日期	12月4日	12月5日	12月6日	12月7日	12月8日	12月9日
①	种植: 深绿色 高度: 1.2cm 温度: 23.5°C 湿度: 57%	种植: 深绿色 高度: 1.4cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.5cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.6cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.7cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.8cm 温度: 23°C 湿度: 57%
②	种植: 深绿色 高度: 1.4cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.5cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.6cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.7cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.8cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.9cm 温度: 23°C 湿度: 57%
③	种植: 深绿色 高度: 1.5cm 温度: 23.5°C 湿度: 57%	种植: 深绿色 高度: 1.6cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.7cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.8cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.9cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 2.0cm 温度: 23°C 湿度: 57%
④	种植: 深绿色 高度: 1.5cm 温度: 23.5°C 湿度: 57%	种植: 深绿色 高度: 1.6cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.7cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.8cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.9cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 2.0cm 温度: 23°C 湿度: 57%

日期	12月4日	12月5日	12月6日	12月7日	12月8日	12月9日
①	种植: 深绿色 高度: 1.2cm 温度: 23.5°C 湿度: 57%	种植: 深绿色 高度: 1.4cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.5cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.6cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.7cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.8cm 温度: 23°C 湿度: 57%
②	种植: 深绿色 高度: 1.4cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.5cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.6cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.7cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.8cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.9cm 温度: 23°C 湿度: 57%
③	种植: 深绿色 高度: 1.5cm 温度: 23.5°C 湿度: 57%	种植: 深绿色 高度: 1.6cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.7cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.8cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.9cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 2.0cm 温度: 23°C 湿度: 57%
④	种植: 深绿色 高度: 1.5cm 温度: 23.5°C 湿度: 57%	种植: 深绿色 高度: 1.6cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.7cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.8cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 1.9cm 温度: 23°C 湿度: 57%	种植: 深绿色 高度: 2.0cm 温度: 23°C 湿度: 57%

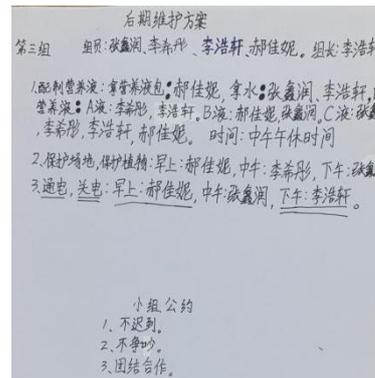
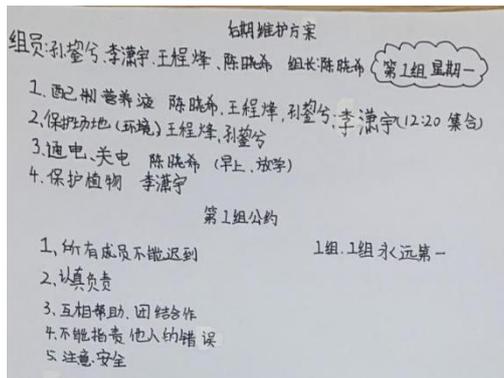
## Making Post-Maintenance Plans

Monday, December 7, 2020 Monday Weather Condition: Sunny

The "Aerosol Cultivation System" is finally completed! Looking at the operating system, everyone was reluctant to leave. In the early stage, after some seedlings withered, the students reflected in time and decided to make a post-maintenance plan for the group, so as to ensure the smooth operation of the system.

All the groups actively put forward their own ideas on the post-maintenance plan. After summarizing, the plan made by the children themselves was born! In the process of its implementation, we found that the students can conscientiously perform their duties, and maintain the "aerosol cultivation system" in batches and periods.

I believe that with the post-maintenance plan, the "aerosol cultivation system" set up by the children themselves can "add a touch of green color" to our campus on the platform of the third floor of our school forever!



## Well-Illustrated Articles about Making the "Aerosol Cultivation System"

Thursday, December 10, 2020 Thursday Weather Condition: Cloudy

Today, the students proposed that if we only rely on the exhibition to publicize our devices, the audience is still very small in number. Under the guidance of teachers, the children think of the question of how to use other ways to expand the influence of their aerosol cultivation system?

The team members had a heated discussion and decided to write down the whole process of completing the project in the form of graphic and text. After some exploration, the members of the group unanimously agreed to publicize the project in the form of preparing well-illustrated articles, which are accompanied with pleasant music, beautiful pictures and sincere introductions from the children.

The children also asked the question of how to let everyone know about such beautiful articles. Some students suggested, "Why don't we design a QR code and put it on the poster? In this way, everyone can scan the code to enjoy the beautiful articles while he is looking at the poster!" Students all think it makes sense. So, the children made the QR code, and you may scan the code to have a look at the beautiful articles!

Children have made a breakthrough in the traditional methods of display and publicity, which shows that they can think by themselves and explore more diverse solutions actively. It can be seen that interests and hobbies are the best force to promote the development of children's creativity and pioneering thinking.

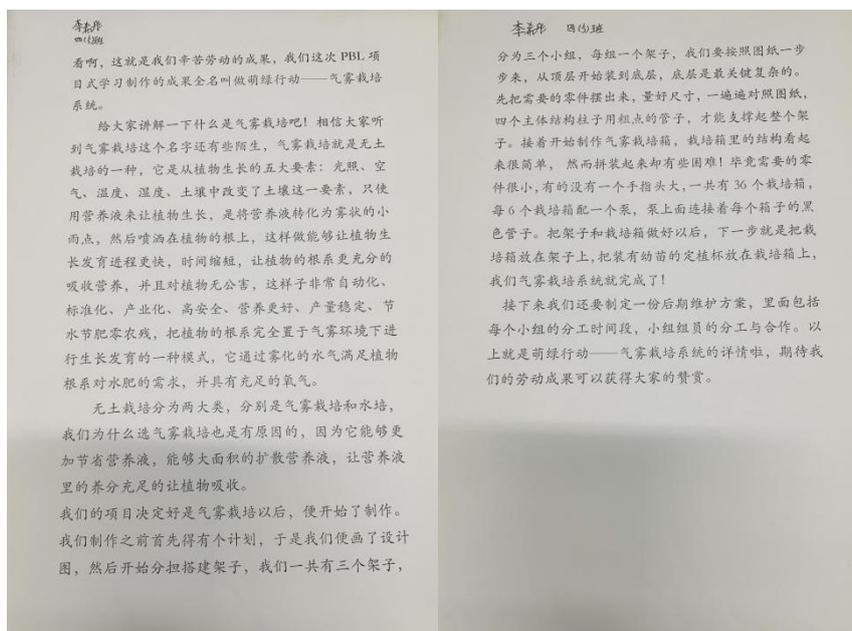


## Write the Commentary on "Aerosol Cultivation System" in both Chinese and English

Monday, December 14, 2020 Monday Weather Condition: Sunny

Next, students need to start preparing for the exhibition. In order to make the exhibition successful, the students wrote a commentary and the reasons why they chose this project and how they completed it. At the end of the commentary, the children also sincerely expressed their good wishes for the success of the project.

In this process, the students discussed in cooperation, reorganized their understanding of the aerosol cultivation system, and described a new object of their firsthand experience with words, which have greatly improved their language application ability and information processing ability. It turns out that words are so powerful! With the well-composed commentary, the children have more confidence in the success of the exhibition!



Hello, everyone. I'm a student from Class 5, Grade 4 in Wen Tianxiang Primary School. Today I want to show you our application of aeroponics.

Aeroponics replaces soil with nutrient solution, so that the root of the plant can absorb the nutrients better. We choose aeroponics because it's safer, more convenient, and more nutritious.

We have made a plan and divided ourselves into three groups. And we worked together to build frameworks and make aeroponics cultivation boxes. It was difficult, but we did learn a lot.

Next we are going to make a maintenance program, which includes division of working time and cooperation.

That's all of my report. Hope you like it!

## Have a Report Meeting of The Project Results

Wednesday, December 16, 2020    Wednesday    Weather Condition: Sunny

Today, the Zhengqi Hall is very lively! The children have invited some experts, community representatives, the teachers, students and parents of the whole school to Zhengqi Hall to participate in the exhibition of the results of the project-based-learning (PBL) course of the Bud Green Action, the aerosol cultivation system.

The representative of the project team came to the podium to introduce the project to the audience, talking with fervor, assurance and confidence, publicizing the concept of "aerosol cultivation", telling them the process of production and maintenance of the devices, and sharing with them the technology of "aerosol cultivation". The aerosol cultivation system set up by the children over three months was really amazing and it won unanimous praise from everyone.

At the project exhibition, Dr. Tao Ming, an assistant researcher at School of Life and Marine Sciences, Shenzhen University who was invited to the exhibition, said that the project was shocking because the children were more serious in doing experiments than some graduate students. Dr. Li Yuting, from the Research Department of Huaqiang Vocational School, said that the children's spirit of active learning and exploration, their problem awareness and their ability to solve problems were really eye opening for her and she was

full of praise for that.

Later, the participants of the exhibition visited the "Aerosol Cultivation System" together, and the student commentator reported in detail the process of setting up the system, and shared with them the happiness and hardships the students have experienced in the process.

At the final stage of the activity, the children also picked and cooked on the spot the fruits and vegetables they had planted, invited the representatives: teachers, students and their parents, as well as experts, to taste them, and shared the results of setting up the "aerosol cultivation system".

This is really a marvelous learning journey and PBL is really an interesting way of learning. I believe the children have gained a lot from this project-based learning activity.





