



## Primary School Division Winner - Chongfu Primary School



Elroy, Yon Jun, Yan Qian

### “Are You Weatherproof?” by “The Sunshine Boys@Chongfu”

#### Objectives

- To promote weather study amongst our pupils
- To promote awareness that weather patterns affect the livelihood of school-going children.

#### Our Milestone Check

The team planned to do the following :

- Formation of team
- Selection of topic for study
- Installation of Mini-Weather Station
- Training on the usage of Console and software
- Setting up of Vantage Pro2 Console
- Installation of Weatherlink software
- Data collection
- Analysis of data
- Downloading of attendances of pupils from School Cockpit
- Conducting of interview among pupils and staff of Chongfu Primary
- Evaluation of project
- Writing of Report
- Putting up recommendations

#### Collection of Data

We set a ten minute time interval for the recording of data on the console so that we were able to capture data for a period of ten days. We downloaded the data during our weekly CCA meeting days. We identified the following variables for our study :

- Amount of rainfall collected
- Outside temperature

Form Teachers in the school were requested to update the daily attendance of pupils in the school cockpit system. The team then started to study if weather changes have affected the attendance of pupils.

To ensure that our study results are accurate and consistent, we interviewed pupils who have been absent during the period of our study. We also interviewed some teachers who had taken ill during the same period of time to affirm our hypothesis.

#### Analysis of Data Collected

We created graphical plots using the Weatherlink software as well as on Microsoft Excel to enable us to analyse the data collected. We superimposed rainfall records and outside temperature against time on a single plot to help us see if there was any correlation.

In addition to this, we exported rainfall and outside temperature data onto Microsoft Excel and examined each variable separately. We calculated the daily average outside temperature and rainfall.

We plotted a line graph to show the average daily temperature. We also plotted a column graph to show the average daily rainfall.

Using the School Cockpit system, we extracted the daily attendance of pupils from 2 February 2006 to 10 March 2006. From the data collected, we plotted the graph of Daily Absence of pupils during this period of time.

#### Hypothesis :

The attendance of school-going children in Chongfu Primary is affected by weather changes.

#### Mentor Teachers :

Mdm Yeo Soek Leng  
Mr Lim Lye Liang

#### Team Members :

Ng Yon Jun  
Tan Yan Qian  
Elroy Yong Han Qin



## Our Findings

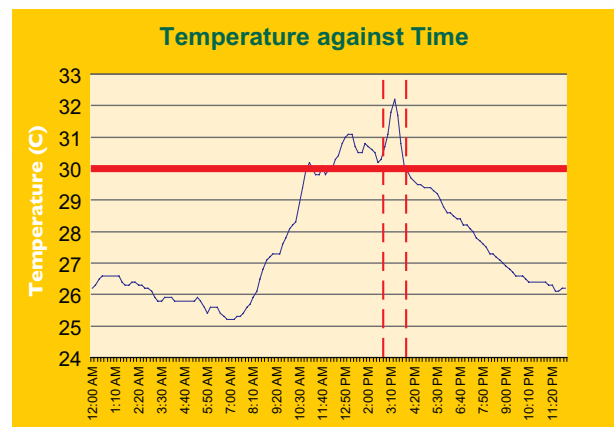
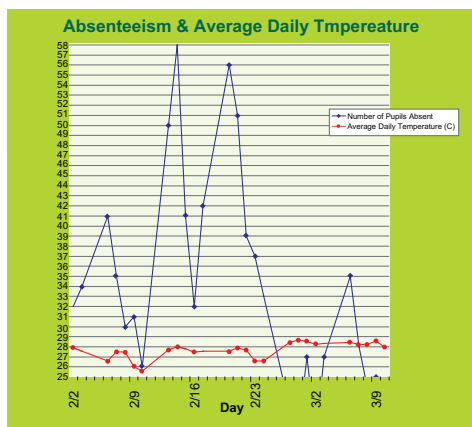
The average daily temperature has a direct correlation to the absenteeism of pupils in our school. This is markedly shown during the period of 13 February 2006 to 22 February 2006.

From the 'Absenteeism & Average Daily Temperature' Graph, we noticed that the rise in absenteeism in our school took place during the period when the average daily outside temperature was high. We were able to affirm our conclusion through the interviews conducted on our pupils and staff who were absent during this period of time.

Though the average daily outside temperature recorded was high from 27 February 2006 to 3 March 2006, the absenteeism rate was low. This was probably due to the fact that it was during the revision and examination week. We interviewed the administrative staff and learnt that during these few days, many pupils actually went home after recess when the examination paper for the day was over. This was further confirmed when we checked the Record of Pupils Leaving School Early book.

The team studied a typical day, 13 February 2006, and noticed that the daily outside temperature between 2.30 pm and 4.00 pm is relatively high. The team chose this day to study as it represents any other day during the period of study.

An outside temperature of 30°C is set as the limit for an outdoor activity to be carried out. The team recommends that teachers conduct outdoor activities only after 4.00 pm. This limit is indicated by the solid red line as shown in the graph below.



## Conclusion

When the average daily outside temperature is high, the absenteeism of pupils in our school is also high. We also discovered that for the next few days after a high temperature was recorded, the absenteeism of pupils would also be high.

With this information, teachers can then plan to conduct less outdoor activities during curriculum and Co-curricular Activities (CCA) times when the temperature is high. They can also advise pupils to drink more water and to stay out of the sun as much as possible after school.

## Our Outreach Effort

The Sunshine Boys showcased our project at the Singapore Science Centre on 21 April 2006 Friday, in conjunction with the Earth Day exhibition put up by Senoko Power Limited.

In order to reach out to a wider audience, we created the following website: <http://www.geocities.com/soekleng/index.html>



Showcasing the project at Singapore Science Centre



## Primary School Division 1st Runner-Up - North Spring Primary School



Team: Weather Bomb  
Gerald Lim Bing Xian,  
Somesh s/o Sallish, Sonia Tan Ser Lin,  
Sandra Yeo Yuan Ning, Tan Zhi Xin,  
Teacher facilitator :  
Miss Esther Ko Mei Chen

### The effect of air temperature on students' memory

#### Purpose

This study tested how air temperature in a learning environment affected the memory ability among a sample of 37 Primary 4 pupils. It was hypothesized that lower temperature would lead to better performance in the test involving memory.

#### Method

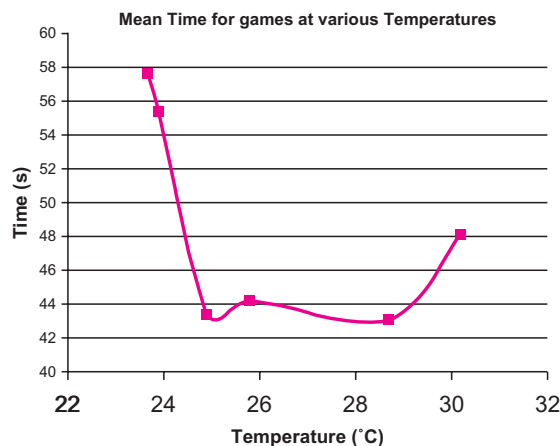
37 average students played a memory game by pairing up 16 pairs of mixed up cards from My Rivercube (A game produced by North Spring Primary). There were 18 females and 22 males, across ethnic groups. The student played games 5 rounds at 6 different temperatures, ranging from 23.7°C to 30.2°C. The students were timed by their partners, and the average timing at each temperature is calculated.

#### Data

The data was collected from January to mid-February.

Temperature (°C)	Mean Time (sec)
23.7	57.58
23.9	55.33
24.9	43.38
25.8	44.15
28.7	42.99
30.2	48.08

The results showed that in the range from 25-29°C, the students' learning ability was better. In the range between 25-29°C, the time taken for the memory game was 43-44 seconds. Outside this range, the time could be as long as 58 seconds.

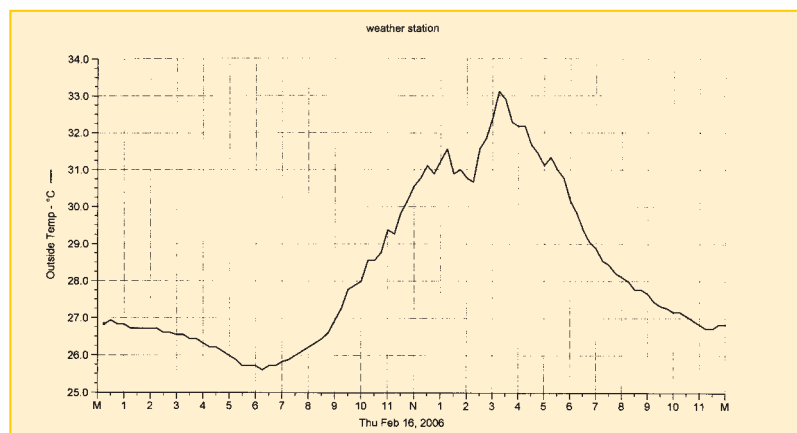




## Discussion and implications

Varying outdoor humidity was not studied in detail here as it seemed to be inversely correlated to outdoor temperature.

From the results, students did better on memory tests at temperatures between 25°C to 29°C, implying a comfort range of temperatures for studying that requires concentration. On a typical day (Thursday 16 Feb 2006), from the temperature chart, the best time to study is from 6 am to 11 am, and from 7 pm to midnight.



1. Thus we suggest that Mathematics and Science periods should be conducted from 7.20 am (a school's starting time) to 11 am. Music (usually conducted in air-conditioned music rooms) and non-academic subjects could be conducted later.
2. We also suggest recess should be at 9.50 am instead of 9.20 am, as temperature starts to rise at the later part of the morning.
3. The afternoon session's students will not be able to concentrate and do as well as the morning session's. So if resources permit, schools should be a single morning session.
4. We suggest that every classroom should have air-conditioning and that the temperature should range from 25-29°C.
5. However, air-conditioning may be too expensive and unfriendly to our environment. Thus fans with water sprayers on each of the pupil's desk could be used instead.
6. Alternatively, a cost-saving and more environmentally-friendly way would be to use mini fans can be used to blow at bowls of water to accelerate evaporation and produce a cooling effect.

On a broader note, if global warming is taken into account, there might be an indeterminate impact on children's mental function. The IPCC (Intergovernmental Panel on Climate Change) projects an average global temperature increase of 0.6-2.5°C in the next fifty years, and 1.4-5.8°C in the next century.

This study could thus be used as a basis for conducting future research of the effects of weather and global warming on learning, and perhaps with a more varied range of students, academically and age-wise.



## Primary School Division 2nd Runner-Up - Si Ling Primary School

Melvin Teh Wey Ho, Vivian Tay Hui Min,  
Joey Goh Xiu Wen,  
Muhammad Lylia B Mohd Hutta,  
Feng Ting Yi

### How accurate is weather forecasting?

Weather is the daily condition of the atmosphere at any one time (Cosgrove, 1991). Weather forecasting is a prediction of what the weather will be like in an hour, the next day or the week after (<http://weathereye.kgan.com>). Weather forecasting is important. It can help the private sector, agriculture, the general public and other meteorologists. In severe weather conditions, short-term forecasts and warnings can help save lives and protect properties. Therefore, it is vital that weather forecasts be as accurate as possible because many people depend on them. This is not to say the forecasts have to be perfect all the time, but they should be in the ballpark every time.

The objectives of this study are: (1) to investigate the accuracy of weather forecasting by Singapore Meteorological Station; (2) to investigate the accuracy of weather forecasting by Vantage Pro 2 console and (3) to compare the accuracy of weather forecasting by the Singapore Meteorological Station and Vantage Pro 2 console.



Our Mini Weather Station on the rooftop.

Figure 1 below showed that Vantage Pro 2 has the most accurate forecast followed by the Meteorological daily forecast and the 3 days outlook. Vantage Pro 2 has around 69% accuracy. The meteorological Station's daily forecast has about 44% accuracy and the meteorological station's 3 days outlook has about 29% accuracy.

The possible reasons for this finding could be that Vantage Pro 2 collected the information of the microclimate around the school and gave forecast based on these data collected. Therefore, we could expect the forecasts to be the most accurate since the actual weather information that we used for comparisons with the forecasts were gotten from the console too. For the meteorological daily forecast, it is not as accurate because the daily forecast is for the whole of Singapore. Thus, though it predicted rainfall, it could mean rainfall in other areas instead of Woodlands. In this case, since we are looking at the actual weather of Woodlands itself, the forecast might appear to be inaccurate. 3 days outlook is expected to be the most inaccurate because weather elements change quickly and thus it could be difficult to provide an accurate forecast for more than a day.

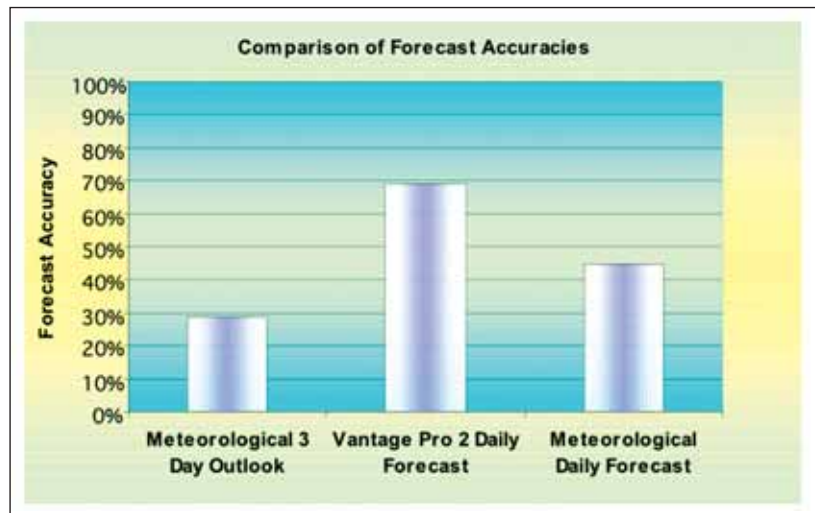


Figure 1: Comparison of Forecast accuracies



*The Weatherpersons and their completed handmade instruments.*



*The Weatherpersons making the homemade instruments.*



*The Weatherpersons interviewing Mr Lee, a weather forecaster.*



*At the National Library doing research for the project.*

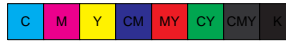
Knowing that Vantage Pro 2 gives an accurate forecast for the area, we hope to be able to work with meteorological station to complement their forecast so that the public could benefit from a more accurate forecast given by the meteorological station.

The visit to the Singapore Meteorological Station and the interview with Mr Lee, a Meteorologist, have enlightened us on the responsibilities of a weather forecaster. We learnt more about the equipments, information used in weather forecasting as well as additional information about weather. It was indeed fulfilling.

In conclusion, weather forecasts are becoming more accurate. Today, predictions of general weather patterns some 5.5 days in the future are as accurate as those 3.5 days made in 1977. The increasing sophistication of computerised weather prediction systems is a major reason for this improvement (Lyons, 1999). From our findings, we could see that Daily Forecast and Nowcast are more accurate than 3 days outlook. Since our Vantage Pro 2 console provides an accurate forecast for our area, we hope that we can work with the Singapore Meteorological Station to provide them with the forecast from our console so that they could in turn provide the public with a more accurate forecast. Not only so, Senoko Power has supplied about 180 schools with the Vantage Pro 2 console and these schools could co-operate with the meteorological station too. Last but not least, the submission of this report is not an end but the beginning to our own weather forecasting!



*A group photo at the preliminary assessment.*



*Lim Jia Min Maries, Teo Ming Ee,  
Remya Nair, Randy Soh, Zest Ang*

## Primary School Division Meritorious Submission

### - South View Primary School

## An Okra's weather journey

### 1. Introduction

Our team from South View Primary decided to go back to basics and investigate if firstly, there is concrete evidence of the effects of global warming on the weather patterns today. Secondly, we want to measure the extent of the effects on our very basic need: food.

### 2. Project Overview

The specific objective of this project is to determine the relationship between the daily weather and the growth of an okra plant. The duration of this whole project was about three months with previous reference to similar background experiments dating from January 2005.

### 3. Background and Research

#### a) Earth's ill health

As a result of burning carbon fuels over the decades, the average global temperature rose 0.7°C. Giant ice sheets in Greenland are predicted to melt and raise sea levels by 23 feet if all the fossil fuels on earth are burnt today. Such numbers have moved the team to carry out our project with greater curiosity.

#### b) Effects of international efforts on Asia's economy

Climate changes affect the growth rate of plants, so that farmers cannot sell the crops to support their livelihood. Thankfully, the Kyoto Protocol actively encourages the different nations to reduce the emission of greenhouse gases by 2012.

However, it will only work when all nations unite. The biggest polluter, the United States, China and India, have yet to join in. The team hopes that this project will alert them to the fact that it is imperative for all of us to take action and unite to prevent further destruction to our planet.

#### c) Scope of project

Since Okra is not found naturally in the wild and is grown more as a cultivated plant, we are able to narrow down the factors of change to just temperature and amount of rainfall by manipulating the soil and water conditions. The manipulation of soil and water also helps to reduce the adverse effects of other factors on the plant. We would like to state that the findings of this project represents the results of a cultivated okra plant and not for all wild okra plants in general.

#### d) South View's unique input to the project

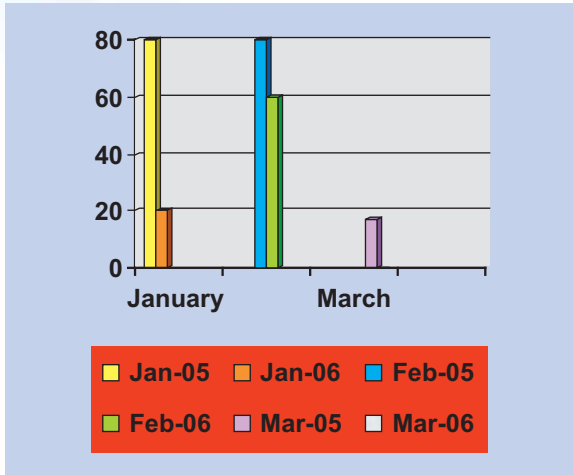
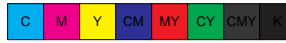
In 2005, as part of our Inter-Disciplinary Project Work, we collaborated with Vision Network to teach us how to grow plants similar to the way needy farmers in Asia grow them. The okra was the plant of choice because its 21-day cycle of growth and harvest was suitable for us to monitor it against the changing weather patterns today. The okra plant is also a cheap source of income with a great harvest. In short, our team wants to conclude for ourselves that such drastic changes in weather patterns would affect the growth of important crops and would ultimately mirror the larger effects seen in the neighbouring economies.

#### e) Factors for plant growth

To ensure that the experiment was a fair one, we continued to use the same plot of land (same location), the same type of okra plant, the same type of soil and fertilizer (wood chips and organic manure) and the same amount of water (amount of 1 watering can) for the project experiment in 2006 as we did in our farming project in 2005.



*Okra plant*



**3. Data Analysis**

We noticed that although the temperature was more or less the same, there was a sharp contrast in the amount of rainfall. The graph below shows the sharp contrast in the levels of rainfall, especially in the month of March.

The shortage of adequate rainfall in 2006 between January and March directly affected the growth of the plant as the height for this year's plant reached a maximum of 23 cm as compared to last year's maximum height of approximately 40 cm.

**3. Project Evaluation**

The results of the growth of the plant this year was indeed a revelation. We never realized how important water and temperature was to the health and success of the okra plant. It shocked us to see that we could not even get a crop like the okra plant, which normally only takes about 1 month to bear fruit, to bear fruit this year, even after 3 months!

The project has certainly taught us more about teamwork and time management. Besides the monitoring of the weather console and the okra plot, we also had to research into environmental issues. This, on top of our regular avalanche of homework, certainly proved rather challenging at times. We are now more well informed and aware of what is really happening to Earth.

The truth about the EL Nino and global warming suddenly became stark reality and the project proved that something had to be done to prevent the already unpredictable weather patterns from deteriorating. Therefore, we hope that the people living on earth would cooperate and take action by not polluting the earth.

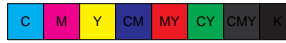


Tending to the garden

We feel that the Kyoto Protocol is of utmost importance as the concerted efforts of many of the industrialized countries will help in preventing the climate changes from further deteriorating.

**4. Conclusion**

We strongly believe that the project is but a small mirror to the situation which farmers in the neighbouring lands are experiencing. The results of this project have exposed us to the negative effects global warming has on our basic need: food. As we come to the end of the project, our eyes have been opened, our hands worn and our hearts have been deeply convicted of the need to inform the rest of the present generation to sit up and take notice that it is up to us to tune our ears to the cries of our ailing earth and to take steps to make the difference.



## Primary School Division Meritorious Submission - Teck Ghee Primary School



*Shea Foo Qi Wei, Dorothy So Sing Woon,  
Mary Rani Das, Lim Hong Yee,  
Keith Ong Kang Wei  
Primary 5A*

### Incidence of respiratory diseases in relation to weather patterns

Over the past decade or so, there have been an increasing number of reports citing the growing problem of global warming affecting the world we live in today. With global warming, there have been many incidences of bad and often severe weather. From unusually dry weather to extremely hazy and smoky days, the quality of human life has been drastically affected. From developing severe respiratory problems to incidences of the common cold and flu, the weather of today has severely affected human lives.

Realizing how the weather may affect the human life, our team of budding scientists decided to find out how the weather has affected, how the weather is affecting and maybe even predict how the weather will affect the lives of the people who live, work, school or commute near the school they are studying in i.e. Ang Mo Kio.

After many brainstorming session with the team and the teachers in charge, the team finally decided to embark on a project to investigate the relationship between the different weather conditions in Ang Mo Kio and the incidences of common ailments affecting the vast and diverse demography of Ang Mo Kio.



*A photo for the album with the preliminary assessment judges*

Weather data for this project were collected from the mini-weather station that had been strategically located in the school compound. The data were analyzed and compared with the incidences of several respiratory diseases that could affect the local population of Ang Mo Kio. The respiratory diseases are influenza and cough, bronchitis, asthma and pneumonia.



*Q & A with preliminary assessment judges*

With so many relevant data of common ailments needed, we realized that we needed to reach out to the community. As such, the team engaged the help of Ang Mo Kio Polyclinic to provide them with the necessary data on a daily basis. They had also spoken to several medical professionals who have provided them invaluable inputs and information on how they (the doctors) feel the different weather patterns will affect the incidences of common ailments in the human population.

Our investigation showed that the number of cases of influenza and cough increased with a mean temperature of over 29°C and on rainy days. On the contrary, no relationship was observed between the number of cases of asthma, bronchitis and pneumonia with that of weather pattern. An explanation for this could be due to the small number of cases reported in Ang Mo Kio to substantially discern any pattern.



With the completion of the project, the team had a greater understanding of the above-mentioned relationship. They also hope with this new knowledge, they would be able to educate and inform the rest of the school population and parents inclusive about the increasing health risk of global warming that we are facing in this world of today. They also hope that by presenting these findings, they would like to inculcate the interest of environment protection or at the very least, care for the environment to all the students, teachers and even some of the parents in the school.