

Individualised Research Study (IRS)

**PROJECT
EXHIBITION 2010**

4 November 2010, Republic Polytechnic
GIFTED EDUCATION PROGRAMME

IRS EXHIBITION 2010

MESSAGE

The 2010 Individualised Research Study (IRS) Exhibition cum Presentation is a showcase of exemplary research projects produced by pupils from the GEP primary centres and School-Based Gifted Education (SBGE) schools. These projects, which cover a wide range of topics, are the products of months of intense research work, fuelled by the pupils' interest, sustained by self-motivation and supported by teacher-mentors. The exhibition not only provides the platform for pupils to present their projects to a big authentic audience, it also serves to inspire pupils in their next research endeavour.

I would like to commend all the pupils whose projects have been featured in this year's exhibition. In these research projects, pupils have applied critical thinking and problem-solving skills to investigate and delve into an area of passion and interest. This demonstration of self-directed learning is one of the 21st century competencies essential in lifelong learning. I hope pupils will continue to uphold high standards and make effective and innovative use of their knowledge in future research work.

The gallery walk with a guided tour led by student leaders from the SBGE schools last year was very well-received and will continue to feature in this year's exhibition. The gallery walks will be customised for P4 pupils, and P6 and S1 pupils. The P4 gallery walk will focus on the projects by the primary school pupils while that for P6 and S1 will focus on projects by secondary school pupils.

As in previous years, outstanding IRS projects that are featured in this year's exhibition will receive Gold, Silver or Bronze Awards to recognise pupils' research endeavours. The reports of projects that have received awards at the exhibition will be published and circulated to primary GEP centres and SBGE schools next January to promote good practices in research work.

Albert Szent-Gyorgi who won a Nobel Prize in Physiology and Medicine in 1937 said, "Discovery consists in seeing what everyone else has seen and thinking what no one else has thought." We hope this exhibition will open up a world of new discoveries for pupils and inspire them to explore the exciting possibilities in research work. Finally, I would like to thank principals and teacher-mentors of the schools for their unwavering support of the IRS Exhibition cum Presentation.



Dr Tan Bee Geok
Deputy Director/Gifted Education
Education Programmes Division

BLANK PAGE

USEFUL INFORMATION

The IRS Exhibition is held at Republic Polytechnic on Thursday, 4 November 2010, from 8.30am to 5.30pm.

Registration

Upon arrival, all participants should report at the foyer at E6 for registration and collection of programme booklets. They should then proceed to their respective venues for the general briefing. (Please refer to the table below.)

Reporting Time	Schools / Participants	Grp	Briefing Venue	Officer i/c	
0800 hrs	<ul style="list-style-type: none"> ▪ Anglo-Chinese School (Primary) ▪ Rosyth School ▪ Tao Nan School 	Pri 4	A	LT-E5	Mrs Lim Wei Ling
		Pri 6	B	LR-E5	Mrs Elaine Yee
	<ul style="list-style-type: none"> ▪ Anglo-Chinese School (Independent) ▪ Nanyang Girls' High School 	Sec 1			
	<ul style="list-style-type: none"> ▪ Catholic High School (Primary) ▪ Nan Hua Primary School ▪ Raffles Girls' Primary School 	Pri 4	C	Agora Hall 1	Miss Teh Chiew Guek
		Pri 6	D		
	<ul style="list-style-type: none"> ▪ Dunman High School ▪ Raffles Girls' School (Secondary) 	Sec 1			
1230 hrs	<ul style="list-style-type: none"> ▪ Henry Park Primary School ▪ Nanyang Primary School ▪ St Hilda's Primary School 	Pri 4	E	LT-E5	Mrs Lim Wei Ling
		Pri 6	F	Agora Hall 1	Miss Teh Chiew Guek
	<ul style="list-style-type: none"> ▪ Hwa Chong Institution 	Sec 1			

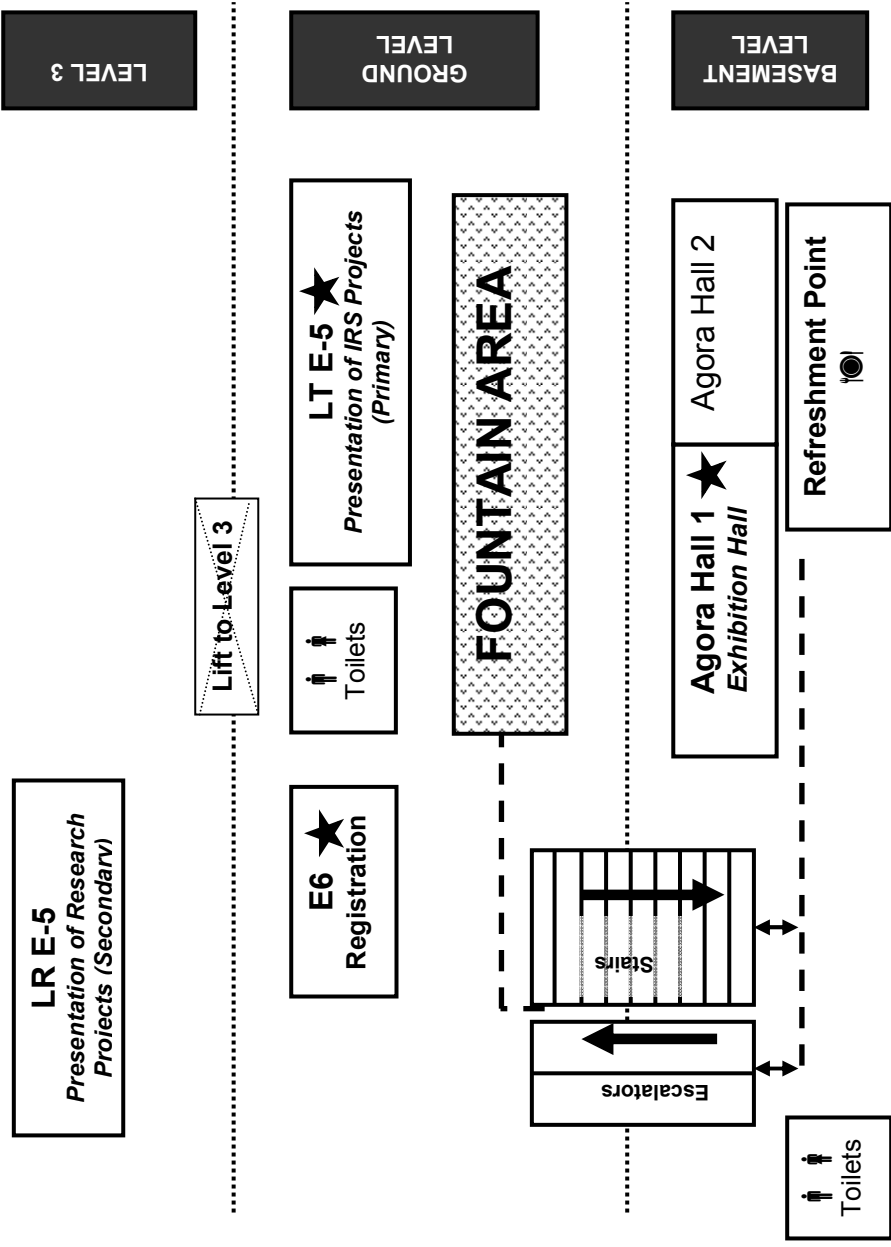
Poster Exhibition (Gallery Walk)

The IRS poster exhibition and gallery walk are held in Agora Hall 1.

Project Presentations

Project presentations are held in LT-E5 for Primary 4 pupils and LR-E5 for Primary 6 and Secondary 1 pupils.

Map



THURSDAY, 4 NOVEMBER 2010
Morning Sessions: 8.30am to 12.00pm
Afternoon Sessions: 1.00pm to 5.30pm

Start Time	Project Presentation (LT-E5 or LR-E5)	Tea Break (Outside Agora Hall)	Exhibition/Gallery Walk (Agora Hall 1)
0830 hrs	Group A (LT-E5) Group B (LR-E5)		Group C Group D
0945 hrs		Group C Group D	
1015 hrs	Group C (LT-E5) Group D (LR-E5)	Group A Group B	
1045 hrs			Group A Group B
1200 hrs	End of Morning Sessions		
1300 hrs	Group E (LT-E5)		Group F
1415 hrs		Group F	
1445 hrs	Group F (LR-E5)	Group E	
1515 hrs			Group E
1630 hrs	End of Afternoon Sessions		
1640 hrs	All oral presenters and exhibitors to be seated in LR-E5 by 1640hrs		
1645 hrs	Prize Presentation Ceremony in LR-E5		
1730 hrs	End		

PRIMARY PROJECT PRESENTATIONS
Venue: LT-E5

Session	Time	School	Project	Presenter(s)
A	0830 – 1015 hrs	Anglo-Chinese School (Primary)	P5 GEP Pupils' Knowledge of Copyright Issues	Muzammil Arif Din s/o Abdul Jabbar
		Anglo-Chinese School (Primary)	Features of Teenagers' Dream Mobile Phone	Tang Cheng Han Calvin
		Rosyth School	Cleaning with Food	Lee Vint Ve Shein Lin Httut
		Rosyth School	Music and Running	Lee Jun Yang, Josh
		Tao Nan School	Tween Secrets	Hazel Ng Kai Jie
		Tao Nan School	Effects of Commonly Consumed Drinks on Tooth Decay	Jazlynn Tan Xiu Min
C	1015 – 1200 hrs	Tao Nan School	Road Safety	Cole Lim
		Catholic High School (Primary)	Best Material to Store Freshly Squeezed Orange Juice	Liu Songtao
		Catholic High School (Primary)	The Lead Portal in Catholic High School (Primary)	Aw Khai Loong
		Nan Hua Primary School	Problems that Left-Handed Pupils Face in School	Clement Neo

Session	Time	School	Project	Presenter(s)
		Nan Hua Primary School	Eye Care Habits of Pupils in Nan Hua Primary School	1. Wong Kok Chee 2. David Yao
		Raffles Girls' Primary School	Which Liquid Hand Soap Is The Best?	Chao Zong-Ying Beatrice
		Raffles Girls' Primary School	Comparison of Antibacterial Properties of Antiseptic Creams	Genevieve Toh Yun Wei
E	1300 – 1445 hrs	Henry Park Primary School	Leonardo Da Vinci: The Man And His Inventions	Cedric Tay Tze Ming
		Henry Park Primary School	Solar Panels	Shawn Chua Wei Jun
		Nanyang Primary School	The Value of Chinese Dialects	Lim Ein Le
		Nanyang Primary School	Tourism in Singapore	Joshua Cheng Xuan En
		Nanyang Primary School	Types of Water Affecting Plant Growth	Low Jia Qian
		Nanyang Primary School	Which Fabrics ?	Alden Tan Ming Yang
		St Hilda's Primary School	Creativity in Computer Games	1. Lee Jia Ming 2. Tan Yi Song
		St Hilda's Primary School	Insecticides: Which One Is Really The Best?	Yeo Jiong Han

SECONDARY PROJECT PRESENTATIONS
Venue: LR-E5

Session	Time	School	Project	Presenter(s)
B	0830 – 1015 hrs	Anglo-Chinese School (Independent)	Finding The Uses of Utricularia Gibba And The Physical Factors Affecting Its Growth And Development	1. Alex Cheah Han Loong 2. Philip Ong Zheng Yang 3. Daniel Chew Sheng Jin
		Nanyang Girls' High School	Making An Environmentally Friendly Cleaning Agent	1. Low Jia Yi 2. Tan Ming Min Belle 3. Tan Mui Yee 4. Wang Hua Xian
		Dunman High School	Formation of Bioethanol from Dead Fallen Leaves	1. Cheong Yu Qian 2. Cassandra Lim 3. Kee Ruo Ting 4. Oh Hui Xian
		Dunman High School	Active and Healthy Ageing	1. Lee Chin Yee 2. Cheryl Ng 3. Soh Jun Hem 4. Huang Bo Ning
		Raffles Institution	A Comparative Study of the Effectiveness of PB2+ Ion Absorption by Crab Shells and Chicken Eggshells	1. Fan Ting Wei 2. Loh Jun You 3. Gong Haoran 4. See Wei Yang

Session	Time	School	Project	Presenter(s)
		Raffles Institution	Investigation of the Effects of Micro Moisture Serum and Biotin on the Tensile Strength and Strain of Human Hair	<ol style="list-style-type: none"> 1. Lawrence Wong Wen Jun 2. Ryan Chua Rui Kang 3. Govind Shankar Ganesan 4. Brian Anugrah Ip Zhi Hao
D	1015 – 1200 hrs	Anglo-Chinese School (Independent)	Finding The Uses of Utricularia Gibba And The Physical Factors Affecting Its Growth And Development	<ol style="list-style-type: none"> 1. Alex Cheah Han Loong 2. Philip Ong Zheng Yang 3. Daniel Chew Sheng Jin
		Nanyang Girls' High School	Making An Environmentally Friendly Cleaning Agent	<ol style="list-style-type: none"> 1. Low Jia Yi 2. Tan Ming Min Belle 3. Tan Mui Yee 4. Wang Hua Xian
		Dunman High School	Formation of Bioethanol from Dead Fallen Leaves	<ol style="list-style-type: none"> 1. Cheong Yu Qian 2. Cassandra Lim 3. Kee Ruo Ting 4. Oh Hui Xian
		Dunman High School	Active and Healthy Aging	<ol style="list-style-type: none"> 1. Lee Chin Yee 2. Cheryl Ng 3. Soh Jun Hem 4. Huang Bo Ning
		Raffles Girls' School (Secondary)	Development of the Ideal Singaporean Coconut Ice-Cream	<ol style="list-style-type: none"> 1. Averil Chow Mingni 2. Cheong Huijing Samantha 3. Rachel Liu Yunyann
		Raffles Girls' School (Secondary)	Soccer Talk: A Systematic Functional Grammar Approach to Analysing Sir Alex Ferguson's Speech	<ol style="list-style-type: none"> 1. Murni Nadra Bte Abdul Rahim 2. Rafhanah Banu Bte Abdul

Session	Time	School	Project	Presenter(s)
				Razar Deborah Roshni Rajaratnam
F	1445 – 1630 hrs	Raffles Girls' School (Secondary)	Development of the Ideal Singaporean Coconut Ice-Cream	1. Averill Chow Mingni 2. Cheong Huiling Samantha 3. Rachel Liu Yunyann
		Raffles Girls' School (Secondary)	Soccer Talk: A Systematic Functional Grammar Approach to Analysing Sir Alex Ferguson's Speech	1. Murni Nadra Bte Abdul Rahim 2. Rafhanah Banu Bte Abdul Razar 3. Deborah Roshni Rajaratnam
		Hwa Chong Institution	Fables: A Parody!	1. Long Jun Da Darrel 2. Chee Jian Li Benny 3. Sia Bao Huei
		Hwa Chong Institution	Team G-Power	1. Teo Zheng Jie 2. Ong Xin Jie 3. Aloysius Oh Shengxun
		Raffles Institution	A Comparative Study of the Effectiveness of PB2+ Ion Absorption by Crab Shells and Chicken Eggshells	1. Fan Ting Wei 2. Loh Jun You 3. Gong Haoran 4. See Wei Yang
		Raffles Institution	Investigation of the Effects of Micro Moisture Serum and Biotin on the Tensile Strength and Strain of Human Hair	1. Lawrence Wong Wen Jun 2. Ryan Chua Rui Kang 3. Govind Shankar Ganesan 4. Brian Anugrah Ip Zhi Hao

**PROJECT ABSTRACTS
PRIMARY SCHOOL SECTION**

1 P5 GEP PUPILS' KNOWLEDGE OF COPYRIGHT ISSUES

Muzammil Arif Din s/o Abdul Jabbar
Anglo-Chinese School (Primary)
Teacher-supervisor: Mdm Chui Yuen Phun

Look out for my
oral presentation!



The aim of this project was to increase the level of awareness of intellectual property rights (in particular copyrights) and issues of plagiarism amongst students, and to educate students that breach of copyright is in some cases as serious as theft. A survey, comprising 13 multiple choice questions, was conducted on 80 Primary 5 mainstream and GEP students from Anglo-Chinese School (Primary). The results showed that whilst most students were aware of copyright concepts, an alarming majority were not aware of the “dos and don’ts” related to plagiarism. The study concluded with a recommendation that teachers conduct specific talks on copyright laws and plagiarism to increase awareness of these issues.

2 FEATURES OF TEENAGERS' DREAM MOBILE PHONE

Tang Cheng Han Calvin
Anglo-Chinese School (Primary)
Teacher-supervisor: Mr Sudhesh Vasu Dash

Look out for my
oral presentation!



The objective of the project was to identify the features of mobile phones which teenagers who are aged 10 to 16 years find desirable. The wide array of mobile phone features can present a confusing choice for mobile phone users. Past studies have suggested that teenagers talk less and use more of other phone features. A survey of 50 teenagers and an interview with a senior manager of a phone manufacturer revealed that the top-rated features included a built-in camera, high quality display and long battery life. The least desirable features were the big cursor key, GPS and PDA. The study also aimed to identify phone models currently available on the market that matched the desired features closely. This information could be useful for phone manufacturers as a roadmap for future phone models.

3 AERODYNAMICS AND DESIGN OF PAPER AIRPLANES

Brjan Kaiji Betzler
Anglo-Chinese School (Primary)
Teacher-supervisor: Ms Woon Yuet Meng

This study explored the concepts of aerodynamics and airplane design using paper airplanes modelled after real airplanes. The investigation undertaken tested the design factors which affected the flight duration (time aloft) of paper airplanes in order to find out which paper airplane design, in relation to real airplanes, had a better flight duration in the air. Through the folding and testing of nine different designs of paper airplanes and interviews with experts, the results obtained showed that the design of the paper airplane with a good performance for flight duration is consistent with the aerodynamics and design of a real “glider” airplane.

4 BEST MATERIAL TO STORE FRESHLY SQUEEZED ORANGE JUICE**Liu Songtao**

Catholic High School (Primary)

Teacher-supervisor: Mrs Anne Goh

Look out for my oral presentation!



The aim of this project was to determine how the amount of ascorbic acid (or Vitamin C) in freshly squeezed orange juice decreased over time after it had been stored in containers made of different materials (aluminium, stainless steel, ceramic, plastic, glass and commercial carton). Two surveys were conducted to support the relevance of this project and to determine the duration of the investigation. A redox titration method involving ascorbic acid and iodine solution with the use of 1% starch indicator determined the amount of ascorbic acid remaining. Findings showed that the amount of ascorbic acid in freshly squeezed orange juice decreased the most in polycarbonate plastic, followed by stainless steel, commercial carton, glass, aluminium and lastly, ceramic containers.

5 THE LEAD PORTAL IN CATHOLIC HIGH SCHOOL (PRIMARY)**Aw Khai Loong**

Catholic High School (Primary)

Teacher-supervisor: Ms Thum Chuay Lin

Look out for my oral presentation!



The Lead Portal in Catholic High is the e-learning platform and communication hub for pupils and teachers. This project was carried out to assess how well the portal had served pupils' needs. The objective was to gather information on what the pupils considered useful and which additional features could be added to improve this portal. A survey with 36 boys from the Primary 5 GEP classes, as well as an interview with the IT Head of Department, was conducted. An analysis of the survey results revealed that the Lead Portal was not popular and had been under-utilised by pupils. In order to boost the popularity of the Lead Portal, 69% of the respondents suggested having a greater variety of games and hyperlinks to other websites.

6 HOW LIFE WAS DIFFERENT IN THE SINGAPORE ARMY DURING ITS EARLY YEARS IN COMPARISON TO THE PRESENT**Kenrick Kwa Zheng Feng**

Catholic High School (Primary)

Teacher-supervisor: Mr Tan Cheng Kwang

The role of the Singapore Armed Forces is to prepare all Singaporean males to defend their country. The aim of this project was to find out how life in the Singapore Army during its early years had been different compared to the present, and the motivation for such changes. This would serve as a useful source of information for future recruits entering the Army to serve their National Service. Through conducting an online survey and personal interviews, the data reflected that the quality of life in the Army was better these days in aspects related to training and living conditions. In general, it was found that life in the Army had improved in all areas and such changes had been made for the welfare of the recruits.

7 CORPORATE SOCIAL RESPONSIBILITY**Dylan Michael Yap**

Catholic High School (Primary)

Teacher-supervisor: Ms Thum Chuay Lin

The aims of the project were to evaluate the importance of corporate social responsibility for companies and to understand the adverse impact on consumers, employees and the community at large when companies fail to uphold corporate social responsibility. Judging from recent events, the belief in the mantra “doing well by doing good” seems to have become eroded in today’s corporations. The question is: are companies sacrificing social responsibility for profit alone? Interviews and surveys were conducted to investigate consumers’ confidence in Toyota in the wake of the safety recall. The results revealed that confidence was not shaken as Toyota has a strong reputation of being a socially responsible organisation through successful integration of social and environmental initiatives into business goals and operations.

8 LEONARDO DA VINCI: THE MAN AND HIS INVENTIONS**Cedric Tay Tze Ming**

Henry Park Primary School

Teacher-supervisor: Mrs Chong Khim Ling

Look out for my oral presentation!



The objective of this project was to increase the awareness amongst students about Leonardo Da Vinci’s talent and achievements in inventions, which are lesser known compared to his art. A survey of 106 Primary 4 to 6 students confirmed the hypothesis that most people were not well-acquainted with Da Vinci’s inventions. This observation was further confirmed by an interview with an Italian artist. The end-products of this research were several reproductions of inventions inspired by Da Vinci’s design concepts. These were targeted at helping pupils to learn more about this Renaissance genius in Science and Technology, and generating their interest in his talent in this area.

9 SOLAR PANELS**Shawn Chua Wei Jun**

Henry Park Primary School

Teacher-supervisor: Mr Yip Yew Fei

Look out for my oral presentation!



This project aimed to study the feasibility of installing solar panels more widely in Singapore. Global warming has become a worldwide issue and there is now a greater urgency than before for every nation to play a part in controlling climate change. Households in Singapore can consider using solar panels to produce the electricity that they are consuming from the burning of coal which is an exhaustible resource. Through an interview with an expert, the various benefits of using solar panels were explored. Results from a survey conducted with parents revealed that many would not consider turning to solar panels as an alternative energy source due to high installation costs.

10 ATOMIC BOMBINGS OF HIROSHIMA AND NAGASAKI**Pang Wen Yuan**

Henry Park Primary School

Teacher-supervisor: Mrs Chong Khim Ling

This project was a qualitative study on the perceptions of the atomic bombings that took place in Hiroshima and Nagasaki during World War II. Interviews were conducted with six persons including two local World War II survivors, two offspring of the survivors and two children aged 10 who studied the events in school. The interviews revealed that the war survivors supported America's decision to drop the bombs in Japan due to their personal experiences with the Japanese during their occupation in Singapore, while the other four interviewees felt differently. The interview also highlighted how personal experiences could affect one's perspectives on past events and how memories of the World War II atrocities had eroded through the generations.

11 PROBLEMS THAT LEFT-HANDED PUPILS FACE IN SCHOOL**Clement Neo**

Nan Hua Primary School

Teacher-supervisor: Mrs Soh Peiwen

Look out for my oral presentation!

The aim of the project was to discover the problems faced by left-handed pupils in the school. Through conducting a survey with 20 pupils from different levels in Nan Hua Primary School, it seemed that left-handed pupils did, indeed, encounter inconveniences. It was also found that these issues affected their school experiences. Upon completion of the project, the results of the study would be shared with the Principal, Vice-Principal and teachers in the school in an effort to raise their awareness of the issue. By doing so, it is hoped that the learning conditions for these pupils would be improved.

12 EYE CARE HABITS OF PUPILS IN NAN HUA PRIMARY SCHOOL**Wong Kok Chee & David Yao**

Nan Hua Primary School

Teacher-supervisor: Mr Yap Kian Wee

Look out for our oral presentation!

The objective of this project was to find out more about Primary 5 pupils' awareness of good eye care habits and whether they practise these habits. It is a worrying sight that a growing number of Primary 5 pupils in Nan Hua Primary School are beginning to wear spectacles. An online survey was administered to Primary 5 GEP/TAG classes via the Survey Monkey portal and hardcopies of the survey were distributed to the mainstream pupils. Altogether, 53 responses were received. After analysing the data, it was discovered that the majority of respondents, although aware of what good eye care habits were, did not practise these habits. Moreover, a small percentage of the pupils remained unaware of good eye care habits.

13 PERCEPTION OF HIGHER CHINESE LANGUAGE LEARNING IN TWINNING CLASSES**Karyn Cheong & Clarice Yeoh**

Nan Hua Primary School

Teacher-supervisor: Mrs Soh Peiwen

This study aimed to find out how Primary 5 pupils in the twinning classes perceived Higher Chinese Language learning in the classroom. The objective was to uncover which strategies used by teachers in these classrooms were perceived by the pupils in the Primary 5 twinning classes to be effective methods that had helped them to learn better. Through the administration of surveys to 30 pupils in the Primary 5 twinning classes, it appeared that the pupils preferred to learn Higher Chinese Language through games. The end-product of the project was the invention of a game that would allow pupils to learn Chinese vocabulary and have fun at the same time.

14 CHEAPEST AND HEALTHIEST BRAND OF ORANGE JUICE**Tan Te Juan**

Nan Hua Primary School

Teacher-supervisor: Mrs Jarina Peer

The aim of the project was to find out which brand of orange juice contained the recommended intake of Vitamin C and was the best value for money. Another objective was to discover if the amount of Vitamin C stated on the carton tallied with the experimental results. The amount of Vitamin C was determined using titration with DCPIP (*dichlorophenolindophenol*). Of the four brands tested, the results showed that all brands contained less than the recommended intake of Vitamin C per serving (200 ml) and the amount stated on the package did not tally with the experimental results. When comparing the brands for the best value for money, the cheapest brand was Brand C; however, it was found that its Vitamin C content was very much lower than the recommended level.

15 LOSS OF NUTRITION IN MILK OVER TIME**Hu Hengxuan William**

Nan Hua Primary School

Teacher-supervisor: Mrs Jarina Peer

Many drinks sold in cafés use milk as one of their ingredients and these drinks are often exposed for a period of time before being consumed by customers at the café. Also, those who purchase milk for home consumption may not place the milk in the refrigerator immediately after opening the carton. The objective of this project was to find out what would happen to the nutritional content of milk over time if left exposed under two environmental conditions (in the refrigerator and outside) in the tropical climate of Singapore. Various food tests such as Benedict's test for reducing sugars, Biuret's test for proteins, Ethanol test for fats and Iodine test for starch were carried out with samples of milk that were left exposed for different durations within a day. The results revealed that there was a decrease in reducing sugars and protein over time in the samples tested.

16 USE OF FACEBOOK BY PRIMARY SCHOOL PUPILS**Zhang Guangxuan**

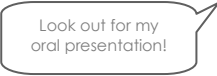
Nan Hua Primary School

Teacher-supervisor: Mdm Shadidah Mokhtar

Facebook is a social networking tool which was originally created for college students. However, it is now popular with many Primary school children, although Facebook recommends that children under age 13 do not register for an account or provide any personal information to them. The aim of this project was to discover the reasons behind Facebook's popularity among the Primary 5 and 6 pupils in Nan Hua Primary School, and gauge their level of awareness on using this online platform safely. Through the administration of a survey, the features of Facebook that appealed most to students as well as some of the negative effects of using Facebook were revealed.

17 THE VALUE OF CHINESE DIALECTS**Lim Ein Le**

Nanyang Primary School

Teacher-supervisor: Mr Mohamad Sapiee bin Mohamad Sabar

Look out for my
oral presentation!



The Speak Mandarin Campaign has been so successful that the younger generations are now unfamiliar with Chinese dialects. The inability to converse in Chinese dialects has also led to a communication breakdown between generations of Singaporeans. The aim of this project was to investigate the value of Chinese dialects. Interviews were conducted with 15 Singaporeans from different generations to gather their views on Chinese dialects. The interviews revealed that although parents were divided as to whether their offspring should learn Chinese dialects, the youngsters unanimously agreed that there was a need to preserve Chinese dialects. The positive response from today's youths, coupled with the willingness of the elderly to open doors to the rich culture of Chinese dialects, will help in the preservation of Chinese dialects.

18 TOURISM IN SINGAPORE**Joshua Cheng Xuan En**

Nanyang Primary School

Teacher-supervisor: Ms Cheng May Ling

Look out for my
oral presentation!



Tourism is a major industry in Singapore and millions of tourists are attracted to Singapore each year. The project sought to find out why tourists pick Singapore as their holiday destination and what Singapore could do to improve its tourism industry. Through conducting a survey with 54 tourists at the Departure Hall of Changi Airport, it was revealed that the top three favourite tourist attractions in Singapore cited by tourists are: the Singapore Zoo, Sentosa and the Singapore Botanic Gardens. The reasons given for these choices included the variety of entertainment available and the beautiful scenery. Although the visitors praised Singapore's tourism industry, they also expressed their desire to see more historical, cultural and natural attractions; improvements in the transport system; and lower admission charges to tourist attractions.

19 TYPES OF WATER AFFECTING PLANT GROWTH**Low Jia Qian**

Nanyang Primary School

Teacher-supervisors: Mrs Chan-Mok Sze Hui & Ms Cheng May Ling

Look out for my oral presentation!



Rising global temperatures is a worrying trend. As plants help to prevent global warming, it is important to know the type of water which helps them grow best. The aim of the project was to identify the type of water which would achieve this purpose. The results would also help to identify the right type of water to use to prevent wastage. An experiment using three different species of edible plants – *Kang Kong*, *Kailan* and *Xiao Bai Cai* – and six different types of water was conducted over three weeks. The height of the plant was measured over time. It was observed that pond water was best at promoting plant growth due to its rich nutrients.

20 WHICH FABRICS?**Alden Tan Ming Yang**

Nanyang Primary School

Teacher-supervisors: Mrs Chan-Mok Sze Hui & Mr Teo Wee Toon

Look out for my oral presentation!



Many consumers buy clothes based on their colour and design, and consideration of the fabrics used may often be merely an afterthought. Some may not even be familiar with the materials used. The aim of the project was to find out how to create an ideal wardrobe of clothes made of different fabrics for people leading different lifestyles. Tests were carried out on four commonly available fabrics – cotton, polyester, wool and silk – to determine their characteristics and suitability as fabric choices for clothes worn on different occasions. Polyester was found to be the most air-permeable and water-absorbent, and it also dried the fastest. Wool was the most wrinkle-resistant and silk was the most comfortable. At the end of the project, the new knowledge gained would help to create an ideal wardrobe for people with different needs.

21 THE EFFECTS OF DIFFERENT DRINKS ON TOOTH SURFACES**Chow Yew Meng Jonas**

Nanyang Primary School

Teacher-supervisor: Mrs Chan-Mok Sze Hui

The aims of the project were to study the effects of different drinks on tooth surfaces and find out the relationship between the acidity (pH level) of the drinks and the loss of tooth substance. An experiment using fifteen premolars, placed in five different drinks, was conducted. The pH levels of the drinks were measured and pictures of the teeth were taken to evaluate the tooth structure before and after the experiment. The erosive potential of the drinks was measured by the amount of weight loss of the teeth. The results of the experiment showed that the lower the pH and the higher the titratable acid of the drink, the greater the erosion of the tooth structure. It was also found that drinks containing certain colouring agents stained teeth surfaces.

22 MAINTENANCE OF PARENTS ACT**Kelly Siah Xinjie**

Nanyang Primary School

Teacher-supervisor: Mr Mohamad Sapiee bin Mohamad Sabar

The aim of the project was to find out whether the Maintenance of Parents Act is a good solution to ensure that children support their parents when they grow old. There is a growing concern that children nowadays do not care much for their parents when the latter grow old, as reflected in many media reports. Through conducting a survey with 62 adults, it appeared that the Maintenance of Parents Act does serve its purpose especially for highly educated adults with high incomes who do not support their ageing parents. Hence, the existence of this Act can help to ensure that these adults play a more active role in parental support.

23 CHICKEN ESSENCE AND MEMORY PERFORMANCE**Leong Shi Ying, Victoria**

Nanyang Primary School

Teacher-supervisor: Mrs Sharon Nathan

The aim of the project was to find out if the consumption of chicken essence helped to improve the memory of Upper Primary pupils. There have been many advertisements claiming that chicken essence is good for one's health and makes one smarter. However, these advertisements do not mention whether it improves one's memory. A survey of 100 Upper Primary students in Nanyang Primary School was conducted to find the prevalence of health supplement consumption in the community. In addition, ten students were chosen to participate in a memory test to validate their memory before and after consuming the chicken essence. The experimental data indicated that chicken essence had a positive impact on the participants' memory. These results suggest that chicken essence may have benefits for both health and memory, but further studies are needed to verify this effect.

24 AN ANALYSIS AND COMPARISON OF BIRTH POLICIES IN SINGAPORE AND JAPAN**Dillon Wong Teck Yuan**

Nanyang Primary School

Teacher-supervisor: Mr Mohamad Sapiee bin Mohamad Sabar

The aim of the project was to compare the different birth policies in Singapore and Japan in order to shed light on what dissuades young couples from having children. The problem of low birth rates is a troubling one for both countries, and despite the introduction of various birth incentives, there have been no improvements in the trends. Through surveys and interviews with Japanese expatriates and Singaporeans, it appeared that material concerns weigh heavily on the minds of young people who would like to have children. The study culminated in the identification of the key factors that could have contributed to deteriorating birth rates. The findings of this study seemed to suggest that the trend of decreasing birth rates was attributed more to individual decisions rather than the availability of governmental support and solutions.

25 VITAMIN C IN APPLES AND APPLE JUICE**Lim Jun Heng**

Nanyang Primary School

Teacher-supervisor: Mdm Ho Siew Hoon

The aim of the project was to compare different Vitamin C sources in fresh apples and apple juice amongst the various brands available on the market. A high consumption of fast food may lead to a decrease in Vitamin C intake, but finding a good source of Vitamin C can help people increase their Vitamin C intake even when consuming the same amount of food and drink. Through an experimental study of four different brands of fresh apples and apple juice, it appeared that fresh apples were a more effective source of Vitamin C than apple juice. It also seemed that the Vitamin C content of the juice might not be reflected accurately on its nutritional label; the Vitamin C content may also be affected by how the juice was transported from one location to the other and how it was stored.

26 WHICH LIQUID HAND SOAP IS THE BEST?**Chao Zong-Ying Beatrice**

Raffles Girls' Primary School

Teacher-supervisor: Miss Jelynn Phua

Look out for my
oral presentation!



The aim of the project was to evaluate five commonly found liquid hand soaps using four factors which users would consider. There is a wide range of such hand soaps and consumers may find it difficult to decide which type of soap to purchase. Through a survey among 75 users, the five most popular brands were identified. The four common factors considered by consumers to be most important in influencing their purchase were antibacterial property, moisturising property, ability to remove grease and price. Experiments were conducted on the hand soaps to objectively evaluate the following: decrease in bacterial count on fingers after use, pH level of the soap solution, ability to mix water with oil and the average price from four shops. The overall results showed that one of the hand soaps emerged a clear winner as the best buy in terms of the ranking rubrics.

27 COMPARISON OF ANTIBACTERIAL PROPERTIES OF ANTISEPTIC CREAMS**Genevieve Toh Yun Wei**

Raffles Girls' Primary School

Teacher-supervisor: Miss Jelynn Phua

Look out for my
oral presentation!



This aim of this project was to discover the antibacterial properties of different brands of antiseptic cream. A survey was conducted to assess consumers' perceptions of antiseptic creams. From the survey results, it was observed that people generally perceived different brands of antiseptic cream to have similar strength in antibacterial properties. However, from the results of the experiments conducted, it was shown that different brands of antiseptic creams did have varying strengths of antibacterial properties. The findings would enable consumers to consider buying the lowest-priced brand (based on price per gram) from among stronger or milder brands to suit their needs.

28 THE EFFECTS OF DIFFERENT TYPES OF RECYCLED WATER ON SWEET POTATO PLANTS**Grace Shen Shen**

Raffles Girls' Primary School

Teacher-supervisor: Mdm Marie Loe

This project aimed to find out if sweet potato plants could survive when watered with different types of recycled water and which type of recycled water was best for plant growth. It is important to maximise the use of recycled water in one's daily activities so as to reduce the demand for fresh water. In this experiment, plants were watered with recycled water (i.e. water obtained from rinsing cups or pots with residual traces of tea, milk and rice) and their growth was monitored over a period of 16 weeks. The results showed that the sweet potato plants could not survive long with water which had traces of milk and tea. Water with traces of rice was found to be best for plant growth.

29 IS CRYSTAL SOIL A SUITABLE SUBSTITUTE FOR WATER IN KEEPING CUT FLOWERS FRESH?**Jeanne Gabrielle Tan Shuen Li**

Raffles Girls' Primary School

Teacher-supervisor: Mr Seah Nam Sin

The objective of the project was to find out if crystal soil is a suitable substitute for water in maintaining the freshness of cut flowers. Crystal soil decreases the risk of mosquito breeding as it stores water in a gel bead. In this experiment, chrysanthemums were kept in flasks with crystal soil, water and charcoal. The flowers were observed over a period of time. The resultant data showed that crystal soil was a good substitute for water.

30 WHICH TYPE OF WATER IS BEST FOR PLANT GROWTH?**Kong Pek Yoke**

Raffles Girls' Primary School

Teacher-supervisor: Mdm Ng Chen Hia

Some people prefer to use rice water for watering plants while others use distilled water. This study compared the effects of three different types of water on plant growth, namely distilled water, tap water and rice water. In the experiment, the plants were watered with the different types of water over several weeks and their growth was monitored from the third week onwards so as to optimise the experimental conditions. Burnt soil was used to ensure that plant growth was not due to the amount of nutrients found in the soil. The results showed that the plants grew best when watered with rice water.

31 CLEANING WITH FOOD**Lee Vint Ve Shein Lin Htut**

Rosyth School

Teacher-supervisor: Mrs Esther Koh & Mrs Koh Yong Yong

Look out for my oral presentation!



It is a common speculation that some popular carbonated beverages have cleaning properties. This claim had previously been disproved on the popular documentary series, *Mythbusters*, but the idea of integrating the cleaning properties in other foodstuff into real-life applications remained intriguing. Household substitutes for dishwashing liquid or detergent to remove grease (cooking oil stains) on plastic food containers were investigated. The aim was to find the best household substitute for detergent that would make cleaning grease off plastic containers and similar materials easier, and also to provide a cheap and convenient alternative for detergent. Several food substances were selected as testing liquids including diluted lemon juice, baking soda solution, vinegar and two brands of carbonated drinks. These foodstuffs were chosen for their high acidity levels as acids have been known to be used in commercial detergents and other cleaning agents. It was found that foods containing citric acids were the most effective cleaning substitutes for detergent.

32 MUSIC AND RUNNING**Lee Jun Yang Josh**

Rosyth School

Teacher-supervisor: Mrs Esther Koh & Mrs Koh Yong Yong

Look out for my oral presentation!



Researchers believe that people respond to music with different tempos when exercising. This project aimed to find out which types of music help people to feel less tired when running or jogging. An experimental design with three different types of music was applied. Participants were asked to run or jog for a distance of 3.6 kilometres while listening to music; this process was carried out three times for each participant, with the participants listening to a different type of music each time. The time taken for participants to complete the run and their perceived levels of exhaustion before and after each run were recorded. These results were analysed and referenced with the participants' responses to a survey on the topic of the relationship between music and exercise.

33 THE EFFECT OF ANTIOXIDANTS ON SLOWING THE RATE OF OXIDATION**Ace Ang**

Rosyth School

Teacher-supervisor: Mrs Esther Koh & Mrs Koh Yong Yong

Oxidation is a natural process which occurs when materials are exposed to free radicals in the environment and has an impact on various aspects of physical health. Negative consequences of oxidation can be prevented by adopting a healthy diet. The aim of the experiment was to investigate the effect of some common types of antioxidants on reducing the rate of oxidation when applied to food sources. An experimental design with the liquids milk, green tea and lemon juice, and one control set-up was applied to four slices of apple and the changes observed were recorded on video. It was found that lemon juice slowed down the rate of oxidation best due to its high content of ascorbic acid, an antioxidant.

34 CREATIVITY IN COMPUTER GAMES**Lee Jia Ming & Tan Yi Song**

St Hilda's Primary School

*Teacher-supervisor: Mr Tan Boon Tee*Look out for our
oral presentation!

Currently, many pupils play computer games for the pure fun of it. The aim of this project was to find popular games that could help to promote creativity in pupils, as creativity is an essential and valued trait in the twenty-first century. A survey was conducted on all the GEP pupils in St Hilda's Primary School to identify the five most popular computer games and these were evaluated using a self-designed rubric on creativity which was written based on the attributes of creative people. The games which were found to be popular with students were ranked using the rubric in increasing order of their abilities to help foster creativity among pupils.

35 INSECTICIDES: WHICH ONE IS REALLY THE BEST?**Yeo Jiong Han**

St Hilda's Primary School

*Teacher-supervisor: Mr Tan Boon Tee*Look out for my
oral presentation!

The aim of the project was to find the most effective brands of insecticides in terms of cost, speed of killing insects and safety to users. This could help consumers make a more informed choice when purchasing the product. Through a survey administered to the parents of GEP pupils in St Hilda's Primary School, it was found that buyers usually looked out for factors such as cost, safety and speed. In addition, an experiment was conducted to test the speed of the insecticides in killing insects, data was gathered at a supermarket on the prices of the various brands of insecticides, and research was carried out on the safety of the ingredients found in the insecticides. Of the insecticides tested, it was found that Brand X was the cheapest brand, while Brand Y was the safest brand of insecticide which killed insects at the fastest speed.

36 COPING WITH ASPERGER'S SYNDROME: A PERSONAL JOURNEY**Ryan Ch'ng Wei Han**

St Hilda's Primary School

Teacher-supervisor: Mr Tan Boon Tee

People with Asperger's Syndrome, sometimes known as "Aspies", commonly experience some challenges in schools. They are at times discriminated against, misunderstood, mistreated or bullied. The aim of the project was to learn more about some strategies that would help pupils with Asperger's cope with the condition and to raise awareness in school. The research draws on the personal experiences of a pupil with Asperger's Syndrome. Through a survey of the three levels of GEP classes in St Hilda's Primary School and an interview with an expert on the condition, it was found that people were aware of Asperger's Syndrome, but did not want to or did not know how to help with this condition. The end product of this research was a pamphlet promoting awareness and tolerance of Asperger's Syndrome. It is hoped that this pamphlet will help to generate acceptance of "Aspies" amongst pupils in schools.

37 TWEEN SECRETS**Hazel Ng Kai Jie**

Tao Nan School

Teacher-supervisor: Ms Delisa Ng Shao Chui

Look out for my oral presentation!



Tweens, a popular term for pre-teen children, are faced with numerous challenges as they juggle several demands in their daily lives. The aim of this project was to find out more about the problems Primary 5 pupils in Tao Nan School would not confide in their parents or guardians, and how these tweens would handle such problems. A survey of 91 Primary 5 pupils in Tao Nan School revealed that the top tween secret dealt with boy-girl relationships issues, while the top confidants for tween secrets were classmates, siblings and other friends (excluding friends met online). For the majority of tweens who would not confide in anyone, they would ignore the problem and hope that it would go away. The findings provide useful information for creating more effective sources of help for troubled tweens.

38 EFFECTS OF COMMONLY CONSUMED DRINKS ON TOOTH DECAY**Jazlynn Tan Xiu Min**

Tao Nan School

Teacher-supervisor: Mrs Ngho Sze Wei

Look out for my oral presentation!



The aim of this project was to find out which common beverages caused tooth erosion and to compare the degree of erosion from different beverages. This project was chosen to understand how sweet and acidic beverages could have a harmful effect on teeth so that people would be more mindful of what they consumed. For the purpose of this research, two experimental set-ups – one using eggshells and the other human teeth – were used to investigate the degree of erosion. An acidity test of the beverages was also conducted. In general, the results showed that the more acidic the beverage, the higher the degree of erosion.

39 ROAD SAFETY**Cole Lim**

Tao Nan School

Teacher-supervisor: Mrs Ngho Sze Wei

Look out for my oral presentation!



The traffic at the junction of Marine Parade Road and Still Road, near Tao Nan School, is usually very heavy every morning, and raises questions on whether this traffic condition poses problems to Tao Nan School pupils who cross at this junction when travelling to school. The aim of this project was to investigate the factors at this junction which may threaten the safety of pupils. Through an observational field study, it was noted that pupils did face safety issues when crossing at this junction. A survey conducted with 155 Primary 5 and 6 pupils found that many did not actually practise road safety habits when crossing the road. The information gathered could be provided as constructive feedback to Tao Nan School and the respective authorities, so that necessary action could be taken to provide a safe passage for pupils crossing at the junction.

40 RECYCLING AWARENESS AND ATTITUDES**Wong Yu Shuen, Justin**

Tao Nan School

Teacher-supervisor: Mdm Lee Chin Min

The aim of this project was to find out the level of awareness on recycling and to explore creative means to raise awareness on this topic among pupils of Tao Nan School. Although recycling bins can be found in the school, it has been observed that the pupils have not made recycling a habit. A survey was conducted on Primary 5 pupils and the results showed that although most pupils were aware of recycling and its potential impact on global warming, they would recycle only if they were reminded or if it did not require much effort. It is hoped that the results of this project would increase the awareness on recycling in Tao Nan School and reinforce positive recycling habits among pupils.

BLANK PAGE

**PROJECT ABSTRACTS
SECONDARY SCHOOL SECTION**

1 FINDING THE USES OF UTRICULARIA GIBBA AND THE PHYSICAL FACTORS AFFECTING ITS GROWTH AND DEVELOPMENT**Alex Cheah Han Loong, Philip Ong Zheng Yang & Daniel Chew Sheng Jin**

Anglo-Chinese School (Independent)

Teacher-supervisor: Mr See Boon Tiam

Research was carried out on the floating bladderwort, *Utricularia gibba*, to selectively inhibit its invasive growth pattern. Physical factors, such as pH level, salinity, and nutrient concentration, were tested for their effects on the growth of the plant as a group. The effects of the presence of cultured paramecium were also observed separately. It was found that the floating bladderwort grew best under slightly acidic conditions with low salinities. Lower nutrient levels caused a growth spurt, whilst higher nutrient levels resulted in a more controlled, healthy growth pattern. Unusual results of rapid health degeneration were observed in the cultured paramecium experiment. Furthermore, a nitrate test was conducted on the plant to assess its suitability for bioremediation. However, the amount of nitrates tested was too much compared to the amount of bladderwort tested. Further research in bioremediation and phytoremediation are currently being conducted.

2 EXAMINING THE POSSIBILITY AND EFFECTIVENESS OF USING AIR BUBBLE FOR REDUCING FRICTION OF WATER ON SHIP HULL**Ho Dang Khoa**

Anglo-Chinese School (Independent)

Teacher-supervisor: Mrs Durai

Due to drag (water resistance), vehicles travelling in water have lower average speeds compared to land vehicles or aircraft. This study investigated the possibility of using air bubbles to reduce the friction of water on these vehicles in order to achieve higher speed, by measuring the time taken for a model ship to travel along a fixed tube continuously filled with varying amount of air bubbles. The changes in speed in different cases were analysed in relation to the amount of bubbles pumped, while other factors such as initial speed, the amount of water in the tube, size of the tube and force exerted on the ship were also examined.

3 STUDENTS' PERCEPTIONS OF ROOFTOP GARDENS**Samuel Wang Shao-en, Phi Khanh An & Sashikumar Kannappan**

Anglo-Chinese School (Independent)

Teacher-supervisor: Mdm Sarah Huang Gui E

This project aimed to examine the perceptions of students from Anglo-Chinese School (Independent) of rooftop gardens and compare these against factual data about rooftop gardens and indoor vegetation. It was hypothesised that most students from Anglo-Chinese School (Independent) would lack knowledge on rooftop gardens but support the concept as one which was beneficial to the environment. A survey conducted on 40 students corroborated the lack of knowledge of green initiatives amongst students. The survey results also showed that the students rated low in caring for the environment, and viewed this as the responsibility of the government.

4 FORMATION OF BIOETHANOL FROM DRIED FALLEN LEAVES**Cheong Yu Qian, Cassandra Lim, Kee Ruo Ting & Oh Hui Xian**

Dunman High School

Teacher-supervisor: Ms Quah Ya Lin & Mrs Lim-Chua Sheau Horng

The rapid depletion of fossil fuels over the years has led to the need to source for alternative, renewable energy. Research conducted on the production of bioethanol, a form of renewable energy, has dealt mostly with crops like corn, sugar canes and fresh leaves. However, due to the land size needed to grow such crops, these ideas lack feasibility in land-limited Singapore. The purpose of this project was to investigate the potential of dried fallen leaves, which are easily available here, as an alternative source of biomass for the production of bioethanol. The leaves were powdered, dried and autoclaved before being treated with cellulase and β -glucosidase at room temperature for 72 hours. For every 3 grams of powdered dried leaves, an average of 0.5 grams of reducing sugar was obtained, and the spectroscopic method was used to quantify the reducing sugar content. The results showed that the percentage recovery of glucose from every 3 grams of powdered, dried fallen leaves was more than 80%, which is reasonably close to the 90% recovery from fresh leaves in previous literature. This not only holds possibilities for the use of dried fallen leaves for green energy production, but may also contribute to a more effective waste management system through converting the leaves into biomass instead of incinerating or disposing of them.

5 ACTIVE AND HEALTHY AGEING**Lee Chin Yee, Cheryl Ng, Soh Jun Hern & Huang Bo Ning**

Dunman High School

Teacher-supervisor: Mrs Koh Swee Ling

The aim of this project was to promote active and healthy ageing in the present and future generations, in view of Singapore becoming a rapidly ageing society. A growing population of elderly people means greater specialised care, such as medical facilities, old-age pensions, and activities for their inclusion, is needed. An ageing population can bring about social and economic challenges to the society; hence, it is important to encourage and lead the elderly to adopt active lifestyles so that they can remain active contributors to the community. To enable present and future generations to continue to lead fulfilling and healthy lifestyles in their retirement, active and healthy ageing was actively promoted through outreach activities and engaging the young in Community Involvement Programmes (CIP). Overall, despite some unforeseen setbacks, it was found that knowledge of active and healthy ageing was enhanced among the younger generations.

6 ARE ORGANIC FERTILISERS MORE EFFICIENT IN ENHANCING PLANT GROWTH THAN CHEMICAL FERTILISERS?**Louisa Chiang, Kee Ga Jing, Megan Quek, Tan Hui Yee**

Dunman High School

Teacher-supervisor: Miss Christine Tan

Organic fertilisers, such as food waste, occupy space in landfills, whilst chemical fertilisers cause pollution and damage to the soil. This project focused on finding out which type of fertiliser was a better option in enhancing plant growth. In this experimental study, banana peel was used to represent the food waste organic fertiliser, with tomato seeds as test subjects. The organic fertiliser was found to enhance the seedlings' growth better than the chemical fertiliser. It was hoped that findings from the study would encourage people to use food waste as fertilisers for their plants, so as to practise recycling, conserving landfills and protecting the earth from pollution that could be caused by chemical fertilisers.

7 POLLUTION, POLLUTION GO AWAY: A PROJECT WHICH AIMS TO REDUCE WASTE POLLUTION IN SINGAPORE**Inez Yeo, Ng Yuan Hui, Sonia Tan Ying Ying & Tee Jia Xin**

Dunman High School

Teacher-supervisor: Miss Christine Tan

Recent reviews by the National Environment Agency classified Pasir Ris Beach as unsuitable for swimming due to the degree of contamination in its water quality. In order to find out how water pollution affected aquatic plants in Singapore, an investigation of the chemical silica and pH levels of water samples in Singapore was undertaken. Samples of water from various natural water sources from Labrador Park, Alexandra Canal, Geylang River and Pasir Ris Beach, as well as the aquatic plants growing in them, were collected. One hypothesis was that increase in human activities such as rubbish disposal would lead to the increase in silica and acidity in water samples. The impact of water pollution in Singapore was projected based on the chemical silica and pH levels in the samples collected; recommendations on how to reduce the effects of pollution were made based on these findings.

8 RAINWATER HARVESTING IN SCHOOL**Esther Chok, Ng Kai Sing, Ong Xiao Qi & Gloria Poh**

Dunman High School

Teacher-supervisor: Mrs Lim-Chua Sheau Horng

Dunman High School uses a significant amount of water each day. This project aimed to design a container for collecting rainwater and a filtering system to aid in ensuring a sustainable and safe water source for the school. In comparing two types of containers, it was found that the amount of rainwater evaporated in a normal plastic container was 61.7% more than the designed Rainwater Harvesting Container (RHC). After being filtered through the experimental system, the rainwater also proved to be 11-15% cleaner than before it was filtered, reaching a light intensity of 287.3lx, close to the light intensity of tap water, 295.8lx. The findings suggested that rainwater was a potential source of non-potable water using the self-designed RHC and filtering system.

9 INVESTIGATION OF FACTORS CONTRIBUTING TO THE EFFECTIVENESS OF BIRD SANCTUARIES IN EAST COAST PARK**Chua Sing Rue, Aileen Chua Xing Ting & Phua Wen Ting**

Dunman High School

Teacher-supervisor: Miss Pear Siew Li

With Singapore's rapid industrialisation, natural habitats are increasingly being destroyed to make way for skyscrapers. To address this issue, the government intended to transform East Coast Park into a successful recreational area with natural characteristics such as a large diversity of birds. However, few birds can be found in the bird sanctuaries especially created at East Coast Park, suggesting that the bird sanctuaries have been ineffective in attracting birds. This project aimed to investigate the limited success of these bird sanctuaries. Three locations in East Coast Park (including a bird sanctuary) with distinctive features and different degrees of human impact were selected for an observational field study. At each location, various species of birds which were attracted to the site were identified. The data were analysed to reveal the bird diversity and abundance of these three sites using the Simpson's Diversity Index, with the results informing the evaluation of the success factors in attracting birds to each of these three sites.

10 FABLES: A PARODY!**Long Jun Da Darrel, Chee Jian Li Benny & Sia Bao Huei**

Hwa Chong Institution

Teacher-supervisor: Ms Huang Si Jian

The fable is undoubtedly one of the most widely-read forms of literature, with the didactic lessons conveyed meant to be relevant to all age groups. However, with certain values rendered obsolete as a result of globalisation and the advent of technology, the fable may appear to have become irrelevant. Through constant referencing to the library and Internet, it seemed that parodies were effective in making didactic lessons relevant to the modern context. The aim of the project was to find out how to parody a fable well. The end product of this research was an anthology of parodied fables, where the familiar stories were given a twist, with references to certain unique aspects of the modern world.

11 TEAM G-POWER**Teo Zheng Jie, Ong Xin Jie & Aloysius Oh Shengxun**

Hwa Chong Institution

Teacher-supervisor: Dr Tan Kok Kim

The aim of this project was to find out how to contribute to a greener and more sustainable environment. It is worrying to observe that despite the growing severity of global warming, citizens are not taking enough concrete measures in their daily lives to tackle this problem quickly and efficiently. Street interviews with 50 members of the public and 25 alumni of Hwa Chong Institution revealed that the majority of participants viewed the use of alternative energy sources as a plausible way to combat global warming. The project culminated in the installation of various solar panels at different locations within the school, which aimed to reduce the carbon footprint of Hwa Chong Institution and its negative impact on the environment.

12 PROJECT A-LOVE**Koh Qian Siang Gordon, Lim Yan Peng Gary, Khor Hao Yu & Wang Shiyao**

Hwa Chong Institution

Teacher-supervisor: Miss Yeo Siok Ee

Project A-Love is a service learning project which targeted increasing awareness of responsible pet ownership among youths. A growing number of youths have been buying pets on impulse, leading to a high number of abandoned pets, which is a worrying trend. Project A-Love conducted a youth outreach and education programme through workshops with primary school students, library visits and online platforms. Through these channels, Project A-Love groomed primary school students to become ambassadors of the project and helped to promote responsible pet ownership among their social groups.

13 MAKING AN ENVIRONMENTALLY FRIENDLY CLEANING AGENT**Low Jia Yi, Tan Ming Min Belle, Tan Mui Yee & Wang Hua Xian**

Nanyang Girls' High School

Teacher-supervisor: Ms Lim Sixiu

The main aim of this project was to make use of naturally occurring materials or organic compounds to create an environmentally friendly cleaning agent for fabrics. Its effectiveness should be comparable to existing fabric-cleaning agents, which are mostly made up of certain chemicals that contribute to water pollution and kill marine life. Through many experiments, it could be concluded that the ratio of the ingredients of 20ml lemon juice, 20ml rice vinegar, 4g salt, 20ml water, 20ml glycerol, 40g sodium bicarbonate, combined with 160ml water after heating, produced the best concoction of cleaning agent with the same effectiveness of removing stains as laundry detergent and comparable to commercial bleach. According to the Universal Indicator, the pH of our cleaning agent was 7.3, about the same as ocean water (7.5 to 8.4) and river water (7.4). Therefore it could be concluded that the cleaning agent created would not upset the pH of rivers and seas so drastically to have an adverse impact on marine life.

14 EFFECTS OF GENERAL WARM-UPS AND SPORT-SPECIFIC WARM-UPS ON STANDING BROAD JUMP PERFORMANCE**Lim Shu Ning**

Nanyang Girls' High School

Teacher-supervisor: Ms Yeo Peili

The purpose of this research was to investigate the effects of general warm-ups and sport-specific warm-ups on Standing Broad Jump performance. On two separate trials, 50 females aged 13 to 15 years took the Standing Broad Jump test once without warming up, followed by performing either only general warm-ups (300m jog and static stretching exercises), or both general warm-ups and sport-specific warm-ups (five tuck jumps and three practice jumps). Participants then took the test again and the results of the two groups were compared. It was found that there was a significant difference in the distance of the jump of participants before and after warming up. However, there was no significant difference between doing only general warm-ups and doing both general and sport-specific warm-ups, despite evidence from the literature suggesting that sport-specific warm-ups lead to better performance and fewer injuries in a specific sport compared to general warm-ups alone.

15 HOMEGROWN MUSIC IN SINGAPORE: A STUDY OF THE PERCEPTIONS AND ATTITUDES TOWARDS THE LOCAL MUSIC INDUSTRY**Du Xuesong, Hee Jia Min, Liu Jiani, Ong Kaijing Gin & Soh Hui Ling**

Nanyang Girls' High School

Teacher-supervisor: Ms Agnes Ng

This project focused on discovering the level of interest in contemporary Singapore music as developed through local music academies such as Gefang Music Academy in order to gain a better understanding of the local music industry. A survey, containing questions related to aspects of music that participants noticed most, was conducted to assess the level of awareness of contemporary Singapore music amongst the students of Nanyang Girls' High School as well as their receptivity to more information on the local music industry. An analysis of the results revealed that the awareness and understanding of the local music industry could be improved, and the findings were used to organise a talk by Gefang Music Academy which was customised to improve the pupils' understanding and appreciation of the local music scene.

16 A MATHEMATICAL STUDY OF THE GAME 'CHOMP'**Danielle Ho, Vanessa Lim, Ong So Phia & Natalie Yap**

Nanyang Girls' High School

Teacher-supervisor: Mr Tan Chik Leng

In this study, various cases of a mathematical game known as 'Chomp' were considered. A move in 'Chomp' consists of chomping a square out of a 'chocolate bar' board made up of smaller square blocks. Prior research has indicated the presence of a winning strategy for the first player (Brouwer, 2004) and provided solutions for the two simplest $2 \times n$ and $n \times n$ boards (Joyce, 2001), but explanations for boards of greater sizes were too complex to be understood fully. The study began with a $2 \times n$ board and the winning strategy for the first player was discovered. With this result, variations of the Chomp boards were used for n number columns and 2 rows ($n \times 2$ board) and some cases of the $3 \times n$ board, namely the 3×4 , 3×5 , 3×6 boards, and winning strategies for these boards were attempted. From the solutions, observations were made and various board patterns which would allow the first player to be able to win the game were identified.

17 DEVELOPMENT OF THE IDEAL SINGAPOREAN COCONUT ICE-CREAM**Averill Chow Mingni, Cheong Huiling Samantha & Rachel Liu Yunyann**

Raffles Girls' School (Secondary)

Teacher-supervisor: Mr Chad Evans

The objective of the project was to find the best homemade coconut-based ice-cream, which had to fulfill the criteria of (i) being cheap and affordable, (ii) being convenient and fast to make, (iii) requiring few ingredients, (iv) having easily obtainable ingredients, (v) not requiring an ice-cream maker, and (vi) having good texture, taste, and meltdown. The main method of investigation was through the scientific testing of the above variables. A major finding was that the factors affecting the body of the ice-cream included the method of making the ice-cream, the type of ingredients and the percentage of ingredients used. It was found that the ideal coconut ice-cream base required a strict proportion of ingredients to function as emulsifiers, sweeteners (sugars), lipids and water.

18 SOCCER TALK: A SYSTEMATIC FUNCTIONAL GRAMMAR APPROACH TO ANALYSING SIR ALEX FERGUSON'S SPEECH

Murni Nadra Bte Abdul Rahim, Rafhanah Banu Bte Abdul Razar & Deborah Roshni Rajaratnam

Raffles Girls' School (Secondary)

Teacher-supervisor: Mr Asraf Angullia



This project focused on an analytical study of the speech peculiarities of Sir Alex Ferguson, manager of Manchester United Football Club, with the hypothesis that Sir Alex Ferguson has a unique linguistic tendency that is influenced by his social background, the people around him and the environment he lives in. Through analysing transcripts of his interviews, referencing books on Systemic Functional Grammar, and uncovering data on the speech habits of Scots, it was found that in his interviews, he spoke mostly Scottish English, but tried to speak in Standard English to cater to his worldwide audience. He used many relational/existential and material processes as he spoke mostly about his football club.

19 DEVELOPMENT OF GRAFFITI IN SINGAPORE

Rachel Wang Tian Shian, Kwong Zhi Qing Alanna & Cheng Lynn

Raffles Girls' School (Secondary)

Teacher-supervisor: Mr Kevin Ng

The purpose of the research was to study the development of graffiti in Singapore. Graffiti, a byproduct of hip-hop sub-culture with Western origins, is slowly seeping into the Singaporean culture. Graffiti artists, as well as students, were interviewed for their perspectives on this local phenomenon. Surveys were also conducted to gain insights on what people considered graffiti. Through these methods, it was possible to determine a rising trend in the number of budding graffiti artists in Singapore, and conclude that people are becoming more open-minded towards accepting graffiti as an art form instead of regarding it as vandalism. The broadening of platforms provided by the government for graffiti artists to showcase their art was a possible contributing factor to this change.

20 FORMULATION OF A BROAD SPECTRUM SUNSCREEN USING NATURAL PLANT EXTRACTS

Wang Chuning & Lien Chun Hui

Raffles Girls' School (Secondary)

Teacher-supervisor: Ms Ng Zhaoyue

Many people rely on commercial sunscreens for protection from harmful ultraviolet (UV) radiation. However, many of the ingredients found in these products have been reported to cause skin allergies or cancer. The aim of this investigation was to explore the possibility of formulating a broad-spectrum sunscreen using natural plant extracts. The photoprotective properties of flavonoid-rich plant extracts were measured and compared to that of commercial sunscreens using UV spectrophotometry. Most commercial sunscreens absorbed strongly only in the UVB region, while most of the plant extracts tested showed a sharp peak in the UVB region and a smaller peak in the UVA region, arising from the chromanone and phenylpropane moieties respectively. Eventually, plant extracts that absorbed in different regions were combined to confer broad-spectrum sun protection.

21 A COMPARATIVE STUDY OF THE EFFECTIVENESS OF Pb^{2+} ION ABSORPTION BY CRAB SHELLS AND CHICKEN EGGSHELLS**Fan Ting Wei, Loh Jun You, Gong Haoran & See Wei Yang**

Raffles Institution

Teacher-supervisor: Ms Liew Li Pin

This research aimed to investigate and compare the effectiveness of Pb^{2+} (lead) ion absorption from lead contaminated water by crab (*Scylla serrata*) shells and chicken (*Gallus gallus domesticus*) eggshells. 15g of crushed shells was soaked in 25ml of 100ppm lead solution for 5 minutes before the solution was analysed for lead content using the Atomic Absorption Spectrometer (AAS). 60 consecutive repetitions were made using the same shells to determine the shells' absorption capacity in lead solutions up to 100 times its own mass. Results obtained from the AAS analysis showed that the chicken eggshells were able to absorb more lead ions on initial contact with the solution. However, the eggshells lost its effectiveness quickly over subsequent contacts. Crab shells on the other hand absorbed lead ions at consistently high levels. The results indicate greater versatility for application of crab shells as a biosorbent of lead owing to its absorption capacity.

22 INVESTIGATION OF THE EFFECTS OF MICRO MOISTURE SERUM AND BIOTIN ON THE TENSILE STRENGTH AND STRAIN OF HUMAN HAIR**Lawrence Wong Wen Jun, Ryan Chua Rui Kang, Govind Shankar****Ganesan & Brian Anugrah Ip Zhi Hao**

Raffles Institution

Teacher-supervisor: Mr Joseph Chong

The aim of the research was to investigate the effects of the chemically made substance, Micro Moisture Serum (made up of Centrimonium Chloride, Amodimethicone, Guar Hydroxypropyltrimonium Chloride, Trideceth-10, and Trideceth-12), and natural substance, Biotin (Vitamin H), on the tensile strength and strain of human hair. Hair samples were immersed in two commercial shampoos and a sample of egg yolk (rich in Biotin). The samples were then subjected to an Instron tensometer, to determine the tensile strength and strain of the hair samples. The results showed that Biotin was not as effective as one of the commercial shampoos in increasing tensile strength of the hair. However, Biotin was most effective in the increasing the strain or hair extension. Hair elasticity was also the highest for samples in Biotin compared to the other two commercial shampoos.

23 OPTIMISING THE USE OF PANDAN AS A NATURAL COCKROACH REPELLENT**Mathew Gan, Koh Tar Leng, Yi Jiahe & Ong Kay Yang**

Raffles Institution

Teacher-supervisor: Mr Jason Tan

Pandan may be a more environmentally friendly alternative to commercially available insecticides that are used to repel or kill cockroaches. This project explored the use of a natural chemical compound in Pandan leaves (*Pandanus amaryllifolius*) for its cockroach repellent properties. Pandan leaves were blended to obtain a raw Pandan solution containing aromatic compounds, of which a main component is 2-acetyl-1-pyrroline. A portion of the raw Pandan solution was steam distilled to obtain the Pandan distillate, which was then sprayed onto three absorbents: cotton wool, filter paper, and a thin-layer chromatography (TLC) square. The absorbents were placed in a self-designed choice chamber to observe responses and possible differences in the responses of cockroaches to the Pandan distillate on the absorbents. Another trial was similarly conducted using raw Pandan solution instead of Pandan distillate. The data gathered indicated that the raw Pandan solution was more effective in repelling cockroaches than the Pandan distillate. There were no significant differences between the repelling effects of Pandan when applied to the three absorbents.

ACKNOWLEDGEMENTS

The Gifted Education Branch, Ministry of Education, would like to express its gratitude to the following for their help and support:

Anglo-Chinese School (Primary)
Catholic High School (Primary)
Henry Park Primary School
Nan Hua Primary School
Nanyang Primary School
Raffles Girls' Primary School
Rosyth School
St. Hilda's Primary School
Tao Nan School
Anglo-Chinese School (Independent)
Dunman High School
Hwa Chong Institution (Secondary Section)
Nanyang Girls' High School
Raffles Girls' School (Secondary)
Raffles Institution (Secondary)

Judges for Poster Presentations

Mrs Soo Kim Bee, Gifted Education Branch
Mr Tan Chee Wan, Gifted Education Branch
Mr Jason Matthew Lai, Gifted Education Branch
Miss Joyce Soh, Gifted Education Branch
Mr Goh Shu Liang, Gifted Education Branch
Miss Judy Lee, Gifted Education Branch

Judges for Oral Presentations

Mr Andy Shi, Gifted Education Branch
Mr Eugene Lee, Gifted Education Branch
Miss Lim Siew Yea, Gifted Education Branch
Dr Lua Eng Keong, Education Programmes Division, Science Centre Board

Republic Polytechnic (for use of its facilities)

NOTES



NOTES



NOTES



NOTES



NOTES



NOTES



NOTES

