

## **Authentic Assessment through Innovative Project Work in Jurong Secondary School**

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### **Abstract**

At Jurong Secondary School (JSS), Project Work (PW) is conducted for all secondary 2 and 3 students. Besides multi-disciplinary content learning, students' project tasks are crafted so that they carry national education themes to develop in students a sense of pride and belonging to the school and community. For example, in 2005, some students featured achievements of the school, as well as prominent alumni members who made significant contributions to their alma mater and society. Other students featured interesting places in the neighbourhood to create awareness of Taman Jurong community. Some students even focused on the role of Jurong in industrialisation and in the tourism industry, and hence the development of Singapore. This paper details how PW is conducted in JSS to captivate students' interest and motivation. In particular, the paper focuses on how students are assessed using a set of tailored scoring rubrics that give emphasis on the process of doing the project, including information processing, communication and collaboration. Other important outcomes such as innovation and enterprise, complex thinking, and reflective learning, are also achieved through PW. Actual students' work is shared.

### **Introduction**

In 1999, the Ministry of Education formalised Project Work (PW) in schools. PW provides a platform for students to integrate their learning as it gives students the opportunity to synthesise knowledge from various areas of learning, and critically and creatively apply it to real life situations. This process enhances students' knowledge and enables them to acquire skills such as collaboration, communication and independent learning. Separate learning outcomes are articulated in each of the four key domains assessed in PW as given in *Table 1*. As students work in groups for PW, they also learn independently through self-reflection and evaluation of their own work processes.

Apart from critical thinking and problem solving, PW highlights the importance of team work, knowledge application, innovation and lifelong learning. The learning outcomes of PW are in alignment with the Desired Outcomes of Education published by the Ministry of Education in 1998. For instance, all post-secondary students should "be willing to strive, take pride in work, value working with others"; "be able to seek, process and apply knowledge"; and "be innovative - have a spirit of continual improvement, a lifelong habit of learning and an enterprising spirit in undertakings".

The benefits of PW as a learning experience and assessment tool are given prominence in the last few years; in particular, since 2005, PW has been integrated into the formal curriculum of junior colleges and constitutes 10% of the admission scores to local universities.

<b>Domains</b>	<b>Learning Outcomes</b>
Knowledge Application	Students will acquire the ability to make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
Communication	Students will acquire the skills to communicate effectively and to present ideas clearly and coherently to specific audience in both the written and oral forms.
Collaboration	Students will acquire collaborative skills through working in a team to achieve common goals.
Independent Learning	Students will be able to learn on their own, reflect on their learning and take appropriate actions to improve it.

**Table 1: Key Domains and Learning Outcomes of PW**

## **Project Work in Jurong Secondary School**

At Jurong Secondary School (JSS), PW is an integral part of the school curriculum and is offered to all secondary 2 and 3 students. Besides allowing students to integrate knowledge from different disciplines and providing authentic assessment of students' learning, PW is used as leverage in supporting and enhancing the holistic development of students. Students are presented with problems in real world contexts that affect them in their immediate environment and community. Through solving the project tasks, students raise their level of social awareness and learn important values. PW thus is an important part of the JSS educational experience, as students learn to be responsible, committed and caring citizens who are aware of community concerns.

### **Approach to Project Work**

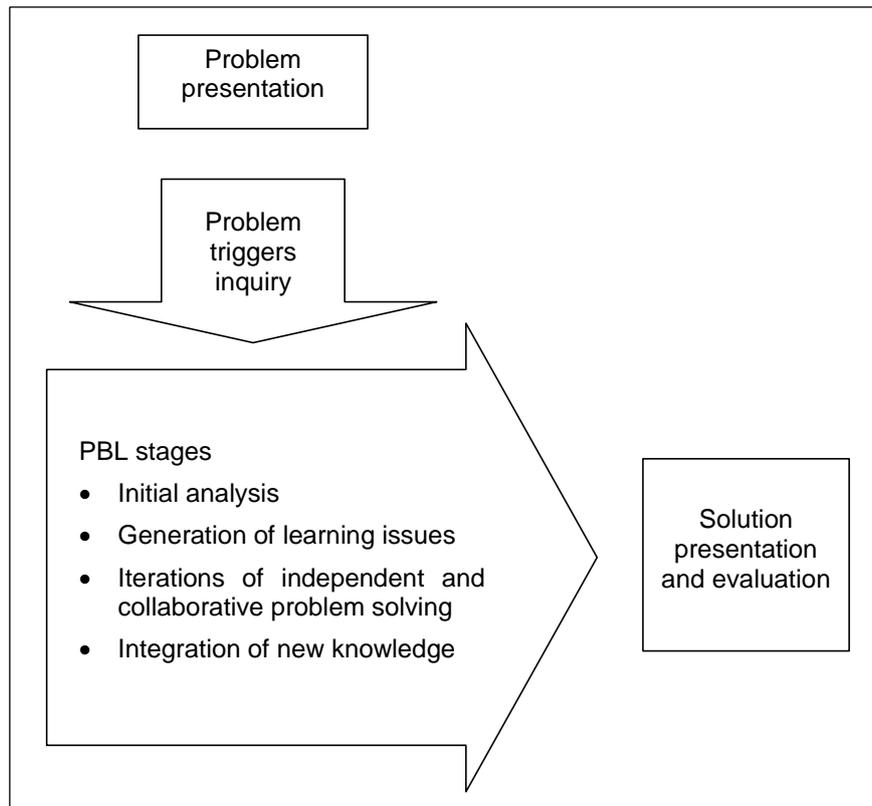
A Problem-Based Learning (PBL) approach is adopted by the school for the facilitation of PW. PBL is an active learning and student-centred pedagogical approach in which problems are used as the starting point of the inquiry and learning process (Tan, 2003). Students work in groups of four or five to solve problem tasks crafted by teachers. They go through the process of identifying the problems, analysing critical issues, generating ideas, independent and collaborative problem solving, and integrating new knowledge to derive solutions, which could be in the form of proposals, models or products. The PBL stages are represented in *Figure 1*.

In addition to pointing students to possible sources of information and explaining new concepts and knowledge, teachers help to facilitate the problem solving process by posing questions to encourage divergent thinking, probing students' responses to clarify their thinking, guiding students in their discussions and research, and helping students evaluate their research findings and converge to solutions.

### **Project Work Organisation**

The core PW committee and the workflow are shown in *Figure 2*. An innovative aspect of PW in JSS is its implementation in a single week after the school's mid-year examinations. For an entire week, students are intensively engaged in the PW tasks during curriculum time and the focused attention enables them to derive high quality solutions. In addition, special arrangements could be made for students to visit places outside the school,

should the need arise. Finally, in contrast to the case where project tasks are stretched over extended periods, students' interest and motivation are maintained throughout the PW process as they work on the problems and come up with good solutions that they are proud of.



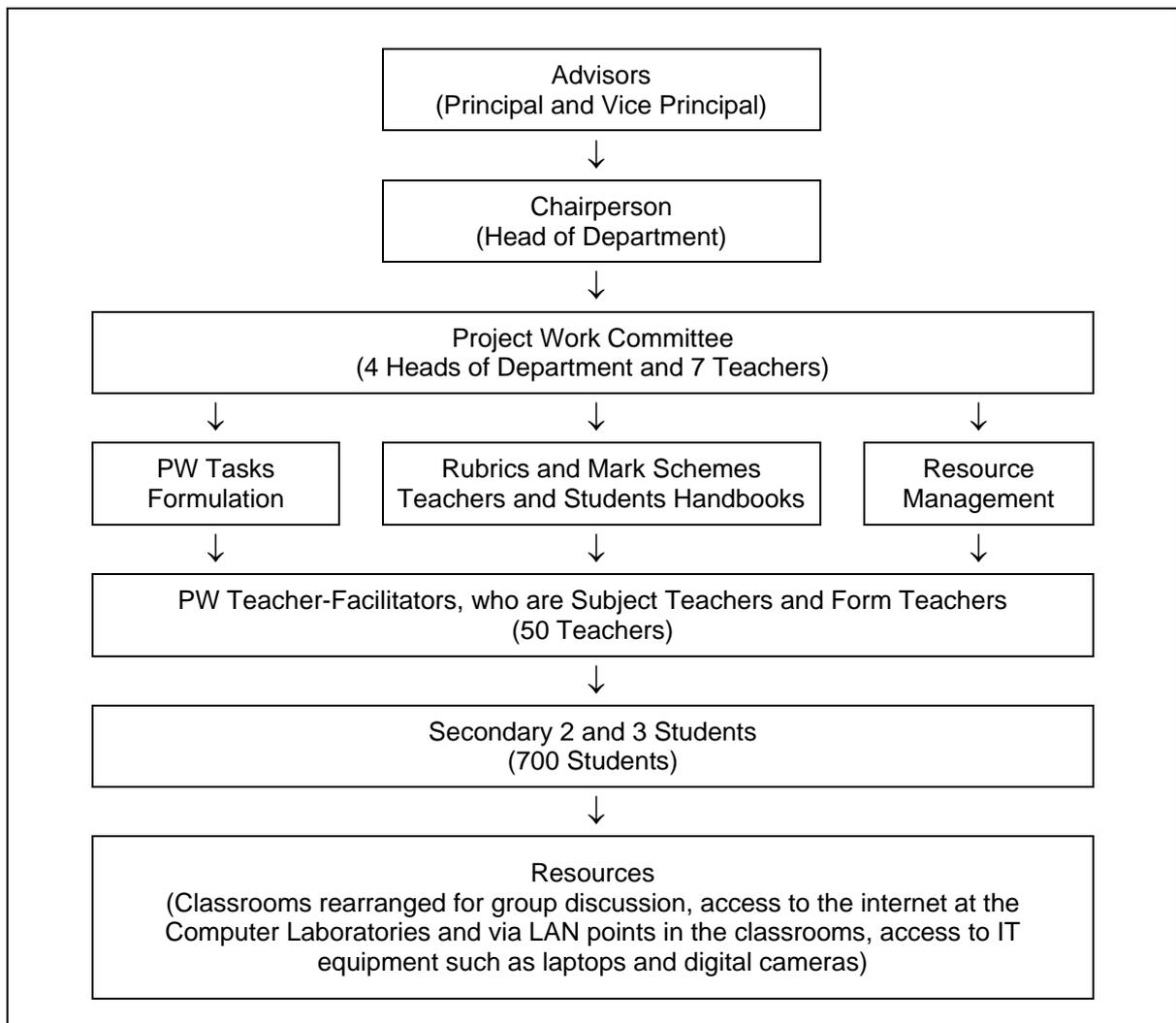
**Figure 1: Stages of Problem-Based Learning**

## **Project Work Tasks**

PW tasks in JSS are crafted to captivate students' interest and motivation, as well as to infuse national education themes to develop a sense of pride and belonging to the school and community. In the 2005 PW tasks, secondary 2 students were challenged in marketing the school to potential primary school leavers. In the process, students learned about their school's rich cultural heritage and achievements, and developed a greater sense of pride and belonging to the school. Some students featured achievements of the school, as well as prominent alumni members who made significant contributions to their alma mater and society.

Secondary 3 students became more aware and sensitive to community needs as they studied ways to resolve some of the issues facing the community. The problem tasks promoted active citizenry in these students as they became involved in community projects and participated actively in crafting innovative solutions. For instance, a group of students featured interesting places in the neighbourhood to create awareness of the Taman Jurong community. Some students even focused on the role of Jurong in industrialisation and in the tourism industry, and hence the development of Singapore.

Examples of products developed by students include miniature models, educational game sets infusing knowledge of the community, calendars featuring photographs of places in the community worth visiting, and videos showcasing tourist attractions. A list of the 2005 secondary 2 and 3 PW tasks are attached in *Annex A*.



**Figure 2: Organisation and Workflow for PW**

## **Project Work Implementation and Assessment**

Students are assessed in PW using a set of tailored scoring rubrics aligned to the skills we intend to measure. The scoring rubrics give emphasis on the process of doing the project and not merely the product. The students are assessed on the four domains of PW, which are further broken down into detailed learning outcomes, including information processing, Habits of Mind, complex thinking, collaboration and team dynamics, declarative knowledge and effective communication. Other outcomes such as elements of innovation and enterprise are also achieved through PW. An example of the scoring rubrics designed is attached in *Annex B*.

Training and support are provided for students to assist them in the problem solving process. These could be just-in-time acquisition or brushing up of essential skills, such as communication, presentation and IT skills. Each student keeps an individual PW Handbook which serves as a guide book and contains reference materials. The PW Handbook is also a means to effect assessment for learning. For instance, the handbook contains students' project planners, decision making matrices and reflection logs. It also contains a simplified set of rubrics (assessment criteria) with guiding questions to highlight to students the skills and areas they will be assessed on, as well as to allow students to perform self-assessment before submitting their final projects.

The learning outcomes, areas of assessment and training and support for students are tabulated in *Table 2*.

Domain	Learning Outcomes	Areas / Skills	Training, Support and Guidance for Students
Knowledge Application	Declarative knowledge, Procedural Knowledge and Information Processing	Problem analysis	<ul style="list-style-type: none"> <li>• Handout: Understanding My Project Task</li> <li>• Handout: KIND Template</li> </ul>
		Planning for task Sourcing for information	<ul style="list-style-type: none"> <li>• Handout: Our Project Planner</li> </ul>
		Sources of references	<ul style="list-style-type: none"> <li>• Handout: Reliability Checklist for Sources</li> </ul>
		Choosing sources and information	<ul style="list-style-type: none"> <li>• Handout: Reliability Checklist for Sources</li> </ul>
		Solution to problem and Presentation	<ul style="list-style-type: none"> <li>• IT support and consultancy for all forms of production</li> </ul>
		Product	<ul style="list-style-type: none"> <li>• Consultancy for preparation and production of videos, brochures, presentation slides etc</li> </ul>
Communication	Communication and Multi-media Presentation	Writing report (written communication)	<ul style="list-style-type: none"> <li>• Handout: A Guide to Report Writing</li> </ul>
		Multi-modal presentation	<ul style="list-style-type: none"> <li>• Just-In-Time training for students: Effective PowerPoint Presentation</li> </ul>
		Production of videos, brochures, etc	<ul style="list-style-type: none"> <li>• Consultancy</li> </ul>
		Oral communication	<ul style="list-style-type: none"> <li>• Just-In-Time training for students: Effective Oral Presentation</li> </ul>
Collaboration	Collaboration and team dynamics	Attributes of effective group learning	<ul style="list-style-type: none"> <li>• Managing Differences</li> <li>• Decision Matrix</li> </ul>
		Resolving group conflicts	<ul style="list-style-type: none"> <li>• Advice to students</li> <li>• Reflections - About My Project</li> </ul>
Independent Learning	Habits of Mind and Complex thinking	Reviewing learning	<ul style="list-style-type: none"> <li>• KIND Template</li> <li>• Reflections - About My Project</li> </ul>
		Planning for task	<ul style="list-style-type: none"> <li>• Our Project Planner</li> </ul>
		Application of ideas across disciplines	<ul style="list-style-type: none"> <li>• Consultancy</li> </ul>
		Effective use IT	<ul style="list-style-type: none"> <li>• Just-In-Time training for students: Using the Internet Search Engines</li> </ul>

**Table 2: Assessment of PW and Support for Students**

### Project Work Outcomes and Reflections

Students consistently produce high standards of work. Through the students' PW portfolios, teachers are able to assess students' learning, not just in terms of the final outcomes but more importantly, the problem solving process. Regular reflections also enable students to make their thinking visible, enhancing their metacognitive ability. In

addition, students are free to choose the mode of presentation of their solutions, which in itself is a form of differentiated instruction, as students inevitably select the mode of assessment that is most authentic and reflects true learning on their part. This could be demonstrated in different forms, such as students' artwork, multi-media production, and written proposals. Examples of students' work are shown in *Annex C*.

PW in JSS has received commendations from even an international audience. In July 2004, a group of high ranking educationalists, including principals and officials from the Department of Education from Queensland, Australia, and professors from Queensland University visited the school. They gave positive comments after interacting with the students. For example, Ms Dorothy Andrews, Associate Dean, Queensland University, commented that the students were "very enthusiastic about sharing their project work" and she was "most impressed by the high quality of their work".

Teachers who facilitated PW concur that "PW is an invaluable learning experience through which students can integrate cross-disciplinary knowledge, learn to work in teams, and demonstrate creativity and imagination in coming up with the solutions". Effective and authentic assessment of students' learning is also possible, as PW is process-driven and process-focused. Students also reflected that "learning is fun" and they enjoyed coming up with solutions to the problem tasks as it gave them a sense of satisfaction on seeing their products after a mere week. Finally, students felt that PW is a fairer mode of assessment, as the problem tasks are directly relevant to them and recognition is given to the learning process.

## **Annexes**

- A. 2005 Project Work Tasks
- B. Project Work Scoring Rubrics
- C. Samples of Students' Work

## **References**

- Ministry of Education (1999). *Project Work Resource Package (Secondary)*. Singapore: Curriculum Planning and Development Division and Research and Testing Division, Ministry of Education.
- Tan, O.S. (2003). *Problem-based learning innovation: Using problems to power learning in the 21st century*. Singapore: Thomson Learning.

## Annex A: 2005 Project Work Tasks

Secondary 2 Project Tasks Theme: Bringing JSS to greater heights			Secondary 3 Project Tasks Theme: The role of Jurong Secondary School in nation-building; creating awareness of the Taman Jurong Community		
Task	Problem Task Description	Remarks	Task	Problem Task Description	Remarks
1	You are part of a team of students involved in promoting your school to potential primary 6 school leavers. Jurong Secondary School has been around for 42 years. You have been asked to compile and project the rich cultural heritage of the school to make it a choice school of the west. Your project should bring out what your school can do for these pupils especially in their character development and inculcation of values.	Products / services created by students: multimedia production, charts, brochures, posters, games, puzzles, model, oral history, drama, website etc	1	The HDB has realised that many people in Singapore are reluctant to buy HDB homes in Jurong West. As a new HDB officer, you have been tasked to come up with a strategy that would make Jurong West an attractive and inviting place to stay. This strategy could be used by the HDB in any media (newspaper, TV, internet, etc) to convince people of the benefits of living in Jurong West.	Products / services created by students: multimedia production, charts, brochures, posters, games, puzzles, model, oral history, drama, website etc
2	You are part of a team of students involved in promoting your school to potential P6 school leavers. You have been asked to showcase one or two ex-students who have succeeded in their careers (who, how, why, when) and how the school has played an important part in their success.		2	You are working with the Singapore Tourism Board. You have been assigned to look at possible interesting and unusual attractions in Jurong that could be developed or improved upon to attract visitors to this part of the island. Some of the attractions have suffered a loss of visitors over the last 3 years.	
3	You are part of a team of students involved in promoting your school to potential P6 school leavers. You have been tasked in highlighting the key programmes, events that are useful and effective in pupils' holistic development & what makes JSS different from other neighbouring schools.	Top 10 projects were presented for competition at the school hall in Term 3 and for parents' viewing during Meet-the-Parents Session.	3	You have been asked to relate some interesting legends, lesser known places or spooky tales of Jurong. You would be presenting your interesting information to the residents of Taman Jurong at the National Day celebrations.	Projects were showcased at National Day celebrations, Open House and for parents' viewing during Meet-the-Parents Session.
4	You are part of a team of students involved in promoting your school to potential P6 school leavers. You have been asked to highlight the staff's contribution in making Jurong Secondary School a school taken care of by committed and dedicated teachers and staff. You may showcase a few teachers or a general showcase of all staff by highlighting their special talents and strengths, as well as how they have helped the school to achieve.		4	Jurong was always known as the home of the industries since the 1960s. Recently many industries have left Jurong and moved on to other neighbouring countries or places. As a JTC official, you are tasked to look at new and creative ways of attracting foreign investors and local businesses to move to the Jurong industrial area. You will be presenting this idea to investors at a seminar "Jurong Industrial Area - Revitalised and Rejuvenated".	
5	Any other areas of attraction/interest that you wish to showcase about Jurong Secondary School that would attract primary 6 pupils to list Jurong Secondary School as a choice secondary school.		5	Any other area of interest that you wish to explore, such as Jurong as the educational hub of the West, cultural centre, nature's haven, etc.	

## Annex B: Project Work Scoring Rubrics

Notes: (1) Award 2 and 4 marks for performance which lies between the outcomes described for 1 & 3 and 3 & 5 respectively.  
 (2) If the total score of a task is 10, it is denoted by (X2).

Learning Target / Score	5	3	1
<b>KEEPING TO SCHEDULE (5)</b>			
<i>work discipline</i>	on time for all the 5 submissions	on time for 3 submissions	on time for 1 submission
<b>PROJECT WORK PLAN (5)</b>			
<b>Information Processing</b> <i>background and purpose of the investigation and plan of action</i>	project well planned; all relevant background information was gathered with little, if any, help from the teacher	basic but workable plan; only more obvious relevant background information gathered, with help from the teacher	little or no evidence of planning despite considerable help from the teacher
<b>REFLECTION (10)</b>			
<b>Habits of Mind</b> [individual] <i>awareness of own thinking</i>	clearly explains the sequence of thinking through tasks or problems, and analyses how an awareness of own thinking has enhanced performance	describes the sequence of thinking through tasks or problems, and describes how it has enhanced performance	rarely, if any, describes the thinking through tasks or problems, or how an awareness of own thinking has enhanced performance
<b>Habits of Mind</b> [team] <i>awareness of group's thinking &amp; decisions</i>	clearly explains the reasons for group's actions taken and decisions made; explains in detail how awareness has enhanced performance	describes reasons for group's actions taken and decisions made; briefly explains how awareness has enhanced performance	rarely, if any, describes reasons for group's actions taken, decisions made
<b>REVIEW OF WORK DONE (5)</b>			
<b>Habits of Mind</b> <i>self-evaluation</i>	consistently reviews actions thoroughly from many viewpoints; values both success and failure, and suggests ways of improvement	occasionally reviews actions from a reasonably objective perspective, and suggests ways of improvement	rarely, if ever, reviews actions
<b>COLLABORATION &amp; COOPERATION (10)</b>			
<b>Collaboration &amp; Cooperation (10)</b> <i>working together jointly to accomplish a common goal (x2)</i>	all team members contribute and work as a team with defined roles based on the strengths and areas for improvement of each member	all team members work together with defined roles	project created by one or two members doing it alone
<b>FINAL PRODUCT (40)</b>			
<b>Effective Communication</b> [writing] <i>interpretation of information &amp; results (X2)</i>	findings handled competently in an effective way, with appropriate tables and graphs	findings handled in an effective way but without use of visual aids e.g. tables and graphs	findings not handled and information not presented clearly
<b>Presentation of Report</b> [writing] <i>appropriate use of report format (x2)</i>	excellent report formatting that includes all relevant categories, headings (and / or sub-headings) and page numbers	adequate report formatting that includes all relevant categories and page numbers	incomplete categories, headings and/or missing page numbers
<b>Complex Thinking</b> <i>contexts across disciplines (X2)</i>	in-depth discussion relating to concepts in various disciplines (e.g. social studies and geography) and issues on the community	basic discussion relating to concepts in various disciplines (e.g. social studies and geography) and issues on the community	incomplete discussion with hardly any reference to interdisciplinary knowledge and issues on the community
<b>Innovations &amp; Enterprise</b> <i>use of innovative and/or enterprising way of solution / presentation</i>	very feasible, creative and original ways of dealing with the proposed situation/task	feasible and original ways of dealing with the proposed situation/task	some efforts made to address the proposed situation/task
<b>Information Processing</b> <i>references &amp; citation</i>	accurate and extensive references to print and non-print sources (at least three of each type)	adequate references to print and non-print sources (at least two of each type)	incomplete references to print and non-print sources (one of each type or missing any type stated)
<b>CLASS PRESENTATION (25)</b>			
<b>Effective Communication</b> <i>clarity of presentation (x2)</i>	the presentation is always well-organised and easy to follow all the time	the presentation is well-organised and easy to follow most of the time	the presentation is poorly organised and not easy to follow
<b>Information Processing</b> <i>choice of information to present</i>	all important information is included to present what the group did	information is just adequate to present what the group did	information is unable to present what the group did
<b>Complex Thinking</b> <i>use of IT (x2)</i>	very creative and appropriate use of IT which enhances the presentation	generally appropriate use of IT which enhances the presentation	IT is not effectively exploited to enhance the presentation
<b>GRAND TOTAL = 100</b>			

## Annex C: Examples of Students' Work

# MANAGING DIFFERENCES

When a group of people work together, there are bound to be differences, discuss amicably and use the following guiding questions to help resolve the issues.

What is  
MY IDEA?

What is  
HIS IDEA?

How are our ideas different?



Differences

Some of us ~~we~~ wanted the extension building to be air-conditioned but the rest did not as they felt that it is not necessary in Tang Dynasty.

→ I wanted the background of each slides to be pictures/scenes of Chinese Garden and Tang Dynasty but Yuan Cheng don't want.

How are our ideas the same?

Similarities

- We agreed on the idea of "merging" Tang Dynasty and Chinese Garden.
- We wanted to develop Tang Dynasty but at the same time, maintain the Tang period atmosphere.
- Our another objective is to let people experience life in Tang Dynasty. we all agreed on this as we find it useful to attract visitors.

My Idea (+)

- Air-conditioned building is to let people enjoy the coolness after walking under the hot sun.

My Idea (-)

- Background of slides (pic) will be make the slides more messy, wordings will colour of

be difficult to compromise with the background.

His Idea (+)

- Background can also be very nice and interesting without the use of pictures.

His Idea (-) or,

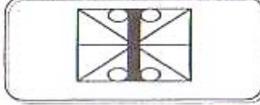
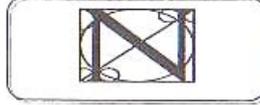
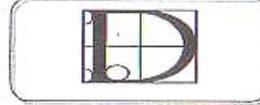
- Without air-condition, people will be under the hot sun for whole day and become very warm and irritated.

Decision

- The 1<sup>st</sup> & last slides, we used pictures. In rest, Yuan Cheng is able to beautify them using templates.
- We let shops be air-conditioned and the horse-riding station, trails and archery area is non-conditioned.

if no agreement is reached, use the decision-making matrix.

**Figure C1: A student used a template on "Managing Differences" to resolve a conflict when there was a disagreement. The student's thinking was made visible as she debated about the issue in a structured and logical manner.**

			
WE KNOW	OUR IDEAS	NEED + KNOW	TO DO LIST
<ul style="list-style-type: none"> <li>- Different attractions in Jurong. e.g. Tang Dynasty Chinese Garden Bird park.</li> <li>- Attractions closed. ↳ Tang Dynasty.</li> </ul>	<ul style="list-style-type: none"> <li>- Shops, fast-food restaurants.</li> <li>- lower ticket fee or even make it free!</li> <li>- make performances more lively, exciting &amp; interesting.</li> <li>- extension building ↳ indoor (air-conditioned) games, place for relaxation &amp; to rest.</li> <li>- renovate place to give it a more appealing appearance to attract visitors.</li> <li>- replace old facilities</li> <li>- add in sports for youngsters to enjoy</li> <li>- theme park.</li> <li>- advertisement</li> </ul>	<ul style="list-style-type: none"> <li>- why it was being closed down?</li> <li>- What causes its loss of visitors?</li> <li>- Background of Tang Dynasty.</li> </ul>	<ul style="list-style-type: none"> <li>- Research on the background of Tang Dynasty.</li> <li>1. Do survey</li> <li>2. Research on the Internet.</li> <li>3. Consolidate all information gathered.</li> <li>4. Presentation</li> </ul>

PH - 05 - PP2 - KIND Template

**Figure C2: A group of students made use of the KIND template to analyse the problem task, generate preliminary ideas and allocate work to different group members.**



**Figure C3: PW offers opportunities for differentiation as students could submit different forms of products as their solutions. These are posters that students drew.**