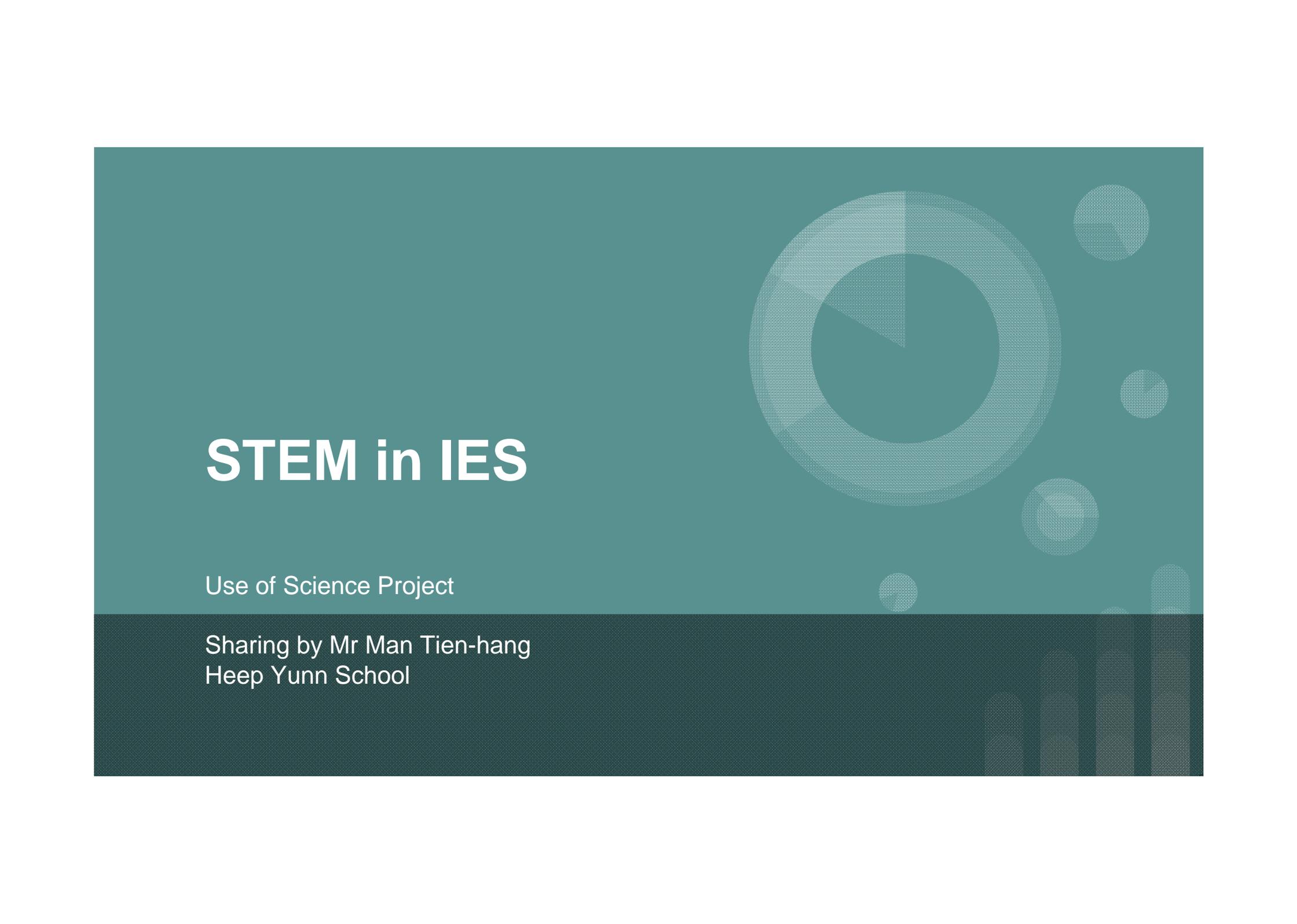


# STEM in IES

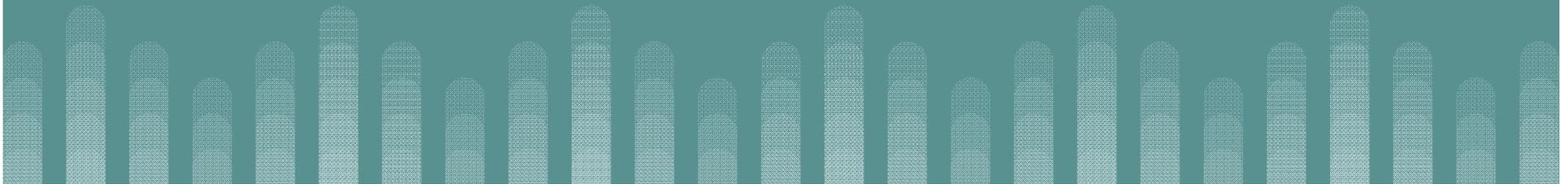


Use of Science Project

Sharing by Mr Man Tien-hang  
Heep Yunn School

# Based on a simple idea:

Can we transform an existing science competition  
project into an IES?





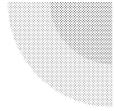
**Find out what were the science projects being done**

**Approach students who participated in science competition**

**Brief this year's F5 students  
Conduct after school workshop on data collection and analysis**

**Students hand in IES framework**

**Students hand in Part C&D first draft**



## The Science Project: Falling Tree Alarm

The students participated in a Science Competition in Form 4 and developed a “falling tree alarm”. The project:

1. Established that trees would grow diagonally on slopes in order to get maximum sunlight
2. Established that the tension on the roots of an inclined tree on slope is higher
3. Designed a simple device to sound alarm when the tree's inclination increases

# Discussion with the student

**Problem: danger of falling tree**



**An alarm to monitor the angle of tree**

**A falling tree alarm**

**Should the IES be about a further improvement of the alarm?**

# Similarity with policy evaluation



**First  
version:**

**Tree management  
policy in HK**



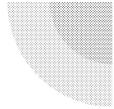
**What would make a  
good tree management  
policy? (Criteria)**

**Device: Falling  
tree alarm**

**Evaluate the  
usefulness of  
the device**

# Adding social context

“Investigation on how the invention of ‘falling tree alarm’ can improve current tree management in Hong Kong”



## Structure in IES framework:

Part A:

- Importance of trees in urban environment + controversies caused by falling tree incidents in Hong Kong

Part B:

- Criteria for evaluating tree management policy: 1) Prevention of tree falling and cutting down trees; 2) financial costs; 3) Engagement of citizens

Part C:

- Current problems of tree management policies in Hong Kong
- Explanation of the rationale and the mechanism of the 'tree falling alarm'

Part D:

- Evaluation of how the 'tree falling alarm' improves the tree management policy in Hong Kong based on the 3 criteria

Heep Yunn School  
1718 IES Framework

This framework should be completed by 8/1/2018

Name:	Janice Leung	Supervising teacher:	THM
Class:	5E		

Topic :

Topic:	Investigating on how the invention of 'falling tree alarm' can improve current tree management in Hong Kong
Nature of evaluation:	Evaluation of a suggestion

Part A: (Significance of the issue)	<ul style="list-style-type: none"> <li>Importance of trees in urban environment</li> <li>The controversies caused by falling tree incidents and cutting of trees</li> </ul>
Part B: (relevant conceptual and contextual background; methodology)	<ul style="list-style-type: none"> <li>The investigation will:                             <ul style="list-style-type: none"> <li>Analyze the current problems of tree management in Hong Kong in terms of risk management (i.e. identifying trees which has the potential danger of falling or being oblique)</li> <li>Introduce the "tree falling alarm", which is aimed to be a low-cost and easily-installed product so as to let every citizen has an objective index to follow that they would understand what the right time for informing and reporting the government is.</li> <li>Evaluate the effectiveness of the alarm to see if, and how it can improve the current tree management system in Hong Kong.</li> </ul> </li> <li>Criteria for evaluation: 1) Prevention of tree falling and cutting down trees; 2) financial costs; 3) Engagement of citizens</li> </ul>

Part C:	<ul style="list-style-type: none"> <li>Analysis of the current situation of tree management in Hong Kong:                             <ul style="list-style-type: none"> <li>Tree Management Section has only 20 participants</li> <li>There is no complete legislation for tree protection management in Hong Kong. At present, tree management, which is based on the tree management guidelines set out by the nine departments, and each of them carries out the tree administration in their respective areas of work, will be awarded to the horticultural companies for their day-to-day work on the risk assessment of trees. These companies will return the assessments and recommendations to all departments, but the department should decide on how to care, repair or chop them.</li> <li>Because of the high cost, the commissioners are not willing to bring all of the equipment and spend a day to carry out risk assessment for one tree cautiously</li> <li>The present risk assessment in Hong Kong is not comprehensive enough, which lags behind Europe and the US as well as neighboring countries.</li> </ul> </li> </ul>
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	<ul style="list-style-type: none"> <li>Horticulturalists are easily qualified, as they only have to gain 3 years of experience in related industries in addition to getting a pass in 200 multiple choice questions. As a result, qualities of their services wanes.</li> <li>The Tree Management Section delegates work to different government departments, so the work of tree management is done by people who are not specialized in tree management. Also, different government departments usually assign the job to other horticultural companies who offer low price, resulting in poor quality control.</li> </ul> <ul style="list-style-type: none"> <li>Explanation of the mechanism of the tree falling alarm                             <ul style="list-style-type: none"> <li>Experiment to show that the tension on the roots of an inclined tree would increase if the tree is taller and heavier</li> <li>Field survey in Tsing Yi showing the prevalence of risky trees</li> <li>The mechanism of the alarm</li> </ul> </li> </ul>
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Part D: Evaluation and Justification

Criteria	1 Prevention	2 Cost	3 Citizens' participation
Government's policy	<p>Point</p> <p>Ineffective tree management</p> <p>Evidence:</p> <p>Usually only check on the trees once a year</p> <p>Definition of locations of trees are considered different by different departments. It takes time for the Tree Management Section to decide which department is responsible to take care of those trees. The management work of those trees is delayed.</p>	<p>Point</p> <p>High cost</p> <p>Evidence:</p> <p>Have to employ professionals to do checking for the trees. Thorough checking of a tree takes a whole day and have to use a lot of expensive equipment. Because of the high cost, the commissioners are not willing to bring all of the equipment and spend a day to carry out risk assessment for one tree cautiously.</p> <p><i>[To estimate the cost of personnel using figures found in the government's reply to the finance committee of Legco]</i></p>	<p>Point</p> <p>Citizens always complain that they are not involved in tree management.</p> <p>Evidence:</p> <p>Residents in Peng Chau complained that 4 trees had been cut off by the Government despite the fact that they looked healthy. The government was accused of cutting off trees immediately without thorough checking on the tree and consultation after receiving complaints.</p>
Invention of the 'falling tree alarm'	<p>Point</p> <p>It prevents the tree from falling by monitoring the inclination of the tree.</p>	<p>Point</p> <p>Cost is low</p>	<p>Point</p> <p>Citizens can have a greater participation in tree management.</p>

	<p>Evidence:</p> <p>The buzzer will produce noise when the tree inclines to a certain degree. Citizens can inform the government immediately.</p>	<p>Evidence:</p> <p>Production cost of a device includes cost of a tube, a pH paper, NaCl/ HCl solution and a buzzer only.</p>	<p>Evidence:</p> <p>A higher level of participation according to the ladder of participation (from consultation to partnership)</p> <p><i>[Look for evidences in other policies where citizens are more engaged to further support this point]</i></p>
Judgement	Installation of the 'falling tree alarm' can improve Hong Kong's tree management.	Installation of the 'falling tree alarm' can improve Hong Kong's tree management.	Installation of the 'falling tree alarm' can improve Hong Kong's tree management.

Suggestion of further improvements	<ul style="list-style-type: none"> <li>Detection of pathogen</li> <li>Connectivity</li> </ul>
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References:

- 無言的樹|鏗鏘集|香港電台「通識網」 Retrieved February 4, 2018, from <http://www.liberalstudies.hk/video/programme.php?vid=tes15.1628>
- Director of Audit's report, Government's efforts in enhancing tree safety, October 2014 <http://www.aud.gov.hk/pdf/ca/c63ch06sum.pdf>
- District Council Paper: [http://www.districtcouncils.gov.hk/central/doc/2012\\_2015/common/FEHWC/881/20121018.FEHWC-Paper-72-2012-Annex1-R1.pdf](http://www.districtcouncils.gov.hk/central/doc/2012_2015/common/FEHWC/881/20121018.FEHWC-Paper-72-2012-Annex1-R1.pdf)
- Legco Finance Committee Paper (2016) [https://www.legco.gov.hk/yr16-17/english/fg/w\\_q/devb-w-e.pdf](https://www.legco.gov.hk/yr16-17/english/fg/w_q/devb-w-e.pdf)
- Legco Research Office – Tree Management (2015) <https://www.legco.gov.hk/research-publications/english/essentials-1415isc04-tree-management.htm>
- Legco Research Office - Tree management in Singapore and Tokyo (2015) <https://www.legco.gov.hk/research-publications/english/essentials-1415isc05-tree-management-in-singapore-and-tokyo.htm>

Please provide the sources of evidences you used above. You should provide:

- Author / Organisation which publish the document / book / website
- Year of publishing
- Title of the article / paper / book / report
- Internet link / Publisher

Criteria	1. Prevention	2. Cost	3. Citizens' participation
Existing tree management policy in Hong Kong	Point: Ineffective monitoring	Use advanced equipment and hire professional contractors	Some citizens complained that they are not involved in tree management
	Evidence: Trees are usually checked once a year	The government spent at least 411 million on tree management per year	Residents in Peng Chau complained that trees were cut without being informed
“Falling tree alarm”	Point: Constant monitoring	Low cost	Citizens have a role to play in tree management
	Evidence: The buzzer will produce noise when the tree inclines to a certain degree	Production cost of a device includes cost of a tube, a pH paper, NaCl/ HCl solution and a buzzer only.	A higher level of participation according to the ladder of participation (from consultation to partnership)
Judgement	It can improve Hong Kong's tree management		

## Second version:

### Tree management policy in HK



What would make a good tree management policy? (Criteria)

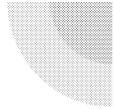
Device: Falling tree alarm

Search on relevant works shows that there are more solutions

Evaluate the usefulness of the device

# Expanding the scope

“How might technologies improve the tree management policy in Hong Kong?”



## Revised structure

Part A:

- Importance of trees in urban environment + controversies caused by falling tree incidents in Hong Kong

Part B:

- Criteria for evaluating tree management policy: 1) Prevention of tree falling and cutting down trees; 2) financial costs; 3) Engagement of citizens

Part C:

- Current problems of tree management policies in Hong Kong
- Explanation of different technologies in improving tree management:
  - Crowdsourcing tree data (e.g. Opentree Map)
  - Wireless monitoring (e.g. a [previous invention](#) by CUHK)
  - Low cost monitoring (e.g. the falling tree alarm)

Part D:

- Evaluation of different technologies based on the criteria (improvements + limitations)

## 3 broad ways of infusing STEM in IES



1. Invention(s) exists but the relevant social problem is not identified
2. Social problem identified but lacks a technological solution
3. Both problem and solution exist but lack data



## Reflection

- The characteristic of Liberal Studies as BOTH a cross-KLA subject and a subject with its own content knowledge
- The possible roles of LS teacher in promoting STEM education



## **My two cents...**

- The social context is important in Liberal Studies
- Relating students' interests in various KLA to contemporary social issues can be one of the roles played by LS teacher