香港中文大學 學習科學與科技中心

通識教育/ 地理科 探究式學習教案

教案名稱	Modification of urban microclimate as an illustration of climate change at local scale: is heat island effect serious in Sham Shui Po as compare to rural Fanling, HKSAR? (How is the climate of our urban areas different from our rural areas? Why is there such a difference?)
科目	Geography
年級	F456
探討議題	**Building a sustainable city－Are environmental conservation and urban development mutually exclusive? OR Climate Change — Long-term fluctuation or irreversible trend?**
探討學習模式	Stripling Model of Inquiry
相關的單元	What problems does urban development bring?
相關概念	Environment, people-environment interrelationship, change over time, spatial variation, urban & environmental problems, pollution, greenhouse gas emissions, heat island effect, urban & sustainable development

教學目標

知識方面:

Microclimate
Urban climate
Heat island effect

技能方面:

Conduct a field measurement/survey on the urban problem
Visit 2 areas & identify the urban problem
Use data loggers / measuring meters / apps and software programs (ArcGIS & Story Map) in the field to collect data of microclimate

態度方面:

Showing concern for the problems caused by urban development
Be aware of the consequences of the interactions between human activities and the natural environment

Showing sensitivity to the development of the surrounding environment

Developing a sense of responsibility and willingness to take action in protecting and improving the urban environment

教學材料及用具：

YouTube, ArcGIS Online, mobile phone / iPad, portable data loggers and handheld weather station plus CO_2 detector, ArcGIS Story Maps

教學流程			
探究過程 與模式	教學活動	學生活動/ 預期教學效果	教學工具
Connect	Play 2 videos (3:00 + 2:07) about heat wave in HK & heat island effect: https://www.youtube.com/watch?v=94AYkwKxd_0 https://www.youtube.com/watch?v=sKnsRAT2Bvk	Students understand how hot it is in urban HK & heat island effect	YouTube
Wonder	Ask students • What does the woman feel inside that flat? • Why is it so hot in that flat? • Where can you find that flat? Where can you find heat island effect? • What is the relationship between that heat & heat island effect?	Students find out the reason why it is so hot there, identify the flat's location, the effect's location, & their spatial relationship.	(Questioning at different orders of thinking)
Investigate	Using ArcGIS Online to investigate/interpret the time-series of 'Carbon Dioxide Emissions on the Rise in Asia (HK)' https://www.arcgis.com/home/webmap/viewer.html?webmap=df31220a81624b80828ad8f4edc1ec86	Students analyses the rising trend of GHG as a potential reason for extreme summer heat in that urban residential flat	ArcGIS Online

Construct	Bring out a new inquiry question • Is there a higher CO2 concentration inside the inner city in the urban area in HK (Sham Shui Po) vs Fanling? • Is the summer urban temperature really higher at the same time? Conduct a field trip to the 2 sites (at the same time by 2 teachers) in summer to measure CO_2 concentration & summer temperature with mobile phone / iPad, portable data loggers and handheld weather station plus CO_2 detector (http://www.ebay.com/bhp/co2-detector)	Students collect environmental & climatic data like CO_2 concentration & summer temperature respectively in the 2 sites	Field equipments like mobile phone / iPad, portable data loggers and handheld weather station plus CO_2 detector
Express	Teach students to use ArcGIS Story Map to present the collected data like summer urban vs rural temperatures & CO_2 concentrations as well as site photos & locations	Students use ArcGIS Story Maps to present the collected data	ArcGIS Story Maps
Reflect	Interpret & conclude the relationship between the 2 variables. Discuss the ways to improve field work measurement and other factors modifying local / urban climate	Students link up the 2 variables while discussing the strength of the relationship so as to look for improvement	(High order thinking skill)

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