

SiGNAL BiZHUB Talk:

How Healthy is Your Environment?

Doug Johnson



What We'll Cover...



Coming Up

- Context and healthy environment 'elements'
- Benefits
- Quantifying, measuring and improving
- Case Study (Putney High School)
- How to get started: 6 quick 'hacks'
- Key Take-aways



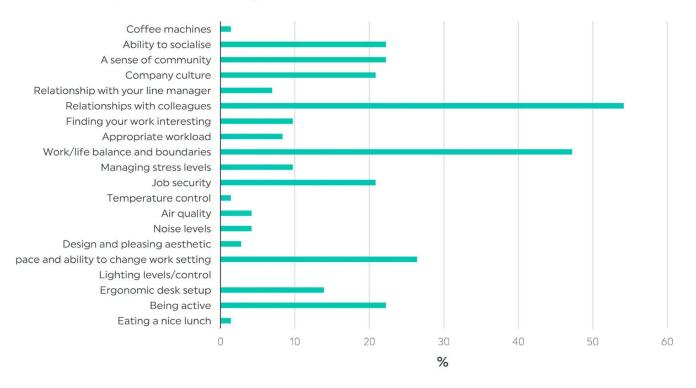
Healthy Environment Context



Context

- Rapidly changing times
- Reordered priorities
- Blurred boundaries
- 'Balance' is key

Since we have reopened the office and embarked on our back to work journey, what do you feel have been the **3 most important factors** for your own wellbeing at work?



Healthy Environment 'Elements'





Healthy Environment Benefits



Benefits

- Reduced harmful stress levels
- Reduced absenteeism
- Increased engagement
- Improved morale
- Increased concentration
- Improved feeling of wellbeing
- Increased productivity



Quantifying, Measuring and Improving



Quantifying and Measuring

- Instrumentation/data logging
- Questionnaires
- Flourish Model



Measurement (Quantitative)



Air Quality

- The World Health Organisation have specific standards for air quality, for living, for buildings inside and outside so it upholds global living requirement, so that people can live with no problems with the air around them.
- Humidity is between 40-70%
- Buildings should have a temperature of 13-30°C.
- The air movement is between 0.1-0.15 m/s.
- That CO₂ is below or at 1000ppm.





Biophilia



Dictionary

Search for a word





biophilia

/bviə(n), tiliə/

noun

(according to a theory of the biologist E. O. Wilson) an innate and genetically determined affinity of human beings with the natural world.

Questionnaires (Qualitative)



The Biophilic Classroom Evaluation

This survey is being conducted to help with future planning and design of green infrastructure in the built environment, and to understand the value of nature infrastructure in the built environment, and to understand the value of nature in a learning environment. Following the introductory presentation you should now be able to make an informed decision as to whether to complete this survey. You are free to whithars/s from the study at any time by not completing his short anonymous questionnaire. The information collected will be treated as completely considerated by the survey team. Survey reports will use summaries of information and not reveal the individual identities. Please fill in as many questions as you can.

Background			
Please note: We ask about age and greeds in buildings	ender because	these are both r	elevant to people
What 6th form year are you in?	Please tick	12	2 13
or are you a teacher?	Please ttck	Yes	² No
and your gender?	Please ttck	Male [1	2 Female
The classroom			
How do you rate the overall location	of the classro	moo	
Unsatisfactory [2]	I 5	6 7	Satisfactory
Is there enough space in the classroo	om?		
Not enough space overall	Please ttck	6 7	Enough space overall
Does the classroom layout suit you.			
Poor layout	Please tick	6 7	Good layout
How do you rate the appearance of t		?	
Poor E	Please ttck	6 7	Good
Your needs			
How well does the classroom meet y			
Very poorly	Please tick	6 7	Very well
Please give examples of things in the	classroom th	at work well for	уоц?

Please give examples of things in the classroom that dont work well for you...?

Comfort) (
This section asks how comfortable you find the classroom in both winter and summer. $ \\$	
How would you describe typical conditions in WINTER? If you have not lived here in winter then please leave these questions blank and just complete the questions on Temperature in Summer.	How would you describe typical conditions in SUMMER? If you have not lived here in winter then please leave these questions blank and just complete the questions on Temperature in Winter.
Temperature in winter Please ttck your nating on each scale	Temperature in summer
Uncomfortable 2 3 4 5 6 Comfortable	Please tick your nating on each scale Uncomfortable Comfortable
Too hot I 2 3 I 5 6 T Too cold	Too hot Too cold
Stable Varies during the day	Stable
Air in winter	Air in summer
Still 1 2 3 4 6 6 7 Draughty	Still 2 3 4 5 6 7 Draughty
Dry P Humid	Dry E B F F Humid
Fresh I I I Stuffy	Fresh F Stuffy
Odourless T 2 3 4 5 6 T Smelly	Odourless Smelly
Conditions in winter	Conditions in summer
Unsatisfactory Satisfactory overall	Unsatisfactory FFFF Satisfactory overall Satisfactory
Noise How would you describe the effects of noise in the classroom? This question refers to conditions all year round Noise overall? Please tick your rating on each scale Unsatisfactory Too much Too much Too much Too much Too much Too much Overall Comfort All hings considered, how do you rate the comfort of the classroom environment overall? Please tick your rating on each scale Unsatisfactory Please tick your rating on each scale Unsatisfactory Please tick your rating on each scale Unsatisfactory Comments about overall comfort	Light How would you describe the quality of the lighting in the classroom? This question refers to conditions all year round Light overall.? Please tot your nating on each scale Unsatisfactory Satisfactory Artificial light? Unsatisfactory Design overall All things considered, how do you rate the classroom design overall? Please tot your nating on each scale Unsatisfactory Satisfactory Comments on design overall Satisfactory

Health			
Do you feel that the classroom affects your health by maki more healthy?	ing you feel less healthy or		
Please ttck Less healthy	More healthy		
In class I am generally content?			
Please tick Not at all	Very		
In class I am generally happy?			
Please ttck Not at all	Very		
In class I am generally confident?			
Please ttck Not at all	7 Very		
In class I am generally angry? Please tick			
Not at all	Very		
In class I am generally tired? Please ttck			
Not at all	Very		
In class I am generally anxious? Please tick			
Not at all	Very		
In class I am generally quiet? Please tick			
Not at all	Very		
In class I am generally sad?			
Please ttck Not at all	Very		
Attention			
In class I daydream?			
Please tick Never	Very often		
In class I am easily distracted by background noise e.g. voi	ices?		
Please ttck Never	Very often		
In class I am easily distracted by visual stimulation e.g. mo	ovement, colour?		
Please ttck Never F F 6 6	Very often		
In class I am easily distracted by internal thoughts or feeling	ngs?		
Never F F F 6	Very often		
In class I always sit in the same place 2			

1	Wellbeing				
	problems. It means feeling good and functioning well. This tool uses WE	allbeing, some people call it happiness, is about more than avoiding health boblems. It means feeling good and functioning well. This tool uses WEMW RS well-well-well-being-keels, a scale which is often used by entitis and psychologists to measure wellbeing, as follows below.			
	in class I feel optimistic about the future? Please tick				
	None of the time 1 2 3 4 5 All of the ti	me			
	In class I feel useful? Phase tick				
	None of the time 2 5 4 5 All of the ti	.me			
	In class I feel relaxed? Please tick				
	None of the time 1 2 3 4 5 All of the ti	.me			
	In class I feel interested in other people? Please tick				
	None of the time 2 3 4 5 All of the ti	me			
	In class I have energy to spare? Please tick				
	None of the time F 3 4 5 All of the ti	me			
	In class I deal with problems well? Please tick				
	None of the time F 3 F All of the ti	me			
1	In class I have been thinking clearly?				
	None of the time	ime			
1	In class I have been thinking good about myself?				
	None of the time Please tick	ime			
/	In class I feel close to other people?				
)	Please tick None of the time	ime			
	In class I feel creative?				
	Please tick None of the time	ıme			
	In class I feel confident?				
	None of the time Please tick None of the time All of the ti	ime			
	In class I am able to make up my own mind about things? Please tick				
	None of the time 2 3 4 5 All of the ti	ime			
	In class I have been interested in new things? Phase tak				
	None of the time 2 3 4 5 All of the ti	me			
	In class I have been cheerful?				
	Please tick None of the time 2 3 4 5 All of the ti	ime			

Changes to	the classroom
	the two sections below, depending on which classroom you have will be taught in for this half term.
The presence	e of plants
I like having plant	is in the classroom? Please tick
I do not care	Very much
The air quality has	
I do not care	Please tick Very much
The plants make t	he room more crowded?
I do not care	Please tick 1 2 3 4 5 6 7 Very much
The presence	e of a mural of nature
I like having the n	nural of nature in the classroom?
I do not care	Please tick Please tick
The mural of natu	re makes the room feel more spacious?
I do not care	Please tick Very much
The mural of natu	re makes the room more crowded?
I do not care	Please tick Very much
Thank you	
Thank you for tak	ing the time to complete this survey. If you have anything else to
add which you lee	l is relevant to the topics raised here please write them below.
Comments	
1	

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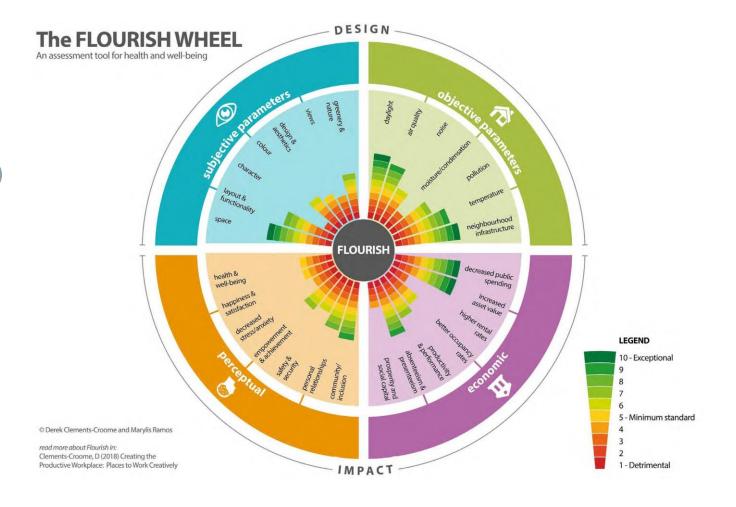


A theory of calming the mind

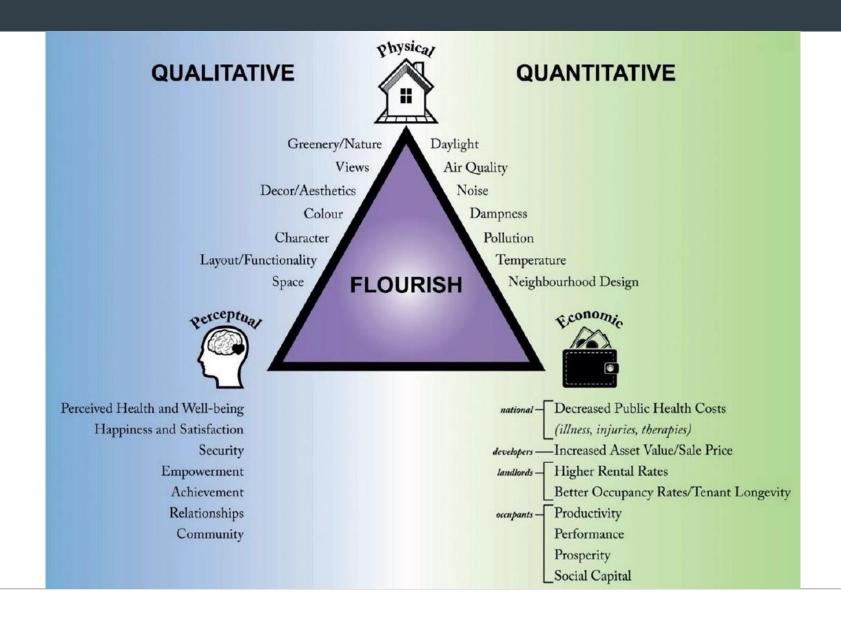
 Improved physiological and cognitive performance through exposure to biophilic environment (Yin, Zhu, MacNaughton, Allen, & Spengler, 2018)

4 Quadrants/3 Layers:

- Objective Environmental Factors
- Perceptual Feelings & 'a choice'
- Subjective The 'Sparkle' layer



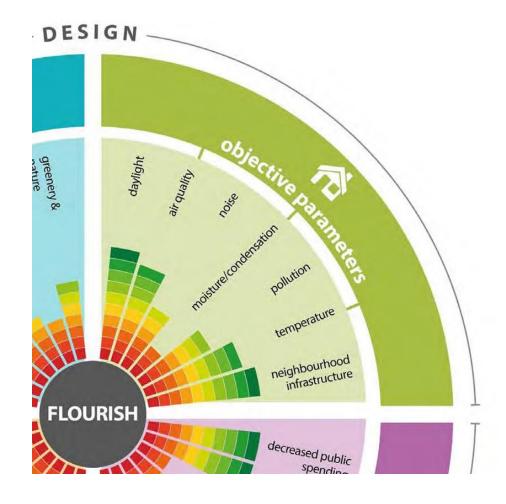






Objective Parameters

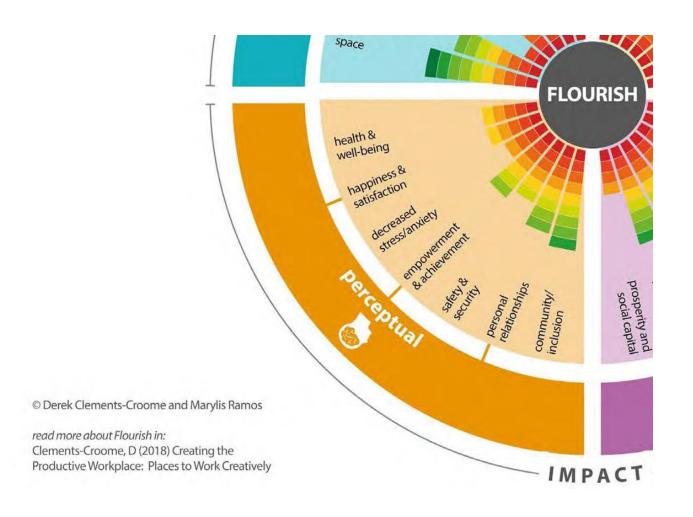
- 'Normal' layer
- Standard comfort health and safety guidelines
- Thermal comfort
- Noise
- Light
- Air quality





Perceptual Parameters

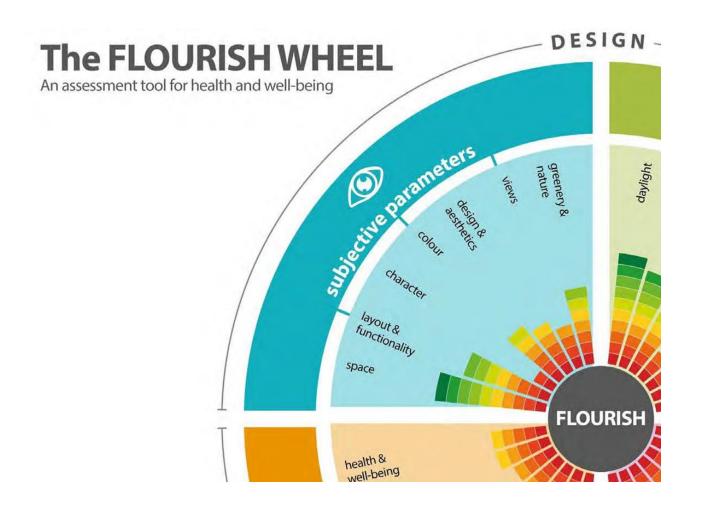
- Individual or 'proportional' layer
- Choice must be made as to priorities
- Based on energy efficiency and cost
- Health and productivity must be considered too





Subjective Parameters

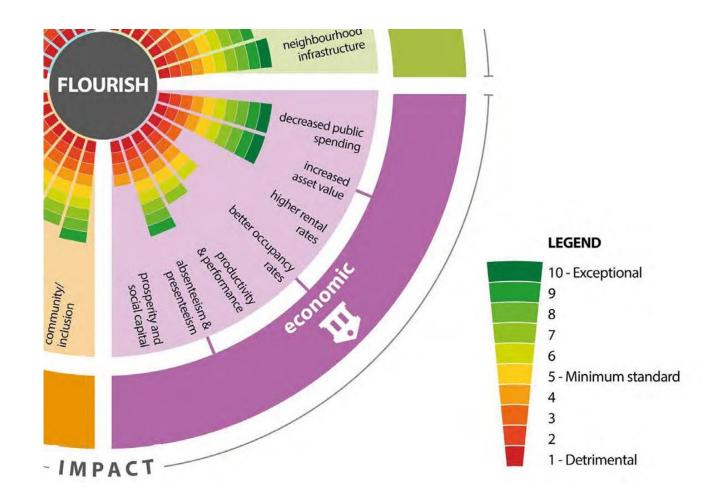
- The 'Wow' layer
- Access to views on nature
- Daylight
- Colour and image
- Layout and green space





Economic Parameters

- Decreased public health costs
- Increased asset value/sale price
- Higher rental and occupancy rates
- Productivity, performance prosperity



GDST Putney High School – Case Study





© Broadway Malyan Architects

GDST Putney High School – Case Study



Indoor environments with natural elements such as GI and daylight have been found to lead to an increase of...



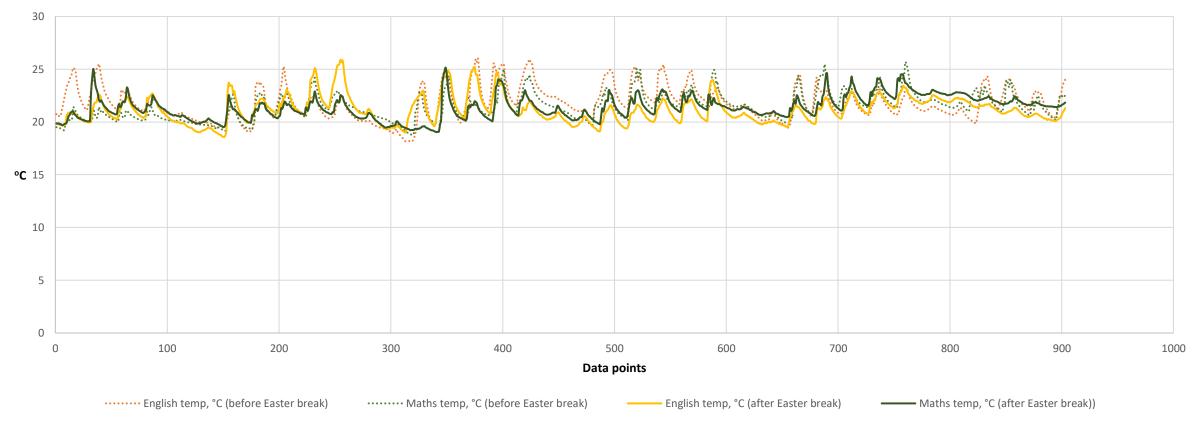




...than those with no natural connection.

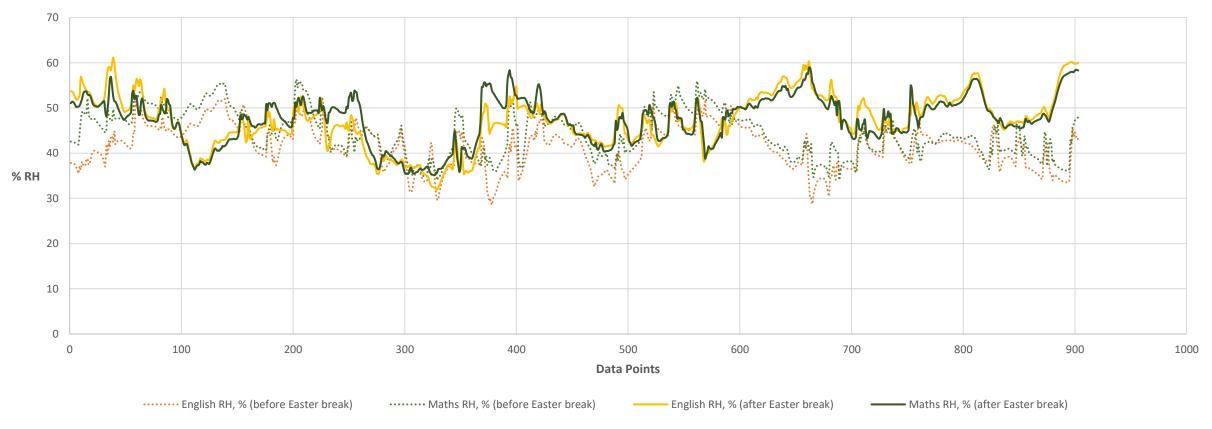




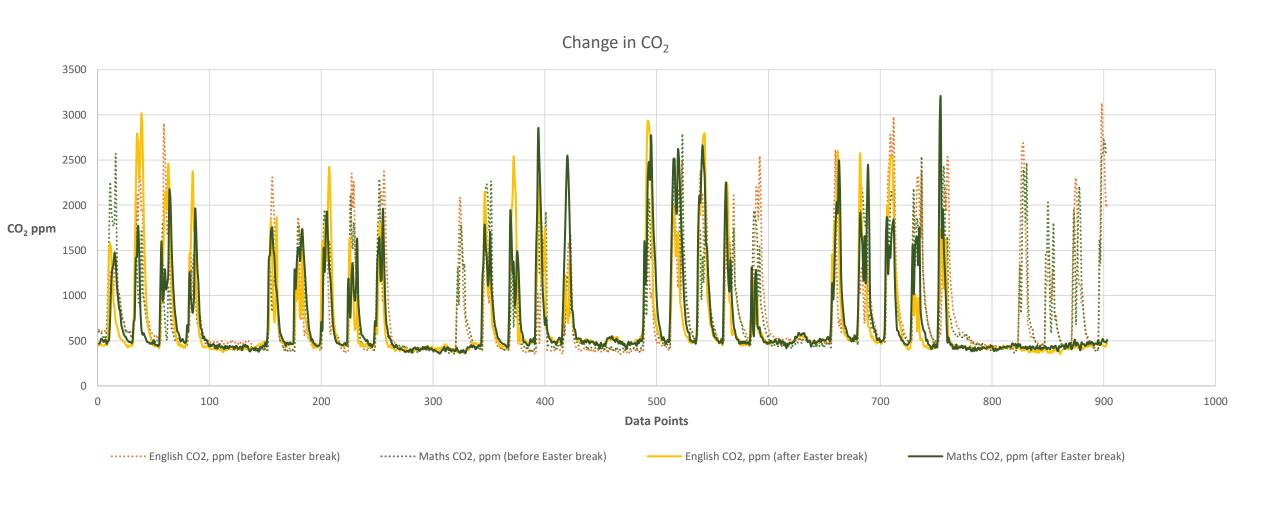




Change in Relative Humidity



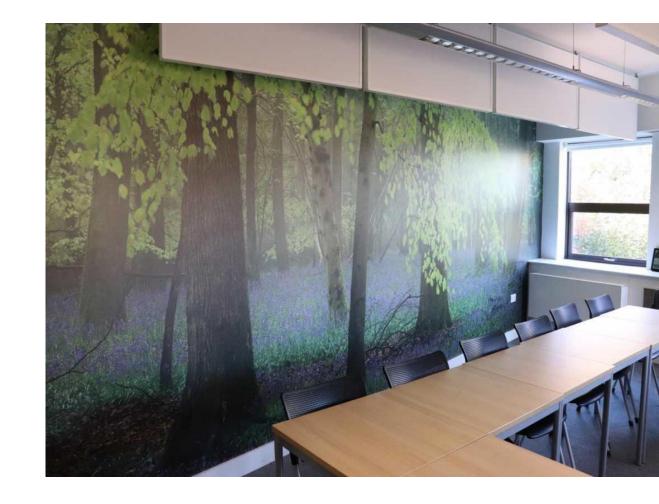






In summary

- Nature in the space has a stronger relationship with occupant cognitive wellbeing
- Less window opening due to regulated indoor air temp
- Humidity improved by 10%
- Level of engagement went from 'High' to 'Extremely High'
- The feedback process continues...



What Happened Next

















CHESHIRE













What Happened Next

















CHESHIRE



















What Happened Next







6 Quick Health and Wellbeing Hacks



- 1. Lighting: Fit a dimmer switch and daylight light bulbs
- 2. Biophilic design: Put some plants in your space!
- 3. A lick of paint and fittings with some thoughtful colour choices
- 4. Proper room temperature control: A thermostat and working TRVs
- 5. Cut out draughts and aim to reduce extremes of heat and cold
- 6. Noise cancelling: Secondary glazing and soft furnishings



Key Takeaways



- Lighting, air quality and connection with nature key to feeling of wellbeing
- Thermal stability and humidity important
- Biophilic design (plants can help concur many of these issues in one fell swoop)
- Leads to increased concentration and productivity
- Measure and compare
- Doesn't take much to change! Small steps



Bonus Slide – Plants that do stuff





















LOW LIGHT

- Chrysalidocarpus lutescens (Areca palm) Howea forsteriana (Kentia palm) Release moisture into the air and remove formaldehyde, xylene and toluene.
- 2a Ficus elastica 'Melany' (Rubber plant)
- 2b Peperomia obtusifolia (Baby rubber plant) Remove chemical toxins from air.
- 3a Dracaena 'Janet Craig'
- 3b Dracaena marginata (Dragon tree) Effective air cleaners removing xylene and trichloroethylene.
- 4a Epipremnum aureum (Marble queen, Golden pothos, Devil's Ivv)
- 4b Philodendron oxycardium (Heart-leaf philodendron) Remove chemical vapours.
- Chamaedorea elegans (Dwarf palm)
- 5b Zamioculcas zamiifolia (Eternity plant) Produce oxygen and reduce carbon dioxide at night.

MORE PLANTS THAT BRING DELIGHT FOR BRIGHT AND DIRECT LIGHT

Cereus peruvianus ('Florida' cactus). Haworthia (White spider) Senecio cephalophorus (Mountain fire) Crassula ovata (Friendship tree, Jade plant) Crassula (Buddha's temple)

Tillandsia (Air plant varieties) Echeveria 'Doris Taylor' (Woolly rose) Echeveria (Purple pearl) Echeveria agavoides Echeveria shaviana 'Truffles'

Putney High School's plant selections are all taken from a NASA study based on guidance set out by Dr B C Wolverton in his publication How to Grow Fresh Air.

The plants were chosen on the basis of:

- Removal of chemical vapours Ease of growth and maintenance
- Resistance to insect infestation Transpiration rate

TOP LOW MAINTENANCE PLANTS WHICH THRIVE IN LEARNING ENVIRONMENTS

BRIGHT LIGHT

- 6a Anthurium andraeanum (Flamingo flower)
- 6b Sansevieria trifasciata (Snake plant) Remove formaldehyde, xylene, toluene and ammonia. The flowers are a visual highlight.
- 7a Aloe mitriformis (Mitre aloe)
- 7b Phalaenopsis sp. (Moth orchid) Effective in removing xylene from the air.
- 8a Chlorophytum comosum (Spider plant)
- 8b Asplenium antiquum (Japanese bird's nest fern) Improve indoor air quality.
- 9a Rhipsalis baccifera (Oasis mistletoe cactus)
- 9b Tradescantia zebrina (Inch plant) Improve indoor air quality.
- 10a Pilea peperomioides (Chinese money plant)
- 10b Calathea ornata (Prayer plant) Improve indoor air quality.



















The selected plants enjoy fortnightly watering, and daily misting helps to improve humidity which creates a fresher learning environment. Allow one plant per 6 cubic metres.

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"To inspire and forge a sustainable legacy"

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- Support at every project stage













