

# Using Virtual Reality (VR) Activities to Enhance Chinese Architectures Learning

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# Background



Office of Education Development  
and Gateway Education

香港城市大學  
City University of Hong Kong



Chinese Civilisation Centre

香港城市大學  
City University of Hong Kong

- Office of Education Development and Gateway Education
- Chinese Civilisation Centre 中國文化中心



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Home

About EDGE

CityU-Learning

Faculty Supports

Student Supports

Gateway Education

Teaching Grants

Introduction

Signature GE Courses

GE Requirements

- 2014/15 Onwards
- 2012/13 & 2013/14
- Before 2012/13

GE Course Information

GE Laboratory

- GE Laboratory - Home
- GE Laboratory - Services
- GE Laboratory - Safety Regulations
- GE Laboratory - Equipment
- GE Laboratory - Studio
- GE Laboratory - Makerspace for Prototyping
- GE Laboratory - Online Reservation

For Students

- What is GE?
- GE Programme Intended Learning Outcomes
- GE Credit Transfer Guideline
- Cross Institutional GE
- Contacts

For Faculty

- GE in University Education
- GE Programme Intended Learning Outcomes
- Curricular Mapping of GE programme
- Information on Proposal Submission
- GE Course Triennial Review
- GE Credit Transfer Guideline
- Contacts

Gateway Education Programme Committee

- Terms of Reference

Gateway Education Laboratory

The aim of Gateway Education (GE) programme is to augment and round out the specialised training students receive in their majors by enabling them to achieve a breadth of knowledge through exposure to multiple disciplines. Aligned with the mission, a technology-enriched active learning space, named Gateway Education Laboratory (GE Lab), was setup in 2012 for supporting active and collaborative learning. It allows students from different disciplines to work together under the GE umbrella. GE lab consists of an active learning classroom (ALC), a prototyping area, and a digital media production space. The ALC is highly configurable with movable tables, it equipped with running water facility and ventilation which are suitable for different type of active learning activities. While the prototyping area housed key equipment and facility to support students realizing their ideas and making functional prototypes, such as professional grade 3D printers, laser cutter/engraver, virtual reality equipment, electronic components library and prototyping platform. With the increasing demands of using digital media to support teaching and learning, Panopto Studio for self-recording and Chroma-Key Studio with professional shooting and lighting equipment are ready for educational video production.

**Update: GE Lab is reported in the QS Asia Quarterly Newsletter.**

CityU Gateway Education Laboratory

稍後觀看

分享

GE LAB

到以下平台觀看：

YouTube

GE Lab 2 (P4907) - Active Learning Space








# Background

- General Education course - GE1125  
Architecture and Space in Chinese Culture  
建築空間與中國文化
- Field trip schedule is only able to arrange in summer



An aerial photograph of the Foguang Temple Pagoda, a tall, multi-tiered wooden structure with dark tiled roofs, standing prominently in a snowy landscape. The pagoda is surrounded by a red wall and a snow-covered courtyard. In the background, a cityscape is visible under a cloudy sky.

建成于辽清宁二年 (1056年)

Built in 1056, it was completed in the 2nd year during the reign of Qingning in the Liao Dynasty.





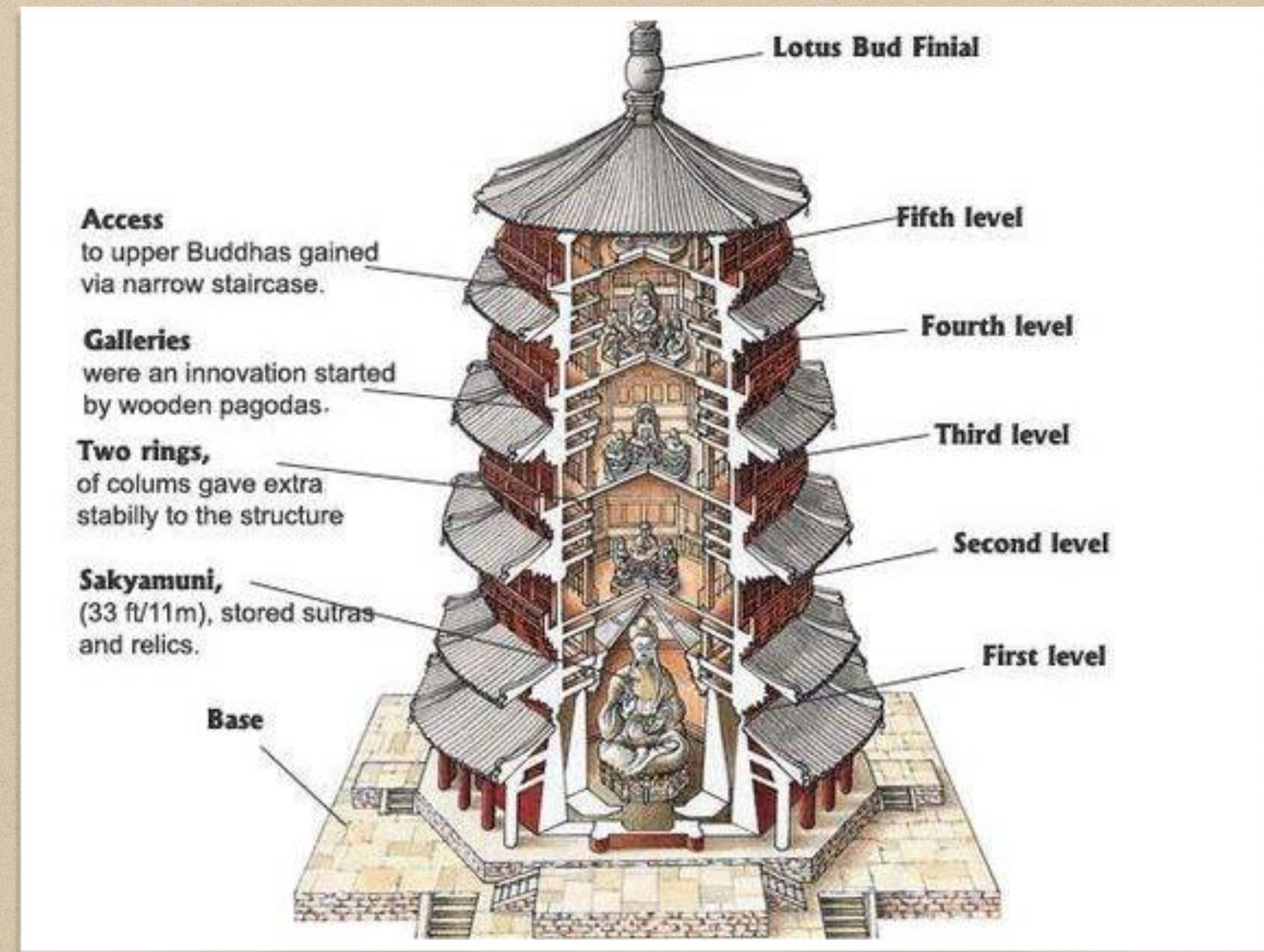
应县木塔全称佛宫寺释迦塔

Also known as the Sakyamuni Pagoda of Fogong Temple,

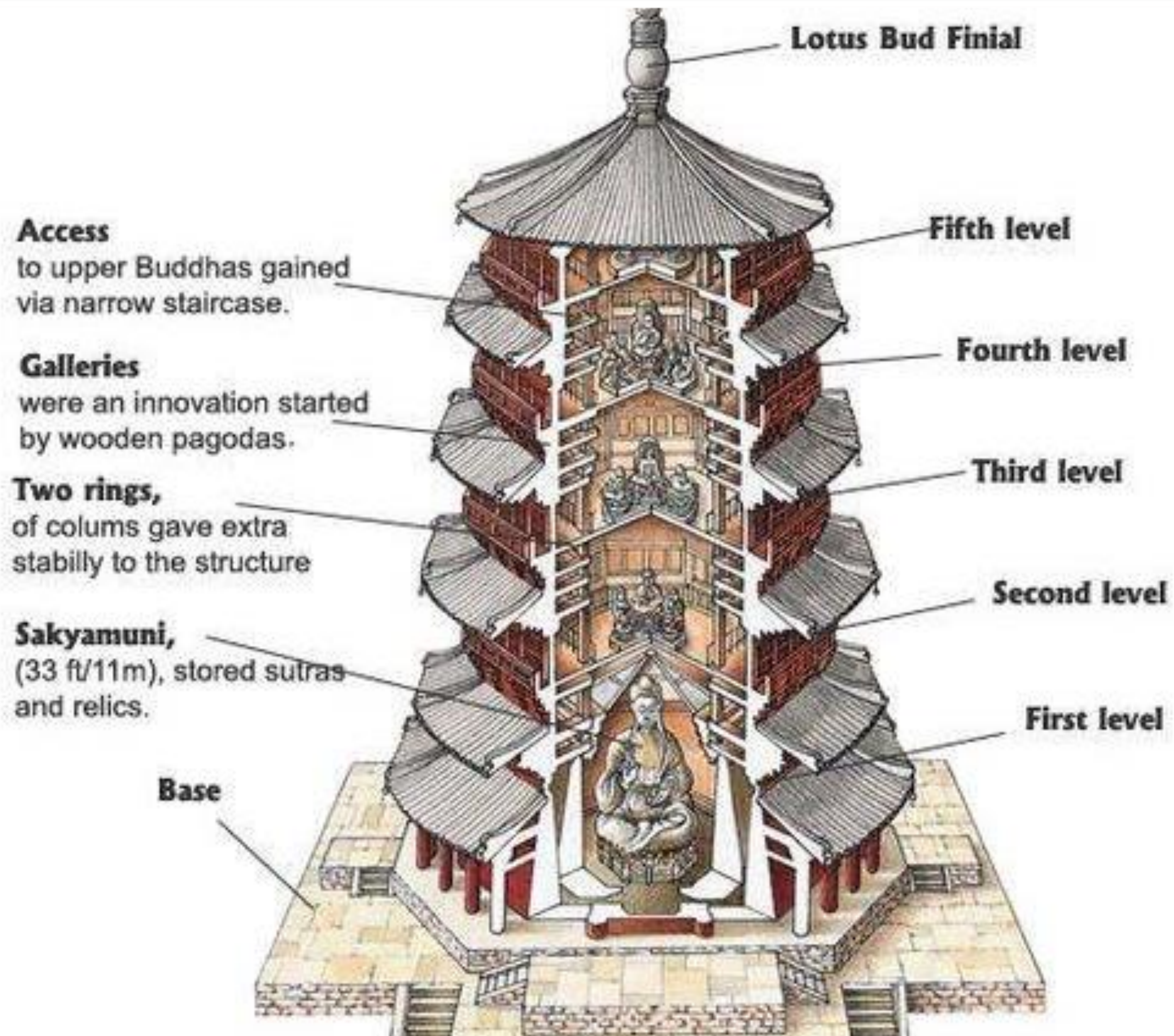


# Rote Learning

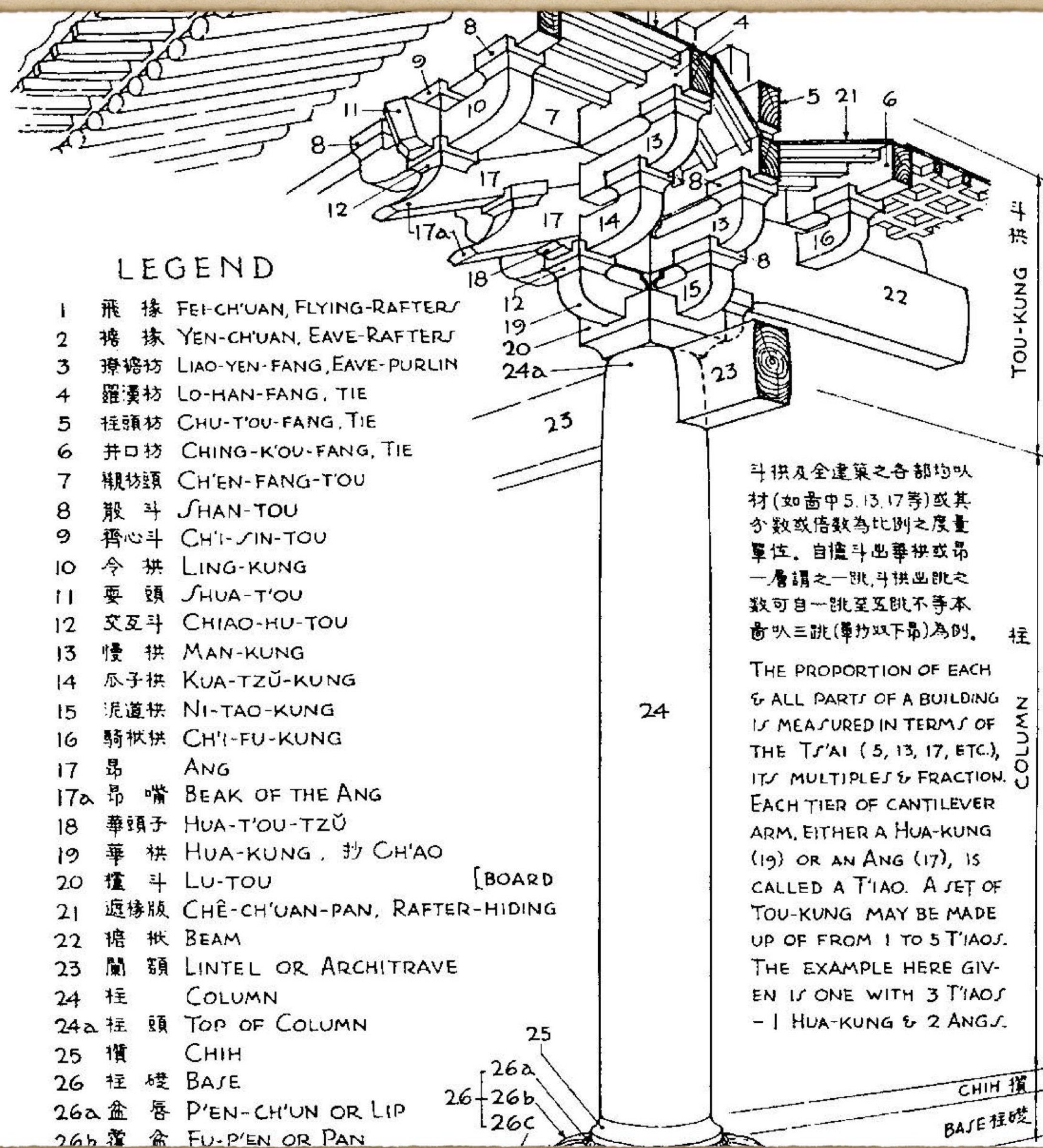
- Images and figures
- No interactive features





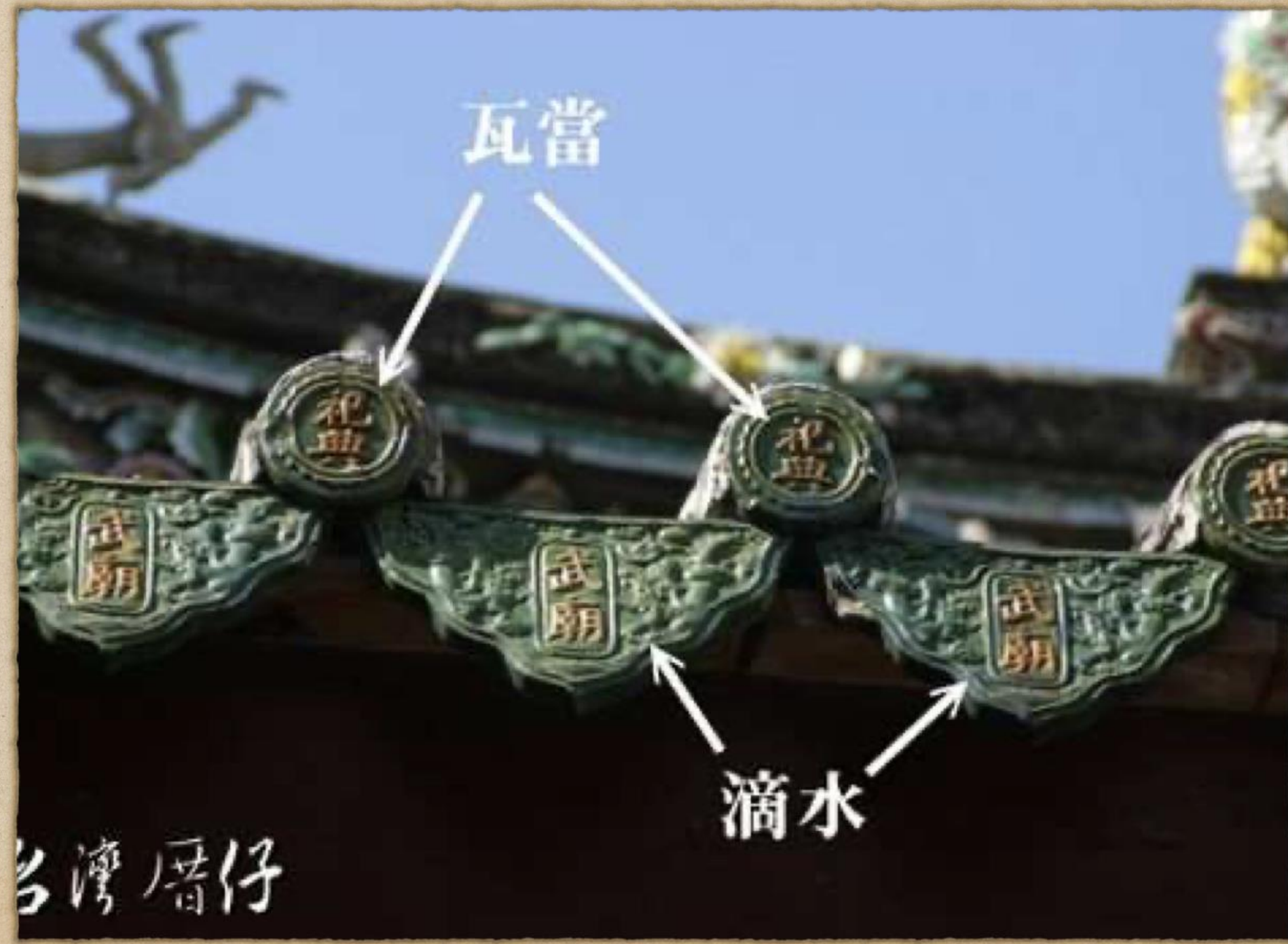






斗拱及全建築之各部均以材(如圖中5, 13, 17等)或其分數或倍數為比例之度量單位。自攪斗出華拱或昂一層謂之一跳, 斗拱出跳之數可自一跳至五跳不等本圖以三跳(華拱雙下昂)為例。

THE PROPORTION OF EACH & ALL PARTS OF A BUILDING IS MEASURED IN TERMS OF THE TS'AI (5, 13, 17, ETC.), ITS MULTIPLES & FRACTION. EACH TIER OF CANTILEVER ARM, EITHER A HUA-KUNG (19) OR AN ANG (17), IS CALLED A T'IAO. A SET OF TOU-KUNG MAY BE MADE UP OF FROM 1 TO 5 T'IAOS. THE EXAMPLE HERE GIVEN IS ONE WITH 3 T'IAOS - 1 HUA-KUNG & 2 ANG.





How to Engage Students in Chinese  
Architectures Learning?







# Realizing mystical buildings in Dunhuang Mural

- A project-problem based learning approach for appreciating ancient Chinese cultural heritage
- 3D printing project

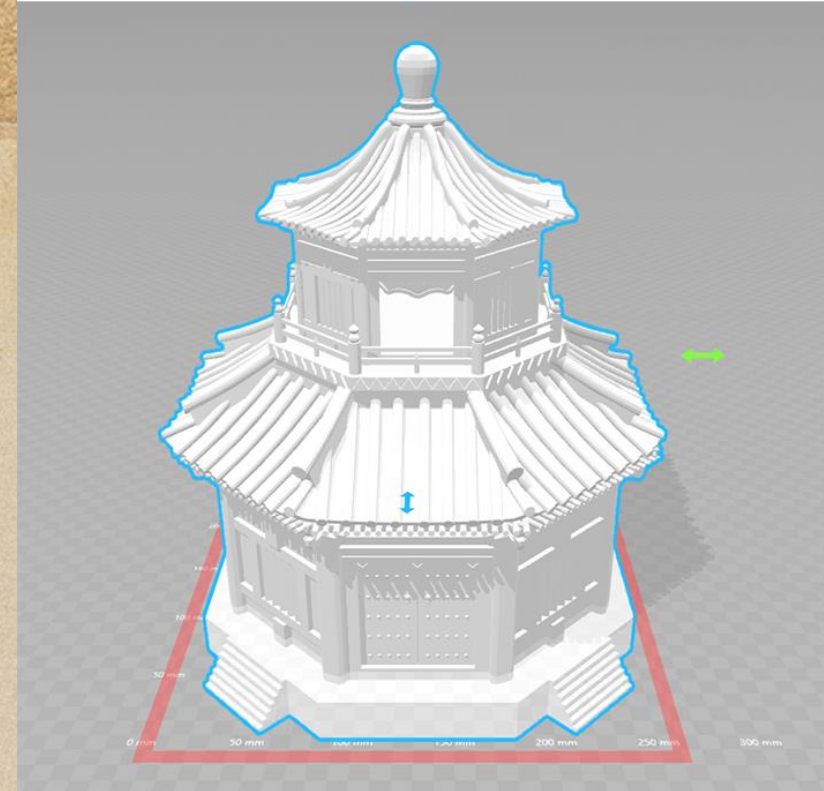




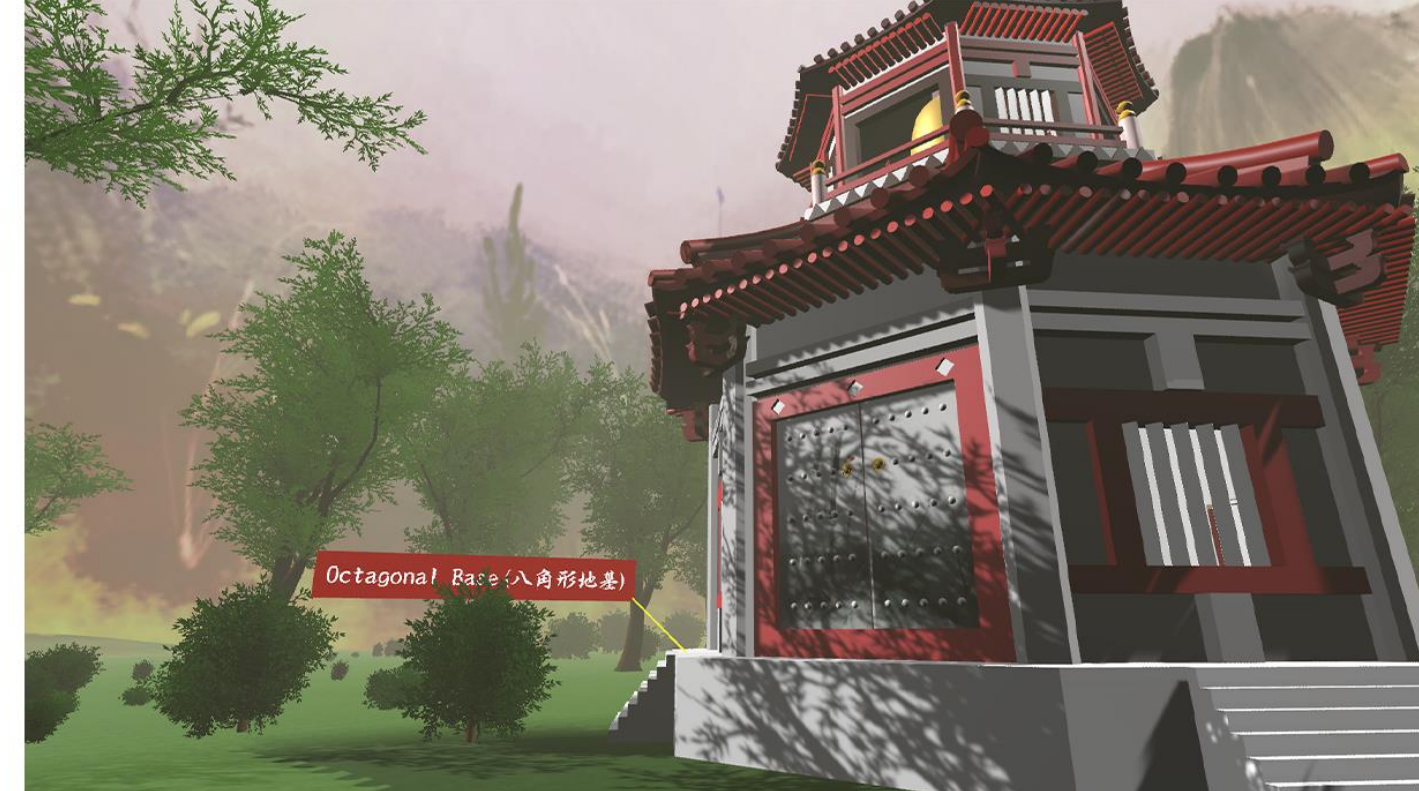


Virtual Reality





(a)



(b)



(c)



(d)



(e)



(f)



(g)



(h)











# Quantitative & Qualitative Survey

- Feedbacks on perceived learning experience
  - 5-point Likert scale
  - IEEE 2018 Conference Paper
  - ICEMT 2019 Conference Paper



Comprehensive  
**Interesting**  
Lack interaction Active learning  
**Informative**  
Significant Inspiring Meaningful  
**GOOD**  
Cool  
Relevant  
Attractive  
**Fun**  
Enjoyable  
New experience  
More information

Survey results



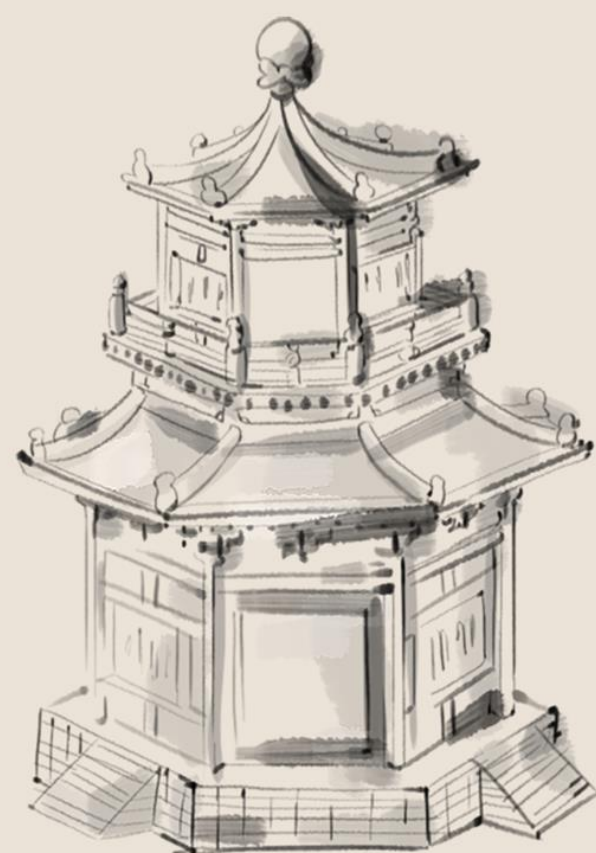
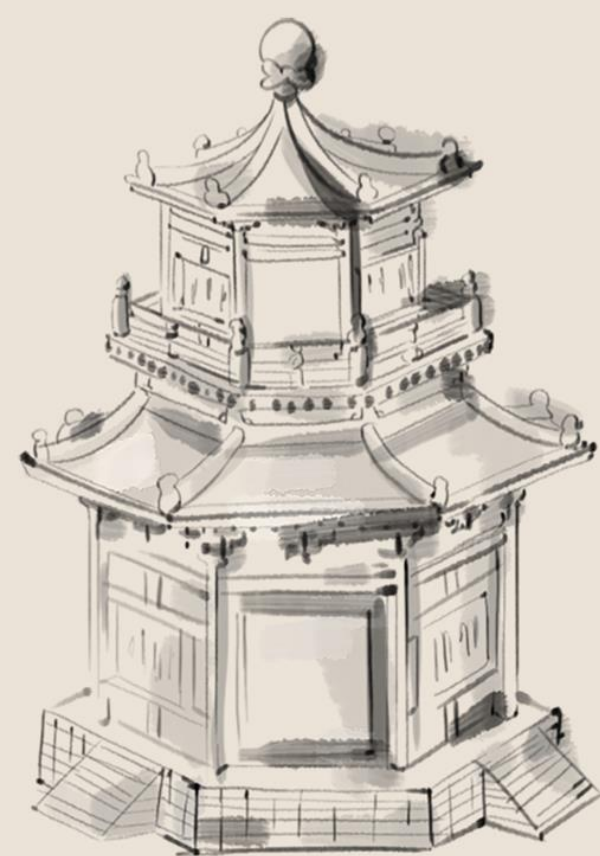
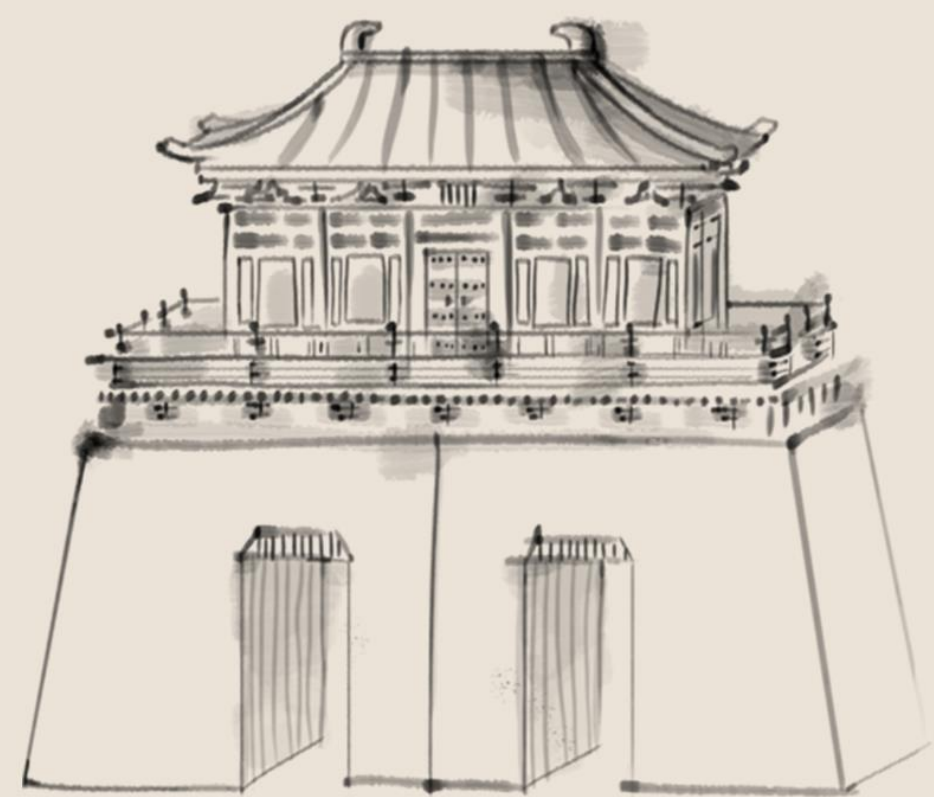
# Overall Learning Experience

- Interesting
- Informative
- Good
- Attractive
- Fun
- New experience



Further enhancement with the VR  
contents









# Water painting with the architectures

VR contents





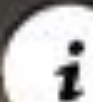
塔刹  
Tasha

牌匾  
Plaque

木塔資料  
Pagoda Info

塔基正面八卦圖  
Bagua diagram  
(The Eight Trigrams)

應縣木塔  
Wooden Pagoda of Yingxian Temple













**Table 1. Acceptance level of using VR contents**

<b>Assessment Items</b>	<b>Mean</b>	<b>SD</b>
The VR environment makes me more concentrated on my learning task	3.78	0.90
By using VR contents, I have developed a better understanding of the features of Chinese architecture, including space, forms, types, structure, and construction.	3.97	0.79
By using VR contents, I have developed a better understanding of how Chinese architecture and culture are connected by the use of ornamentation and symbolism.	3.85	0.88
By using VR contents, I have learnt important building terminologies.	3.78	0.90
Overall, I find the VR contents useful in enhancing my learning.	3.91	0.92
I am willing to continue using VR contents to learn in the future.	4.00	0.74
I wish that other classes also adopt Virtual Reality system to facilitate my learning.	4.03	0.84



**Table 2. Comparison of VR contents - Ease of Use**

<b>Assessment Items</b>	<b>VR Types</b>	<b>Mean</b>	<b>SD</b>	<b>Mean Difference</b>	<b><i>t</i></b>	<b><i>p</i></b>	<b>Cohen's <i>d</i></b>
Easy to manipulate with VR contents	3D	3.86	0.89	.045	0.58	.57	0.06
	360	3.82	0.77				
Able to observe architectures from various perspectives easily	3D	3.91	0.87	.057	0.82	.41	0.09
	360	3.85	0.85				
Experienced discomfort, headache, nausea or other sickness symptoms	3D	3.33	1.29	.034	0.39	.70	0.04
	360	3.30	1.25				
Enjoyed VR contents	3D	4.09	0.71	.011	0.21	.84	0.02
	360	4.08	0.70				



# Conclusions

- Students agree to use new technology to support learning
- VR technology does help flipped classroom teaching approach



Thank You