在慕課上實現沉浸式學習

ENABLING IMMERSIVE LEARNING IN MOOCS

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簡介 ABOUT ME

- 大規模開放線上課堂（慕課）
  Massive Open Online Courses (MOOCs)
- Java 程式設計入門
  Introduction to Java Programming
- 初中科學線上自學計劃
  Junior Secondary Science Online Self-learning Scheme
- 虛擬實驗室
  Virtual Laboratories

探討內容 DISCUSSION CONTENTS

- 大規模開放線上課堂（慕課）
  Massive Open Online Courses (MOOCs)
- 元宇宙和當中教與學的機遇
  Metaverse and the T&L opportunities lies within
- 在慕課中實現沉浸式教學
  Enabling Immersive education in MOOCs
- 範例：具有沉浸式學習內容的斜坡工程慕課
  An example case: Slope Engineering MOOC with immersive learning contents
- 分享：由學生製作以保存文化遺產的沉浸式虛擬導覽
  Sharing: An immersive virtual tour for heritage preservation by students

大規模開放線上課堂 (慕課)
MASSIVE OPEN ONLINE COURSES (MOOCS)

- 透過網路提供給許多人的學習課程
  A course of study made available over the Internet to a very large number of people
- 輕鬆取得課程內容、彈性的學習體驗、多元的學習內容
  Easy access, Flexible and Diverse contents
- 慕課平台:
  MOOC platforms:

coursera

Founded by: Stanford University

Coursera, Public domain, via Wikimedia Commons

edX

Founded by: MIT and Harvard

edX, Public domain, via Wikimedia Commons

HK MOOC

Founded by: HKVU, HKUST

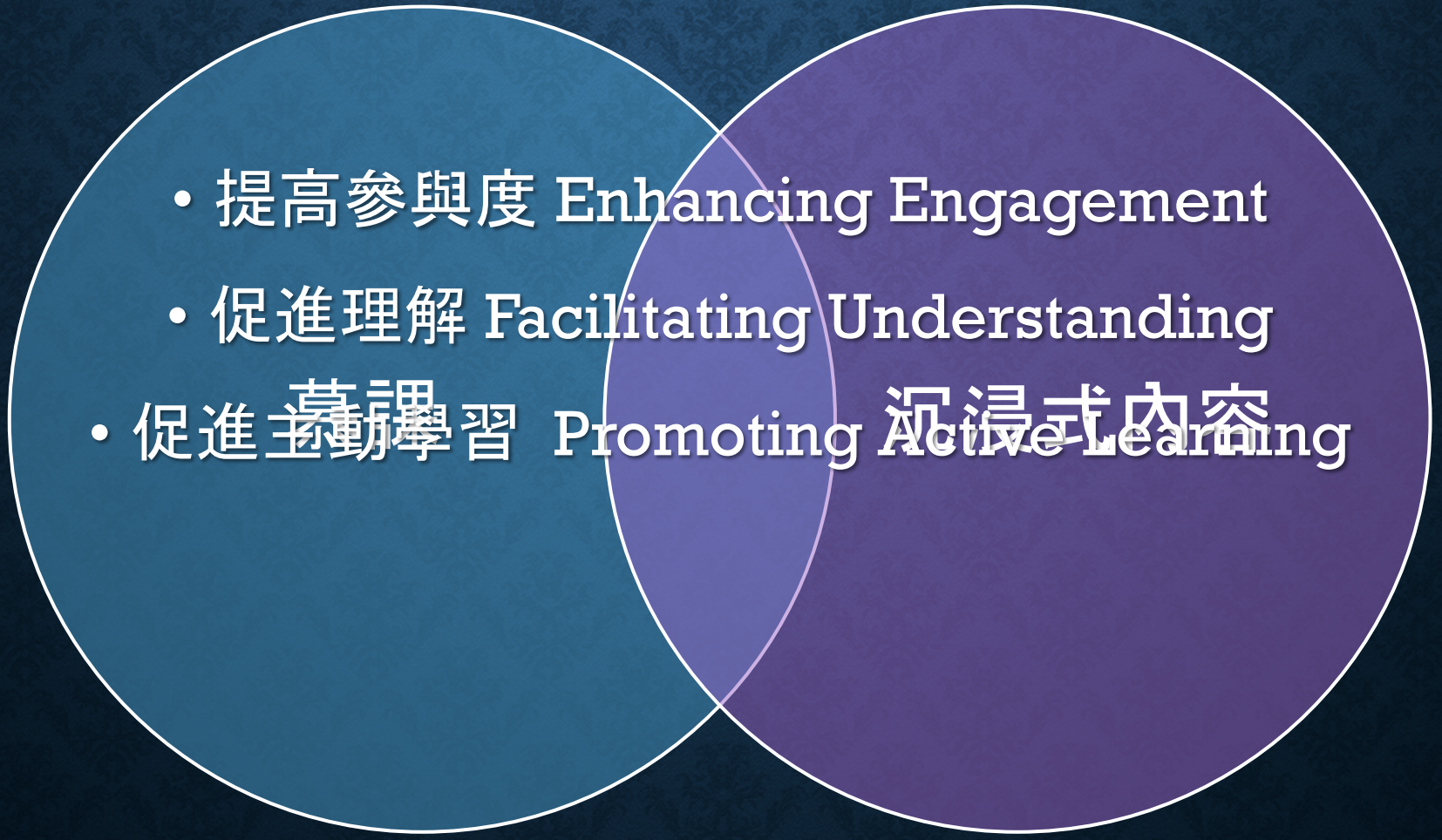
元宇宙 METAVERSE

- 由現實和虛擬實境融合所創造的集體虛擬空間。
  A collective virtual space, created by the convergence of physical and virtual reality.
- 完全沉浸而又能互動的虛擬世界，我們可以在其中工作、進行娛樂和社交活動。
  Fully immersive, interactive virtual world where we can work, entertain and socialize.
- 硬體：頭戴式的虛擬實境裝置，軟體：遊戲引擎和 3D 建模軟體
  Hardware: VR Headsets, Software: Game engines and 3D modelling software
- 例子: Meta Horizon Worlds, NVIDIA Omniverse
  Examples: Meta Horizon Worlds, NVIDIA Omniverse

教與學的機遇 OPPORTUNITIES IN T&L

- 沉浸式互動學習體驗
  Immersive and interactive learning experience
- 模擬真實世界的情況
  Real-world simulations
- 協作學習
  Collaborative learning
- 個人化學習
  Personalized learning

將沉浸式內容帶入慕課
BRING IMMERSIVE CONTENT INTO MOOCS



斜坡工程慕課 SLOPE ENGINEERING MOOC

- 旨在讓公眾了解斜坡安全
  Aims to educate the general public about slope safety
- 內容包括 contents include:
  - 山泥傾瀉分類、原因 Landslide classification and cause
  - 斜坡的穩定方法 Slope Stabilizing Method
- 沉浸式內容 Immersive content:
  - 香港地質景點實地考察的 360° 影片
    360° videos of field trips to geological sites in Hong Kong
  - 一個關於「三軸試驗」土力學的虛擬現實（VR）實驗室
    A Virtual Reality (VR) laboratory of the triaxial test in soil mechanics

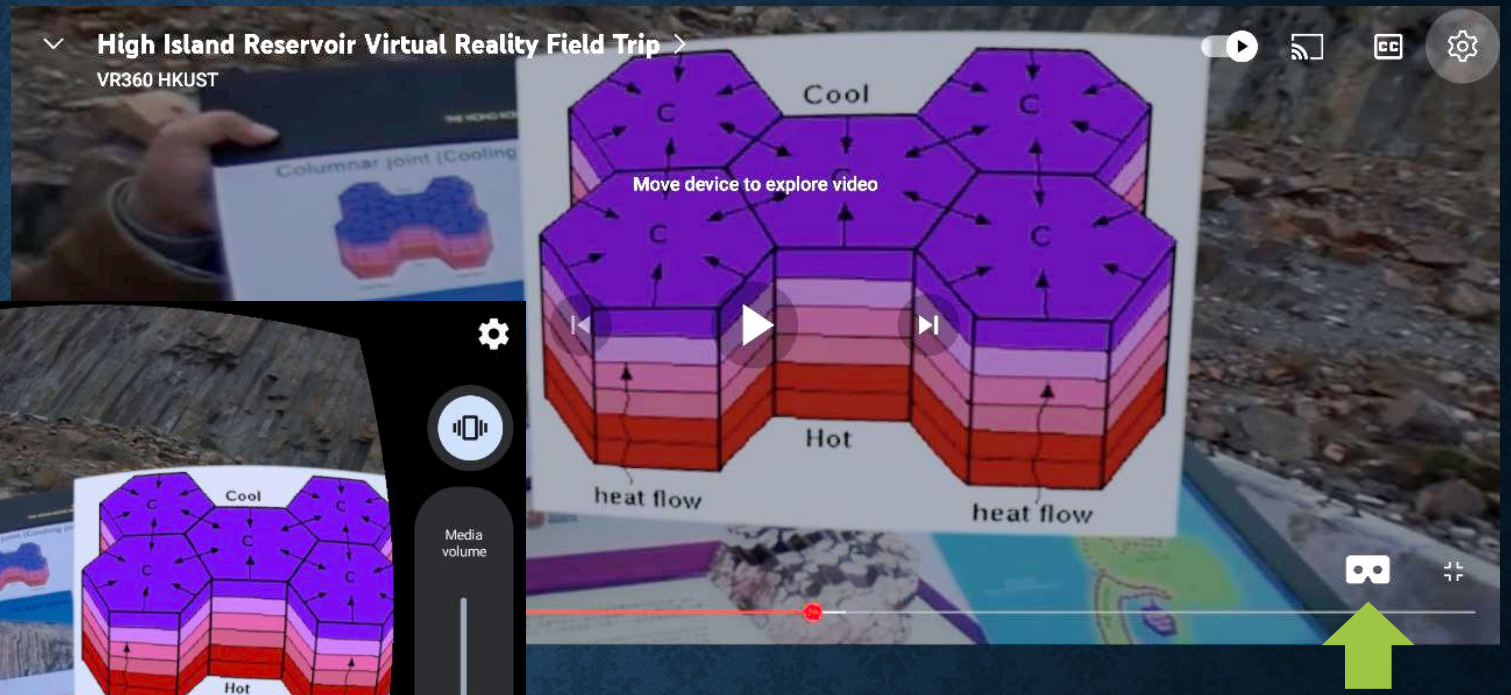
實地考察的 360° 影片
360° VIDEO FIELD TRIPS

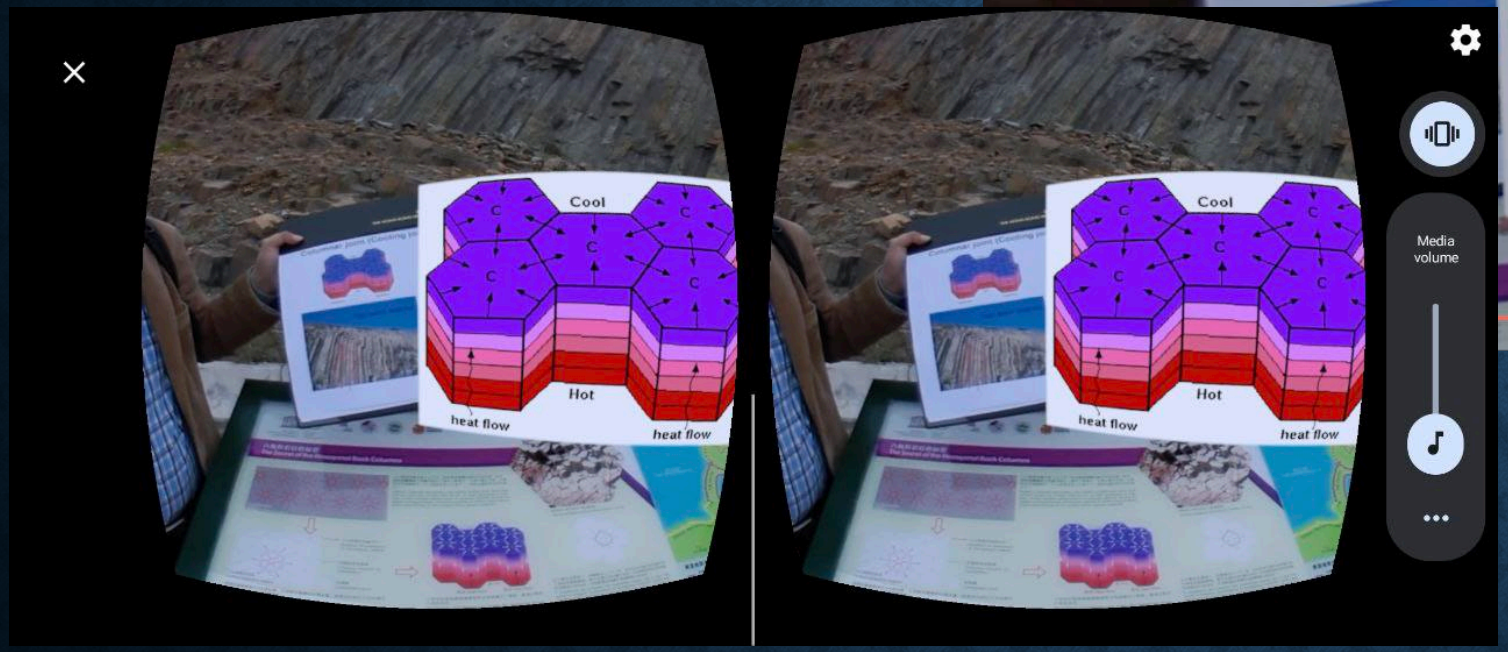
- 3 次實地考察：{荔枝莊，橋咀洲，萬宜水庫}
  3 field trips: {Lai Chi Chong, Sharp Island, High Island Reservoir}
- 讓學生通過沉浸式的 360° 影片了解火山沉積岩，火山結構和相關的地質知識。
  To let students understand volcanic sedimentary rocks, volcano structure and related geological knowledge in immersive 360-degree videos.
- 在 360° 影片中添加註解以便於明白
  Annotations are added inside the video to facilitate understanding
- 學生能透過兩種方式觀看 360° 影片
  Students can view the 360 video with 2 options

製作帶註解的 360° 度影片
PRODUCING ANNOTATED 360 ° VIDEOS

- 以 360 ° 相機拍攝 Shooting with 360 ° camera
  - 縫合線 Stich line
  - 隱形自拍棒 VS 三腳架 Invisible selfie stick VS tripod
  - 開啟穩定功能 Enable Stabilization

- 後製製作（新增註解）Post editing (Adding annotations)
  - 預設相機軟體 Default camera software
  - Adobe Premiere Pro
  - Divinci Resolve (Free)



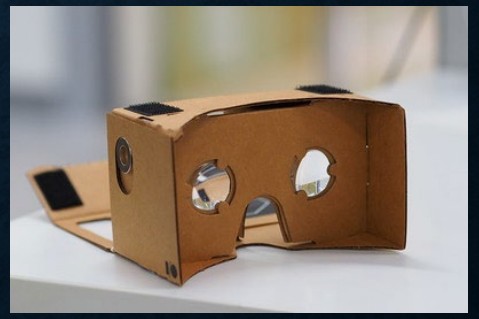


在智能電話上以沉浸模式觀看

需要使用 Google Cardboard

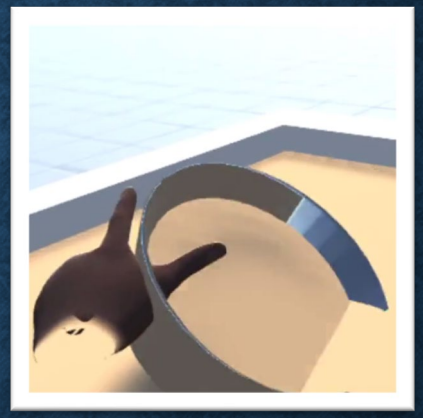
萬宜水庫 Field Trip

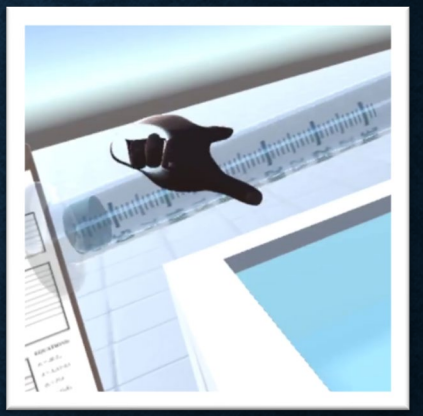
https://www.youtube.com/watch?v=Hk4zKx6VcN4

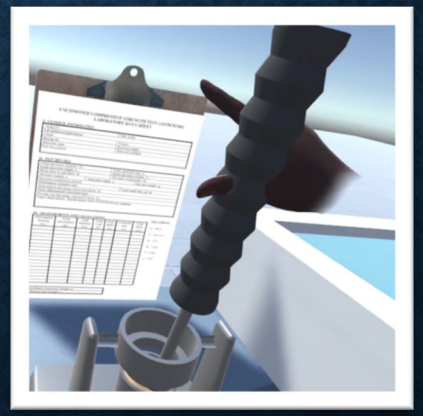


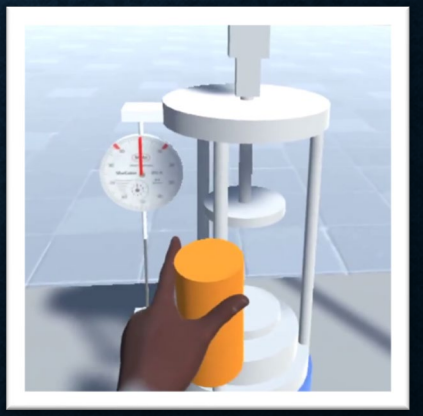
「三軸試驗」的虛擬現實實驗室
THE TRIAXIAL TEST VR LAB

- 測量土樣力學特性的土力學基礎實驗
  A fundamental experiment in soil mechanic for measuring properties of samples
- 了解執行測試的程序
  Learn the procedures for performing the test
- 作為一個真實實驗前的預習
  Can also act as a "Pre-lab" component
- 在慕課中加入動手實踐的部分
  Add a hands-on component to the MOOC course



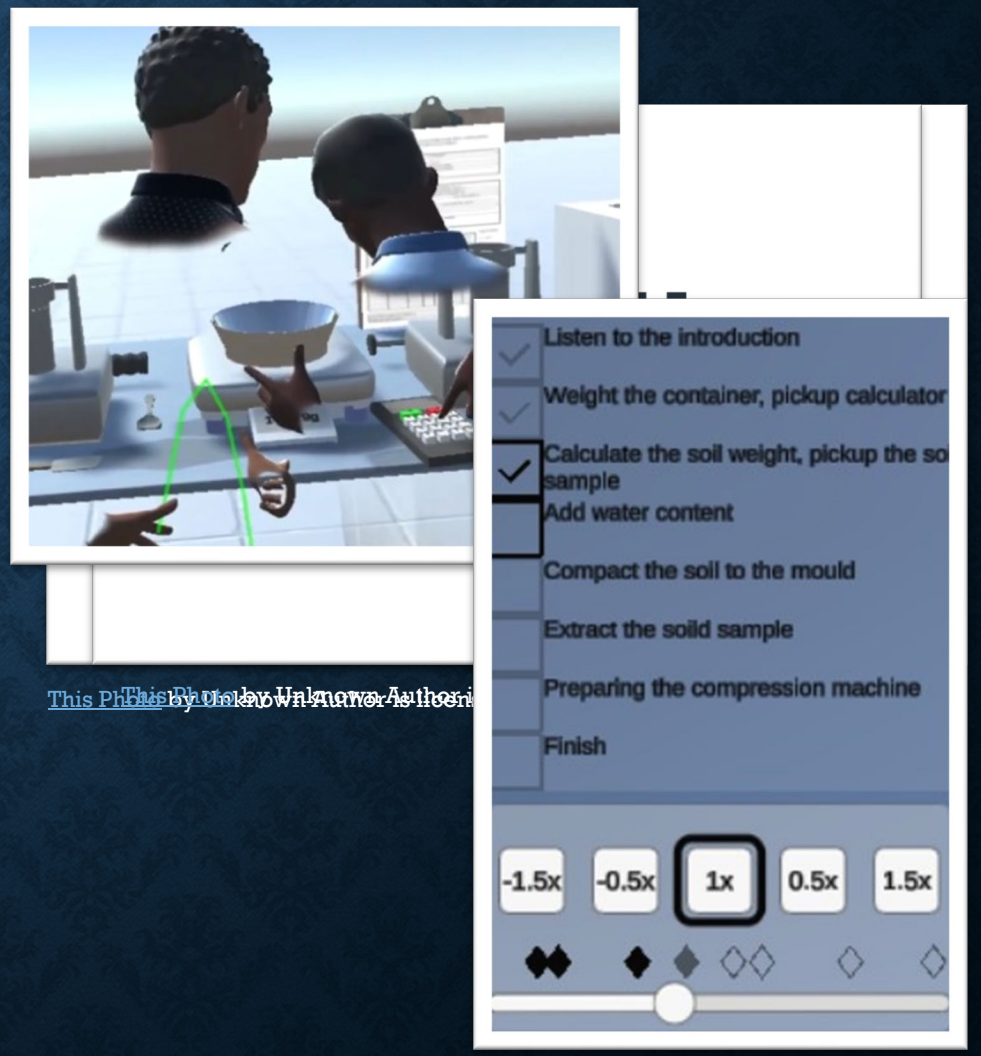






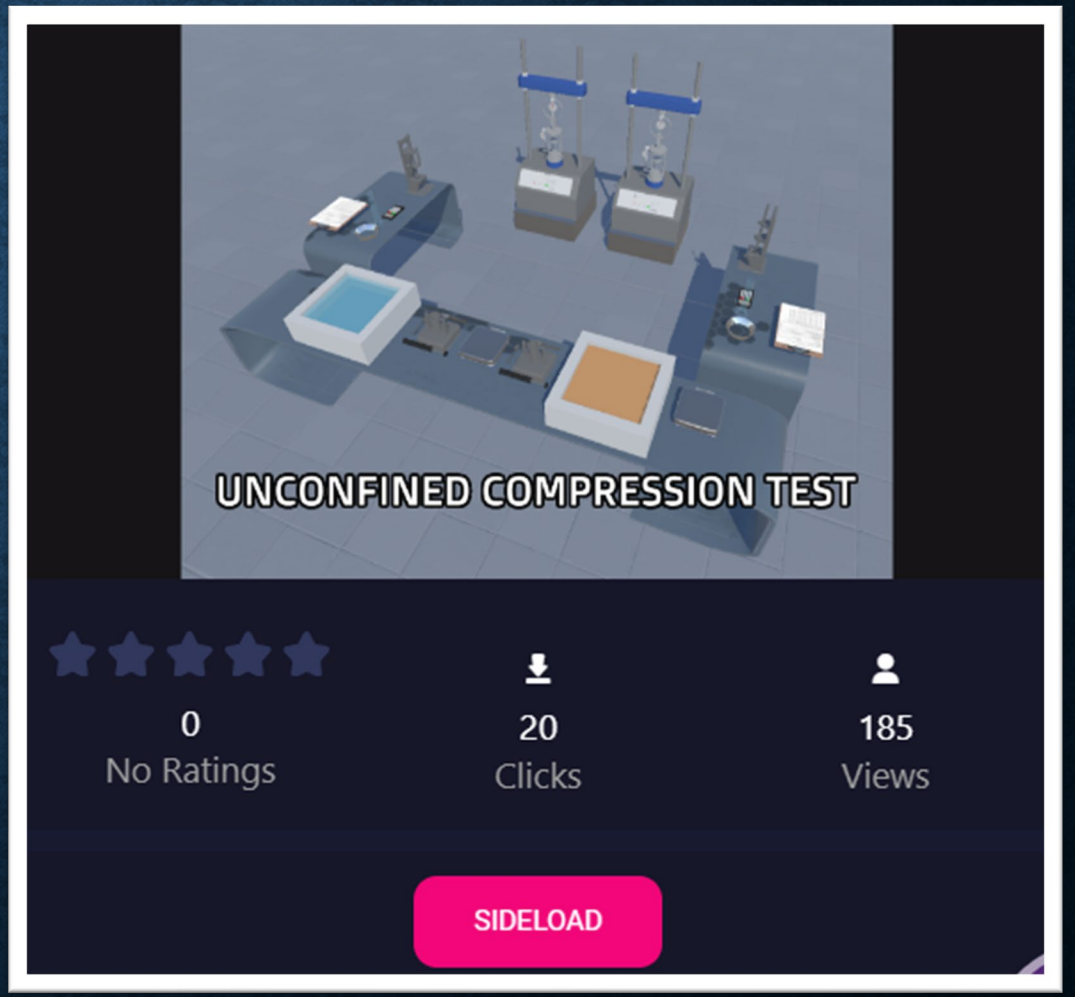
製作過程 DEVELOPMENT

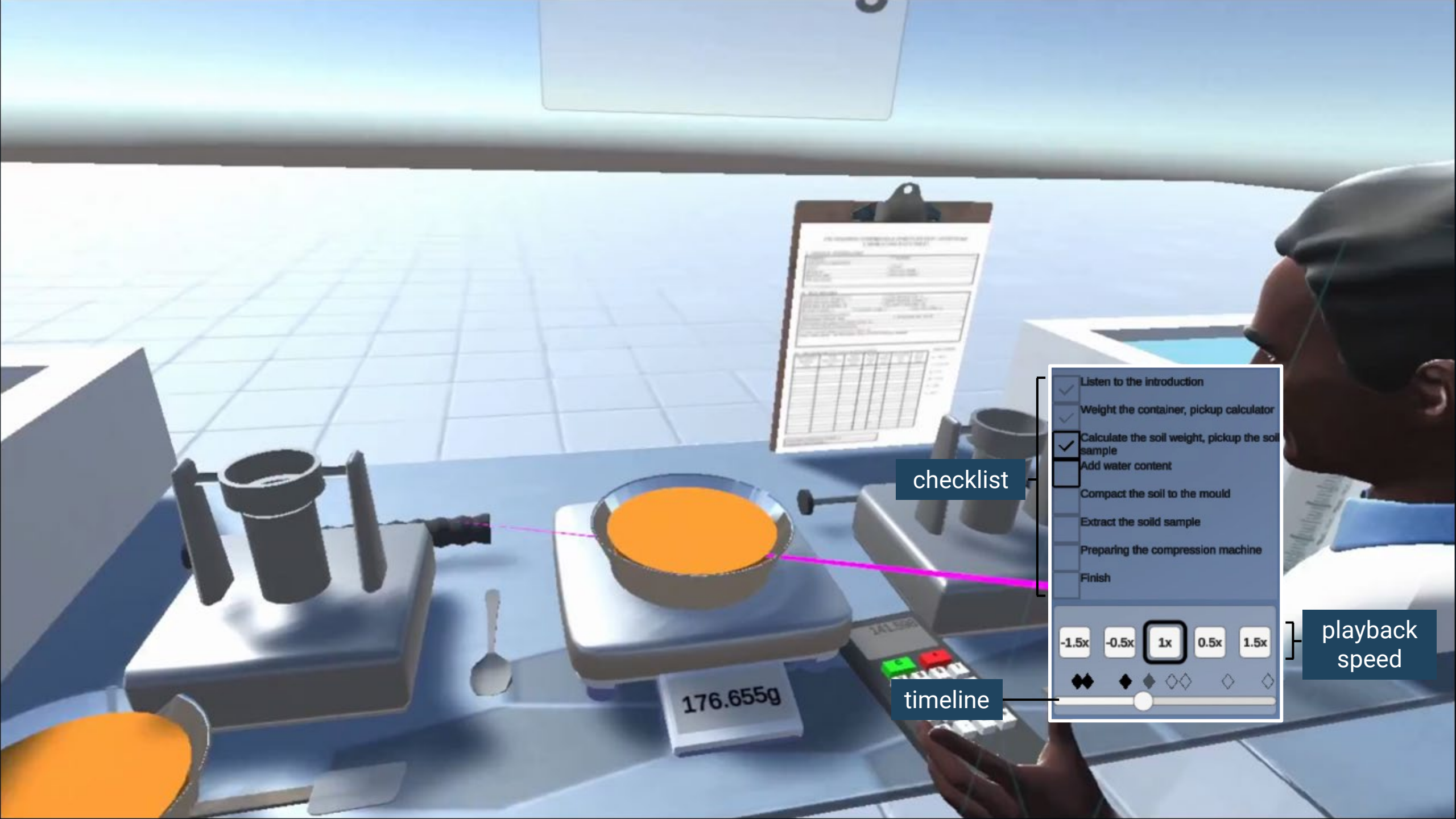
- 運用一個設計思維的方法
  Using a design thinking approach
- Unity 遊戲引擎，VR 頭戴式裝置，具有獨立顯示卡的電腦
  Unity Game Engine, VR headset, Computer with dedicated graphics card
- VR 實驗室中學習的輔助工具
  Learning aids in a VR Laboratory
  - 一個可由時間軸控制的 VR 導師錄影
    An Instructor VR recording with a timeline control
  - 一個實驗程序的步驟列表
    A Step-by-step experimental procedure list



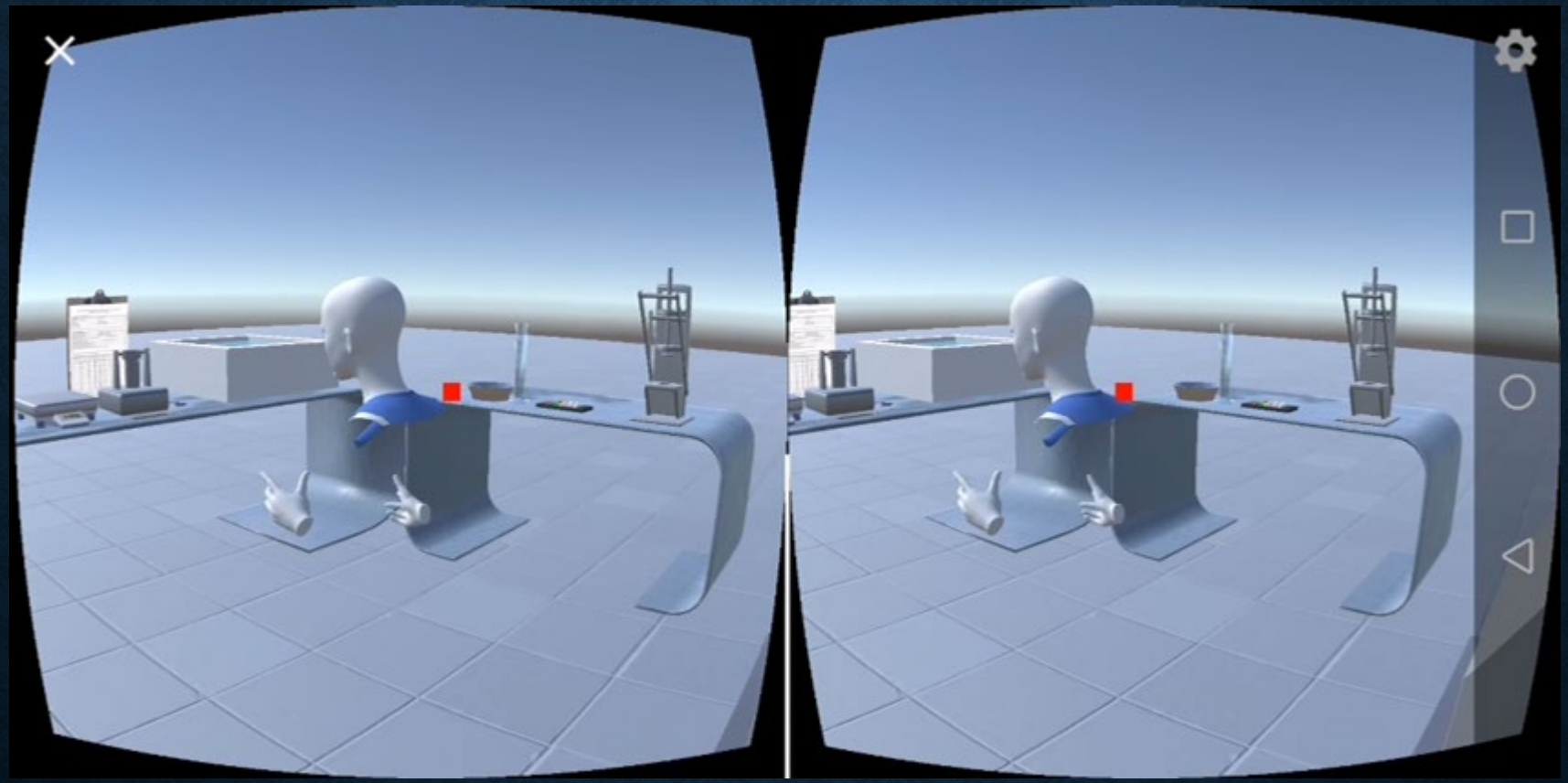
發放和安裝過程 DEPLOYMENT

- 使用 Unity 遊戲引擎編譯為 apk
  Compile as apk using Unity game engine
- 上傳至 SideQuest 平台
  Upload to the SideQuest platform
- 透過 SideQuest 應用程式安裝在 VR 裝置上
  Install on VR headset through the SideQuest app
- 需要 Oculus 開發者帳戶
  Require an Oculus developer account




Listen to the introduction
Weight the container, pickup calculator
Calculate the soil weight, pickup the soil sample
Add water content
Compact the soil to the mould
Extract the soild sample
Preparing the compression machine
Finish
-1.5x
-0.5x
1x
0.5x
1.5x
176.655g
checklist
playback speed
timeline

GOOGLE CARDBOARD APK



HKMOOC

Explore | Sign in | Register

Slope Engineering

1 FILTERS | COLUMNS | SHOW ARCHIVED

Course Run	Start	End
2023_Q4_R1	10/1/2023	8/31/2024

Enroll | SHARE

Schedule: Oct 1, 2023 - Aug 31, 2024

Course Type: Self Paced

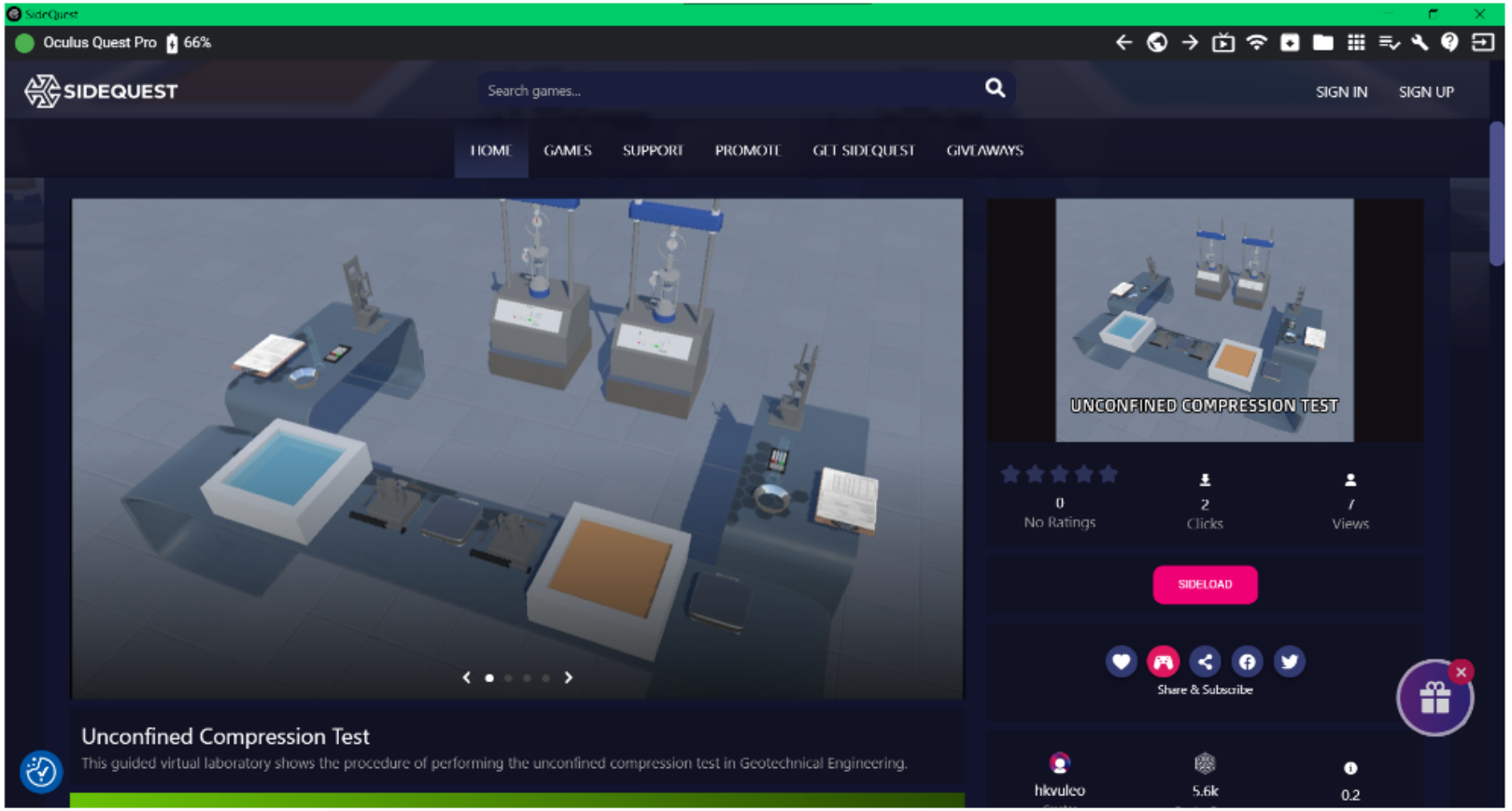
Programs: e-STEAM@Home Award Scheme - Cohort 2024

Organizations: The Hong Kong University of Science and Technology

e-STEAM@

https://www.hkmooc.hk/courses/HKUST+CIVIL-slope

Live on Coursera



1. Click on the "SIDELOAD" button to install the VR app on your headset.
2. After installation, you should find the app "uctvrlab" on your device.
3. Open the app and follow the instructions in the app to experience the Unconfined compression test in the virtual

加入沉浸式內容時的考量
TIPS WHEN ADDING IMMERSIVE CONTENT

- 學生如何使用內容?
  How can student access the content?
- 是當作計分練習、動手實踐、還是示範?
  As graded assessments, hands-on practice or demonstrations?
- 有其他代替的內容嗎？
  Are there any alternatives?
- 是否有一些功能可以幫助學生在沉浸式內容中獨自學習？
  Are there features to aid students in an immersive environment alone?

社區 / 18區新聞

科大地盤神秘隧道結構不穩有倒塌危機　校方指將以3D打印保留

撰文：呂諾君
出版：2021-11-23 15:21　更新：2021-11-23 19:22

今年5月科大學生宿舍地盤內被發現有神秘隧道，大學即時停工並交由古蹟

取自：香港 01
2021-11-23
連結

熱門文章

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文物保存
HERITAGE PRESERVATION

學生使用 3D 打印技術製作隧道模型
3D printed model of a tunnel by students
(香港 01 HK 01)

走進其中一個隧道的 3D 360° 虛擬導覽
A 3D 360 ° Virtual tour walking into a tunnel

相關學術文獻 RELEVANT PUBLICATIONS

- Santawat Thanyadit, Parinya Punpongsanon, Thammathip Piumsomboon, and Ting-Chuen Pong. 2022. XR-LIVE: Enhancing Asynchronous Shared-Space Demonstrations with Spatial-temporal Assistive Toolsets for Effective Learning in Immersive Virtual Laboratories. Proc. ACM Hum.-Comput. Interact. 6, CSCW1, Article 136 (April 2022), 23 pages. https://doi.org/10.1145/3512983
- Pak Ming Fan, Santawat Thanyadit, and Ting-Chuen Pong. 2022. VLOGS: Virtual Laboratory Observation Tool for Monitoring a Group of Students. In Adjunct Proceedings of the 35th Annual ACM Symposium on User Interface Software and Technology (UIST '22 Adjunct). Association for Computing Machinery, New York, NY, USA, Article 49, 1–2. https://doi.org/10.1145/3526114.3558738
- P. M. Fan, S. Thanyadit and T. -C. Pong, "A Design Thinking Approach to Construct a Multi-learner VR Lab Monitoring and Assessment Tool Deployed in an XR Environment," 2023 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW), Shanghai, China, 2023, pp. 731-732, doi: 10.1109/VRW58643.2023.00208.

問與答 Q&A

謝謝！Thank you!