



SUBJECT	3D Educational Resources Development
SUBMITTED TO	Learning and Research Committee
MEETING DATE	September 8, 2021
SESSION CLASSIFICATION	Recommended session criteria from Board Meetings Policy: OPEN
REQUEST	For information only - No action requested
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EXECUTIVE SUMMARY

The 3D Educational Resources TLEF project has entered its second year of work, with the creation of 3D virtual models, UBC Wiki, project [webpage](#), Canvas training module, and workshops. We have employed two project coordinators, 10 students, and have worked closely with UBC Studios and Emerging Media Labs (EML) in our work to expand and explore the use of 3D models in UBC courses for nine collaborators. This project has also made important contributions to the development of workflow process, investigation of copyright law, and building self-help resources for faculty and staff.

Once created by our team of technical experts and students at UBC Studios, 3D virtual models are hosted on [Sketchfab](#), a publicly accessible site that allows for the viewing, manipulation, and downloading of models. Our most popular models include one of a [Western White Pine cone](#) (735 views), a [Caribou skull](#) from the Beaty Biodiversity Museum (769 views), and a [Gray wolf skull](#), also from the Beaty (downloaded 33 times). Models have to be carefully vetted by collaborators for their colour accuracy, resolution, and user functionality. The UBC Studios team has put together a short video that demonstrates the impact of the project from the perspective of our collaborators and students.

As we move into the second year of the project, we are looking at ways in which 3D virtual models can be enhanced in simple but effective ways for teaching and learning. For example, models can have some additional features, such as a measuring stick ([e.g. in the Western White Pine cone](#)), annotations ([e.g. on this Black bear skull](#)), or appear in an 'environment' using a 360 degree photo as background for the model ([e.g. for this soil monolith](#)). Our team has also been exploring the potential for creating basic animations with 3D objects ([e.g. drill bit mounting mechanism demonstration](#)).

Some of the challenges that we have encountered have included creating 3D models of microscopic objects, though we have had some success using 360 degree camera technology for more basic interactive images. We have explored some of the difficulties with copyright law and purchased models, as well as sensitivity that is required for working with culturally significant objects. As a part of the original project objectives, we intended to do 3D object printing, but that part of the project was quickly cast aside at the beginning of the pandemic. In the future, this may still be an area of interest to UBC instructors, since the quantitative aspects of 3D virtual objects is one of the more challenging elements.

Continuing to invest in 3D technology will enhance learning at UBC, even after a full resumption of face-to-face learning.

PRESENTATIONS

1. 3D Educational Resources TLEF project – PowerPoint
2. 3D Educational Resources TLEF video – UBC Studios

3D Educational Resources TLEF Project

September 8, 2021

Suzie Lavalley, Professor of Teaching



3D Educational Resources TLEF project

Suzie Lavallee, Professor of Teaching

Faculty Collaborators

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Project Coordinators

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Overarching goals

- Determine best practices for generating variety of 3D objects
- Create 3D virtual resources for use in labs and classrooms
- Increase public domain resources for education
- Employ and train students in rapidly-developing field
- Explore options for 3D ‘library’
- (3D printing for student ‘kits’)



3D printed version of a humerus (left) and actual bone (right)

Why create and use 3D objects?

- Enable and enhance flipped classroom/lab design
- Accommodate large class sizes in labs
- Accessibility and distance education
- Contribute to publicly-available resources
- Access to rare, fragile and inaccessible items
- *Better than real life* demonstrations



Drill bit mounting array video, showing moving parts

Types of 3D virtual objects

**Acquisition
(creating an object)**

Scanning /
Photogrammetry

3D modeling

Volumetric
Capture

**Digital
Online
Repository**

**Interactions
(end user format)**

3D printing

Website viewer -
3D on 2D screen

Animated 3D

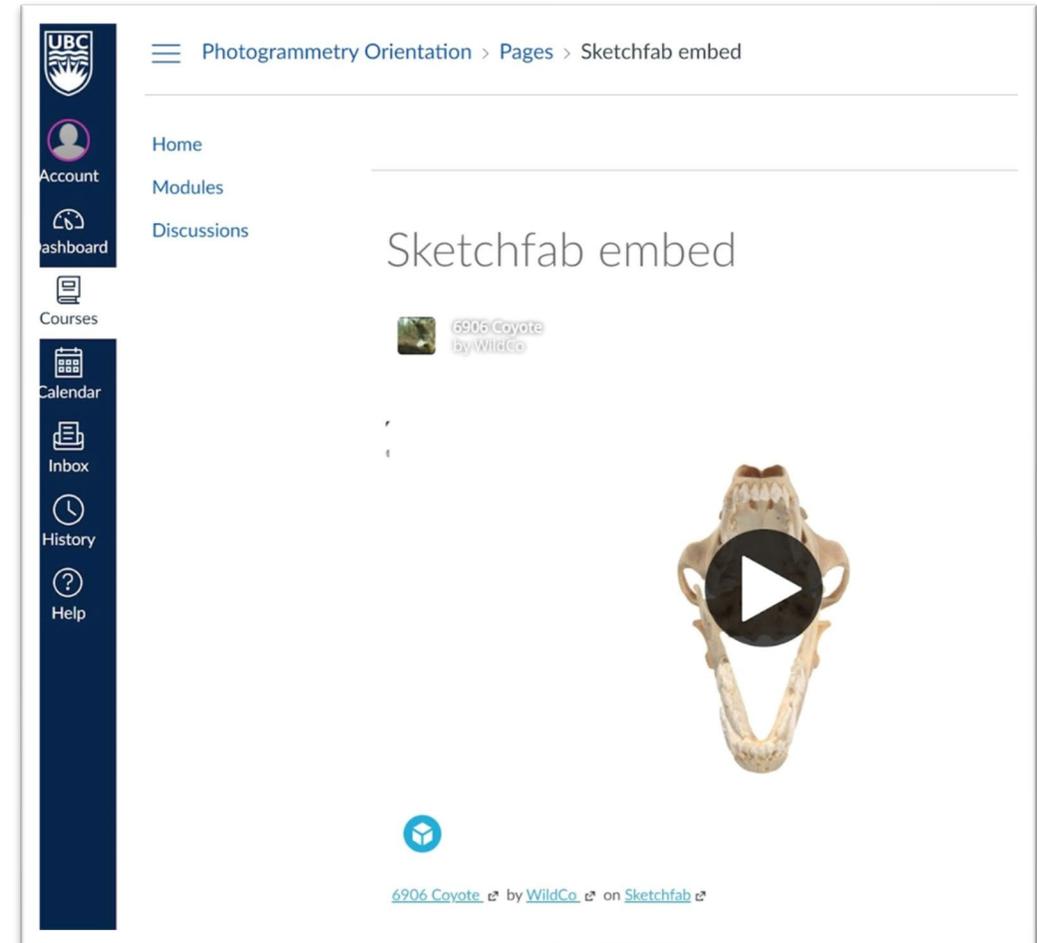
Immersive
visualization

How are 3D virtual objects presented?

We use **Sketchfab.com** – viewer and repository for 3D models

- Free accounts are sufficient for many users purposes
- Wide content in higher education materials

Content from Sketchfab can be seamlessly embedded into Canvas courses



Project Impact – Virtual objects

- **230 models** published on Sketchfab
- **12,319** views
- **224+** model downloads

Objects range from pine cones to skulls to soil monoliths

- **30** ‘unpublished’ models (sensitive materials) for Museum of Anthropology

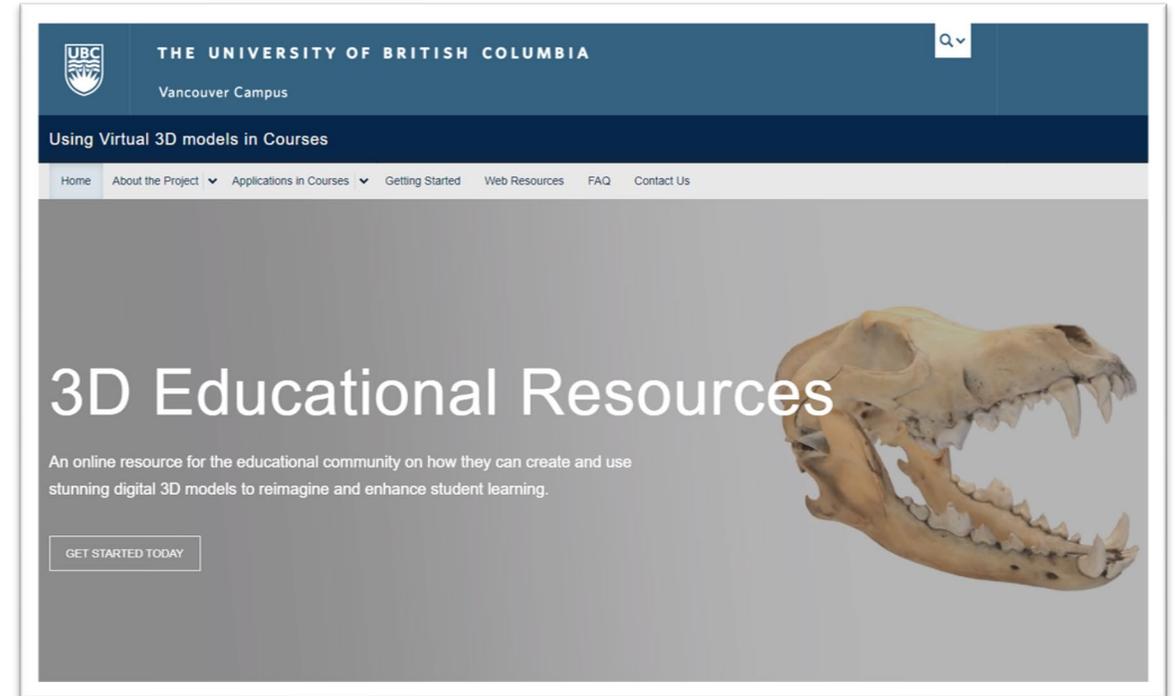


Our most popular model:
Pinus monticola
(Western White Pine) cone

Project Impact – Resources

- **UBC Wiki** used to collect and share information about best practices
- **Project website** provides links, tools, and information about project (**527 views**)

Goals: Promote self-serve options, illustrate uses in the classroom, provide portal for assistance



***Project website landing page
(3Dlearning.ubc.ca)***

Project Impact – Outreach

- **Four** conference presentations / workshops
- **Three** more UBC outreach activities this fall
- **Canvas training module** for student workers and collaborators (can self-enroll)



Project Impact – Video

UBC Studios has put together a short video on the impacts of the project so far.

Additional information on impacts are available at:

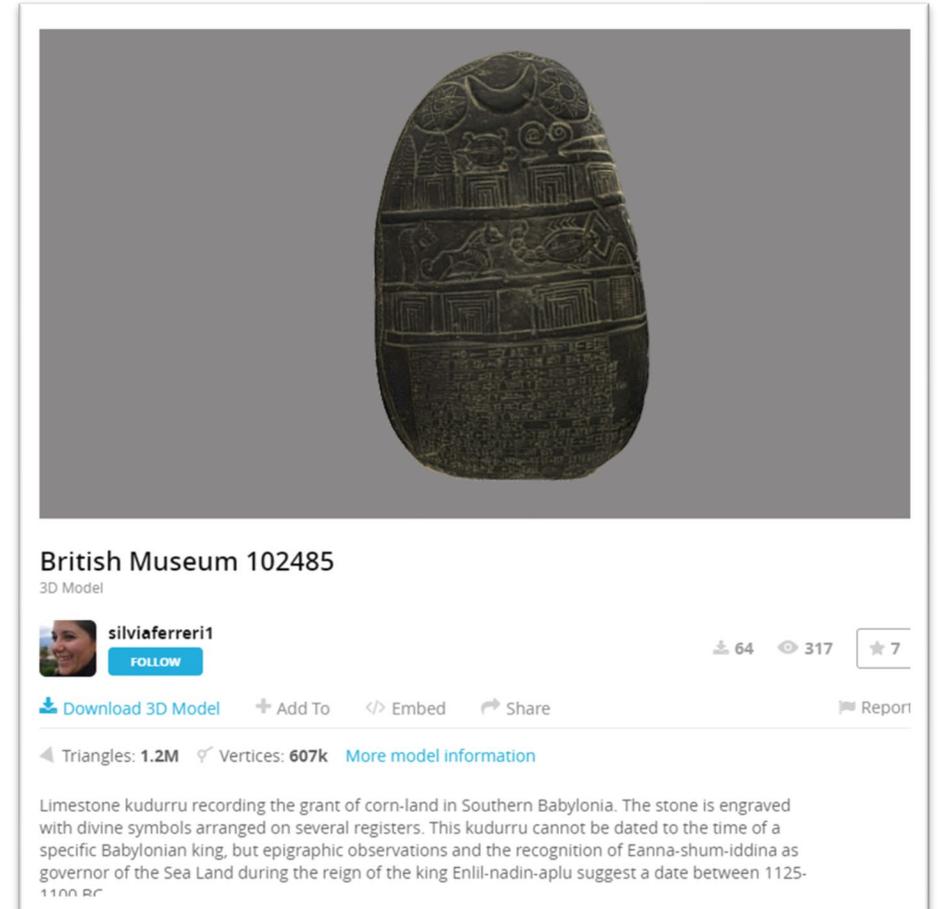
<https://3dlearning.ubc.ca/applications-in-courses/>

Looking to the future – Challenges

‘Ownership’ of an object can be difficult to determine, e.g. copyright permissions

Creating a 3D virtual object of culturally significant items needs to be done with sensitivity

→ *CWL-controlled access to objects*



Babylonian stone engraved with divine symbols – British Museum Collection

Looking to the future – Challenges

Requirements to support an online institutional repository are extensive and beyond the scope of this project

→ *Technology assessment, library resources, integration with other project needs, investment in infrastructure*



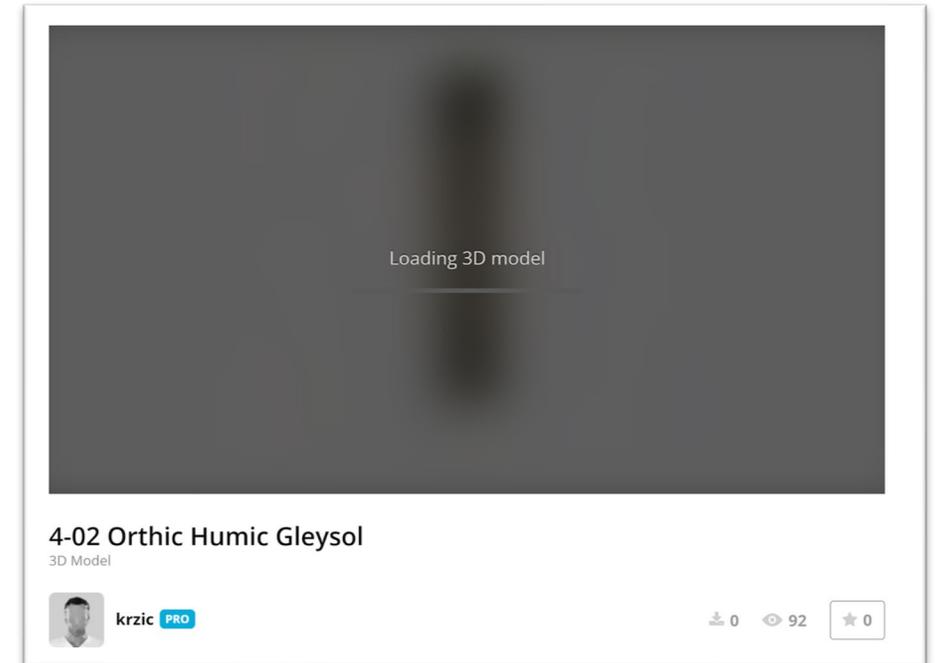
***Virtual library from Sketchfab
(created by denniswoo1993)***

Looking to the future – Challenges

Technological limits that affect end user (student) use of models, e.g. download speeds of 3D models

- Cannot be used in online testing
- Impacts on accessibility
- Limited speed and ease of use for virtual environments

→ *Investment in infrastructure*



Soil monolith model on Sketchfab loading image

Looking to the future – Opportunities

Creating interactive images of microscopic objects (not 3D, but resolution is impressive!)



Bark beetle on entomological pin mount, with SLR camera lens

Looking to the future – Opportunities

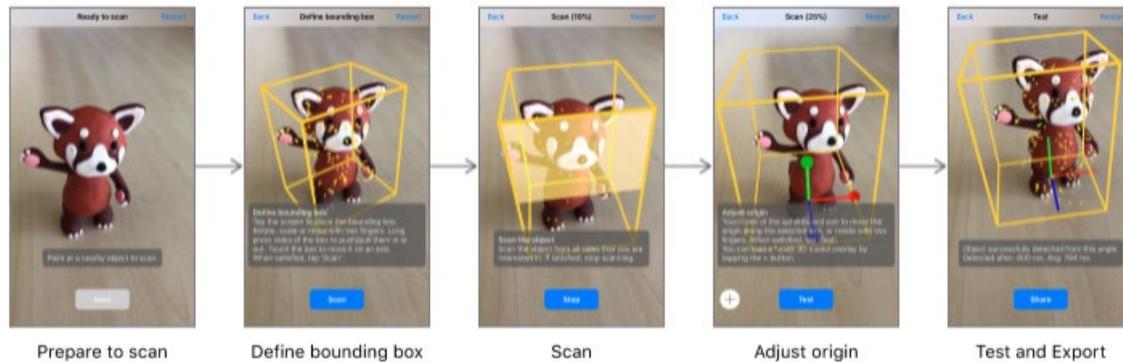


*3D printed version of humerus
(left) and actual bone (right)*

3D printing technology is
continuing to develop

→ *Possible printable collections?*

Looking to the future – Opportunities



iOS promotional images, showing process for creating 3D virtual object with new app

Augmented reality interactions

New apps allows for anyone to create a 3D model with their phone

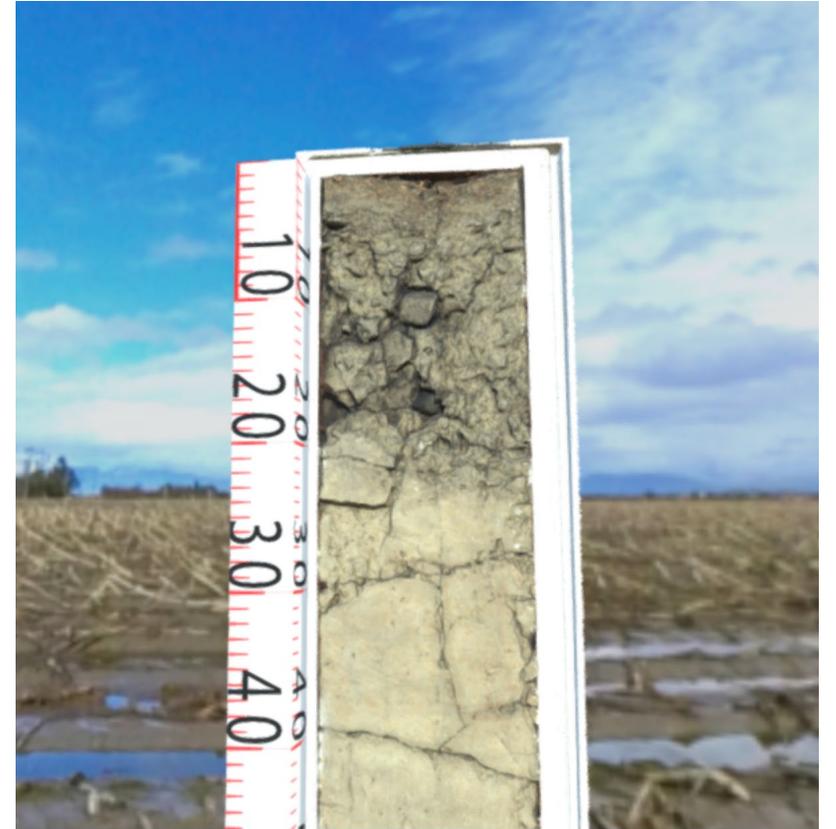
→ *More widespread use of lower-quality models?*

Looking to the future – Opportunities

Strong potential for fee-for-service 3D virtual model creation

Contacts from two collaborators have reached out with interest in creating resources

- Agriculture Canada
(soil monoliths – national collection)
- Canadian Mill Services Association
(lumber grading samples and training)



Soil monolith model, with ruler and 360 camera 'environment'

Looking to the future – Opportunities

UBC has world-class collections that we could be using more in our classrooms and sharing with the world.

Virtual 3D objects offer us a means to make this happen

