Proposal for a

Digital Media Capstone Project

In Partial Fulfillment of the Requirements

For a Master of Liberal Arts Degree

Harvard University

Extension School

Eduardo de la Pena

Proposed Start Date: August 30, 2019

Anticipated Date of Graduation: May 2020
1.1 Project Title
FunEduGeo (may change in the future), an Interactive AR educational Geography Game.

1.2 Capstone Category & Related Courses
Select the category of your capstone:
● Device & emerging media
List the courses you took that relate to the selected category.
● CSCI E-10A
● CSCI E-10B
● ISMT S-170

1.3. Project Goal
The goal of the project is to make education “funnier” as new generations are more used to interactive and digital content and education has not evolved at the same rate.
There are some companies that are already addressing this very same problem using AR such as Yahart, EnvisionAR but their focus and methods are different. The advantage of FunEduGeo over its competitors is the accessibility. Even though some Physical map will be required it can be easily printed.

1.4. Learning Goals
What skills are you planning to develop during the completion of your project?
● AR Development: Even though I have 3 years of professional experience using the main tool UNITY, I don’t have much experience developing AR.

What new approaches or technologies are you planning to learn?
● Photogrammetry which is a technique for 3D scanning. You can capture large objects, like buildings or even mountains, that would be impossible to scan using other methods. Moreover, photogrammetry is also extremely affordable since you probably already own the most important piece of equipment: Your smartphone camera. All that’s left is photogrammetry software to create a 3D file of the object you have photographed(Max von Übel, 2019).

1.5. Elevator Pitch
FunEduGeo will make usually considered “boring” subjects “fun”, such as Geography or history (sadly). AR technology will be used and will be accessible to everyone with a smartphone and a Printer. It will be developed mainly with Unity, Maya and Photoshop.
1.6. Target Audience, Personas & Empathy Maps

My target audience is kids between 6-12 years old who have access to smartphone, internet and have knowledge of the english language. I will use AR technology and will be accessible to everyone with a smartphone and a Printer.
### 1.7 Metric

<table>
<thead>
<tr>
<th></th>
<th>Inadequate</th>
<th>Marginal</th>
<th>Fair</th>
<th>Good</th>
<th>Exceptional</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Entertaining</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The objective of this app is to be entertaining. Once way we could measure how entertained they were is through review and replay.</td>
<td>The users give bad reviews and never open it again.</td>
<td>they give not so bad reviews but never open it again.</td>
<td>The give good reviews and replay it once.</td>
<td>The give good reviews and replay it more than once.</td>
<td>The users are so excited and entertained about using the product. They give excellent reviews and replay it several times.</td>
</tr>
<tr>
<td><strong>Easy to use</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>We could measure how easy to use a product is by the time taken by him to do certain task and the amount of questions required. In this test we</td>
<td>5 or more questions. 1 minute. Unable to complete task.</td>
<td>2 or more questions. 30 seconds</td>
<td>0 questions. 15 seconds</td>
<td>0 questions 10 seconds</td>
<td>5 seconds. 0 questions required.</td>
</tr>
</tbody>
</table>
would make a task that would take 5 seconds to make for an experienced user.

| Educational | Users were unable to answer correctly all the quiz. | Users were able to answer correctly 40% of the quiz | Users were able to answer correctly 60% of the Quiz | Users were able to answer correctly 100% of the quiz | The users learned all the information provided and all the quiz were answered correctly. |

1.8 User Survey

1. Rating from 1(worst) to 5 (best) how was your experience using the product?
2. Rating from 1(worst) to 5 (best) How much did you learn while using it?
3. Rating from 1(worst) to 5 (best) How much fun did you had?
4. Rating from 1(worst) to 5 (best) Would you use the product again?
5. Rating from 1(worst) to 5 (best) Would you use this as a compliment to school?
6. Describe what you enjoyed the most.
7. Why?
8. Describe what you didn’t enjoyed.
9. Why?
10. What would you improve about the platform.

2 Competitor Review

1. Yahart
   - Description
     Their main focus is creating educational games for children using several technologies.
I will be focusing this review on certain development which is an AR solar system carpet which helps children to learn more about planets, moons and stars inside it. They can select certain planet, rotate it and read information about it. the video (Yahart 2015).

- **Pros**
  1. Visuals: All the products developed by them look gorgeous, they have great animations and art style and concept. It’s satisfying to watch.
  2. Engaging: Their products are so engaging and you’re naturally so curious about everything, even though they’re for kids and I am 27 I am considering buying at least some of them.

- **Cons**
  1. Not necessarily a game, even though they’re interactive they cannot be considered a Game.
  2. You need to buy their physical products (in this case the carpet).
  3. Low Replay value
  4. Not free

2. **Envision AR**

- **Description**
  This AR expertised company alongside with many other developments have created an AR educational platform creating content mostly in science and Biology for young learners.
  The One in Particular I will be focusing on I think it may be a great example of AR Education is a Chemistry Game where you put different elements into a flame and see the flame’s reaction depending on the element that the user decides to put into the flame. the video(EnvisionAR 2019).

- **Pros**
  1. Visual: It’s so beautiful everything that’s made from them.
  2. Engaging: This looks so fun to play and it’s a game where they even test you.
  3. It’s easily accessible, you only need to print a piece of paper.

- **Cons**
  1. Their games even though excellent, have low replay value.
  2. Not Free
• **Arkids Cards**

  **Description:** This company developed an amazing game that helps students to learn about animals and the food chain, electricity, maths using AR and Interactive Cards.

  The one I will be focusing now is on their Math Game using Cards. the game is diverse you can play by either giving a number(on the AR camera with cards) answer depending a given equation or you can create your own equation using cards the numbers on the cards will become 3D modelled and will give you feedback about the answer if it is correct or not. the video(Arkids Cards 2019).

• **Pros**
  1. Engaging: their products look so fun to play and they also look so educative.
  2. High Replay value.

• **Cons**
  1. You need the physical equipment( cards, etc), they aren't available for printing.
  2. Not free.

<table>
<thead>
<tr>
<th></th>
<th>Yahart</th>
<th>Envision AR</th>
<th>Arkids Cards</th>
<th>FunEduGeo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visuals</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Sound</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Engaging</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Fun</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Interesting</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Educative Material</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>User Friendly</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Price</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
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</table>
3 Required technologies

Unity 3D

- description: This Software is used mainly for video games although it can be used to develop several AR and VR apps.
- related courses or professional experience: Worked for 3 years as a professional gambling game developer using this tool.
- alternative technologies, technologies used by competitors: Unreal Engine
- reason for selecting this technology vs. its alternatives: I know this tool better.
- how it will be used in your project: The main core will be developed with it.

Adobe Photoshop

- description: This software is used mainly for editing and creating new images or textures.
- related courses or professional experience: DGMD E-50
- alternative technologies, technologies used by competitors: Sketch, gimp.
- reason for selecting this technology vs. its alternatives: I know this tool better.
- how it will be used in your project: The main map and textures will be done with it.

Autodesk Maya
- description: This software is used mainly for creating 3d models and 3d animations.
- related courses or professional experience: I have a bachelor's in Animation and Digital Art
- alternative technologies, technologies used by competitors: Blender.
- reason for selecting this technology vs. its alternatives: I know this tool better.
- how it will be used in your project: all the 3d models and 3d animations will be done with it.

4.1 Product Architecture

First Thing you need to do in order to use the Product is Printing the Map, which will be available for easy printing.
**Second,** Open the App and the app will access your Smartphone's Camera and then point to the Map you previously printed.

**Third,** Select the continent by pushing a button and a 3D display about the continent and its major countries will appear. The app will locate on it’s DB the references you’re looking into and will internally load it.
Fourth, Select a country all the information will be inside the program’s memory so there will be no need for awaiting for internet connections.

4.2 Instructional design Brief

<table>
<thead>
<tr>
<th>6 Facets of Understanding:</th>
<th>Explanation: The user will be able to receive an explanation on different topics.</th>
<th>Perspective: The user is able to play a game and and read about a country(sometimes a stigmatized one) in a different perspective, Will read the good things about it, interesting facts and play a game about it.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interpretation:</td>
<td>Empathy: People will understand new cultures and be able to appreciate its differences.</td>
</tr>
<tr>
<td></td>
<td>Application: Exams at school or just conversations.</td>
<td>Self-Knowledge: The user will awaken an interest in different cultures and if interested enough, Will pursue more knowledge.</td>
</tr>
</tbody>
</table>
### Why/Enduring Understanding(s): Frame your big idea as 1–2 understanding statements. The understanding statement is expressed as a full-sentence statement and represents an insight, inference, or conclusion about the big idea that learners should gain. Rather than the facts you want them to learn, the understanding statement looks to the meaning of the facts.

Learners will understand and gain some new knowledge about certain countries and will relate something about the place to a game, for example Yemen’s game they will build so once they think about Yemen they would think Oh they were great builders.

### Evidence of Understanding: How will you know that your learners have obtained the desired understanding? This is often thought of as assessment in formal learning environments. For self-paced and informal learning experiences, this may be more difficult to identify but try.

They will answer a Quiz, and this results will be uploaded to a DB.

### Learning Flow: What is the general flow of the learning experience? You may provide a bulleted high-level list, create a Journey Map (a timeline that graphically maps the experience), or other graphic organizer.

### Learning Theory(ies): What learning theories—the way in which how people learn—will your learning experience draw upon? List them and make sure you research them further to see how they inform the approach you’ll take.

<table>
<thead>
<tr>
<th>Pedagogies: What pedagogies—methods of how people teach—will your learning experience draw upon? List them and share why.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constructivist: Since people learn through Experience. Constructivism: Because people will learn through experience. Liberationism: Because it is a non standard construction.</td>
</tr>
</tbody>
</table>

### Inspiration: Identify at least three other learning experiences/products that inspire your project, e.g, workshop, training, e-learning course, game, curriculum, museum exhibit, YouTube channel, etc. Be specific.

5 User Journey

**First** Thing you need to do in order to use the Product is Printing the Map.
Second, Open the App and the app will access your Smartphone's Camera and then point to the Map you previously printed.
Third, Select the continent by pushing a button and a 3D display about the continent and its major countries will appear.

Fourth read the Basics of the Country.
Fifth Play the Game.

Depending on the country there will be 2 possible games:

1 - Climber

a) The game is simple, you only have 2 buttons (half and half of the screen) and the objective is to dodge obstacles, if you press on the right part of the screen the climber will go left, if you press the left one then it will go left.

The climber will go up Eternally until some rock makes him fall down, the game will be progressively harder (faster and more obstacles)
Ups a rock appeared!!

Fortunately he can just move, dodge and keep climbing!!
2- Builder
On this game the user will build an eternal skyscraper where blocks will fall from the sky and the user will direct it towards right direction. The game will be eternal and progressively harder until the user loose.
Fifth Answer a Quiz.
Some Quiz examples:

**Which is the official language of Nepal?**

a) Hindi  
b) Tzeltal  
c) Nepalese  
d) Tibetan

Correct Answer: c) Nepalese

**Which is the Capital City of Nepal?**

a) Delhi  
b) Lhasa  
c) Kathmandu  
d) Amritsar

Correct answer: Kathmandu.

*What is nepal most famous for?*
a) Taj Mahal  
b) Mount Everest  
c) Potala Palace  
d) Samarkand

Correct Answer: b) Mount Everest

Please select the nepalese flag.

Correct answer:
### 6.1 Timeline

<table>
<thead>
<tr>
<th>Card</th>
<th>Label(s)</th>
<th>Member(s)</th>
<th>Due Date</th>
<th>Start</th>
<th>End</th>
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<tbody>
<tr>
<td>Capstone String 2020</td>
<td></td>
<td></td>
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<tr>
<td>List of Tasks</td>
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<td>Decide and research short but important information about countries</td>
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<tr>
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<tr>
<td>Create the Map</td>
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<tr>
<td>Create AR Indicators</td>
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<td>Create AR Markers</td>
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<td>Animations</td>
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<td>3D Models</td>
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<td></td>
<td></td>
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<tr>
<td>Visually ensambled</td>
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<tr>
<td>Algorithm</td>
<td></td>
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<tr>
<td>Unity Integration</td>
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</tbody>
</table>

**Project:** Capstone String 2020

**Test update:**

- Time block (incomplete)
- Time block (completed)
- Due date (incomplete)
- Due date (completed)

### 6.2 Milestones

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Completion Date</th>
<th>Description of Deliverable(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decide and research short but important information about countries.</td>
<td>January 8th 2020</td>
<td>Make an extensive research about the selected country and include basic information (capital, languages, flag, etc) but also include some interesting facts about the country (for example if the country is Mali we could mention Mansa Musa I Emperor of the Mali Empire and the richest man EVER)</td>
</tr>
</tbody>
</table>
| Create sample Map                                                        | January 31st 2020| ● Create the Map Itself: create a good looking, memorable map.  
● Create AR markers                                                           |
<table>
<thead>
<tr>
<th>Create 3d Models for Sample Map</th>
<th>February 14th 2020</th>
<th>Once the AR camera is on the map and detects the AR markers it will substitute them with 3d models of some representative building of countries and continents.</th>
</tr>
</thead>
</table>
| Create the game                | April 20th 2020    | ● Create 3D models, textures of the game.  
● Organize it visually in unity: prepare the terrain for it being programed.  
● Program it: make the game actually work. |
| Create the Quiz                | April 6th 2020     | ● Create the questions.  
● Create Question randomizer and evaluation system |
| Test                            | May 8th 2020       | Look out for errors |

### 6.2 References


Yahart (2015) Augmented Reality Education Solar System on CARpet

Video at: [https://www.youtube.com/watch?v=UkWuVVUD4Q](https://www.youtube.com/watch?v=UkWuVVUD4Q)
EnvisionAR(2019) Chemical reaction using augmented reality | Envision AR
Video at: https://www.youtube.com/watch?v=Kp5ubU2Y07Y

Arkids Cards(2017) AR MATHEMATICS. Augmented reality elements
Video at: https://www.youtube.com/watch?v=qn_awl4b5pU