Project Part 3

Describe (in a maximum of 3 *new* pages) the project that you proposed in part 1 (300 points)

a. Include (the same) short description describing the project that you proposed in part 1.

This research study investigates the impact of cultural elements in video games on players' anxiety levels and engagement. Specifically, we aim to examine whether culturally relevant gaming content affects players differently when they share cultural similarities with the game's content. The study employs a mixed experimental design where participants will be randomly assigned to watch either an Indian culturally relevant game or a non-culturally relevant game (control condition).

b. State what kind of analysis you did, and what your result is for every "test statistic" that you conducted (ie a 2 way ANOVA has a test statistic for each of the two main effects, and one for the interaction, so what was the result of each). This needs to be written like a results section: no commentary, just the results in APA format.

1. The 2×2 mixed ANOVA for Analysis of Anxiety Changes revealed the following results: The main effect of time was not significant ($F(1, 25) = 2.377$, $p = .136$, partial $\eta^2 = .087$), with participants showing similar anxiety levels at pre-test ($M = 45.23$, $SE = 1.66$) and post-test ($M = 42.06$, $SE = 1.77$). The main effect of game type was not significant ($F(1, 25) = .092$, $p = .764$, partial $\eta^2 = .004$). However, there was a significant interaction between time and game type ($F(1, 25) = 5.266$, $p = .030$, partial $\eta^2 = .174$), such that participants in the cultural ame condition showed greater anxiety reduction from pre-test ($M = 46.29$, $SE = 2.62$) to post-test ($M = 42.21$, $SE = 2.61$) compared to those in the non-cultural game condition (pre: $M = 36.06$, $SE = 2.71$; post: $M = 36.61$, $SE = 2.70$).

2. The 2x2x2 mixed ANOVA for Cultural Background Effects revealed the following results: The main effect of cultural background was significant ($F(1, 23) = 18.902$, $p < .001$, partial $\eta^2 = .451$), with Indian participants showing higher anxiety levels ($M = 45.58$, $SE = 0.96$) compared to non-Indian participants ($M = 35.00$, $SE = 2.24$). The main effect of game type was significant ($F(1, 23) = 10.577$, $p = .004$, partial $\eta^2 = .315$), with higher anxiety in the cultural game condition ($M = 44.25$, $SE = 1.69$) compared to the non-cultural condition ($M = 36.33$, $SE = 1.75$). There was also a significant interaction between game type and cultural background ($F(1, 23) = 20.731$, $p < .001$, partial $\eta^2 = .474$).

3. The independent samples t-test for Cultural Engagement revealed a significant difference in cultural engagement between Indian and non-Indian participants ($t(25) = 3.301$, $p = .003$, $d = 1.788$), with Indian participants showing higher engagement ($M = 3.83$, $SE = 0.286$) compared to non-Indian participants ($M = 1.50$, $SE = 0.289$).

4. For anxiety reduction, the multiple regression model was not significant ($F(3, 23) = 1.782$, $p = .179$, $R^2 = .189$), though game type emerged as a significant predictor ($\beta = .412$, $p = .043$). For cultural engagement, the model was significant ($F(3, 23) = 8.999$, $p < .001$, $R^2 = .540$), with both cultural background ($\beta = .602$, $p = .004$) and game type ($\beta = -.499$, $p = .002$) emerging as significant predictors.

c. Did the results support your hypothesis or not? That is, could you reject the null hypothesis, and thereby show support for your hypothesis? What type of error might you be making (type I or II),

and what is the chance of that error? How do you know (ie where/what did you do to find the chance of that error you might be making)?

1. Regarding our hypotheses for Analysis of Anxiety changes:
- For the main effect of time (H0: no difference in anxiety levels between pre and post gameplay), we failed to reject the null hypothesis (p = .136). Here we could be making a Type II error (failing to detect a true effect). The chance of this error would be determined through power analysis.
- For the main effect of game type (H0: no difference in anxiety levels between cultural and non-cultural games), we failed to reject the null hypothesis (p = .764). Again, we could be making a Type II error, with the probability to be determined through power analysis.
- For the interaction effect (H0: the change in anxiety over time does not differ between cultural and non-cultural games), we rejected the null hypothesis (p = .030). Here we could be making a Type I error with a 3% chance (the probability of finding a significant effect when there truly is none). We know this from our significance level (α = .05) and our obtained p-value.

2. Regarding our hypothesis for Cultural Background Effects:

- For the main effect of cultural background (H0: no difference in anxiety levels between Indian and Non-Indian participants), we rejected the null hypothesis (p < .001). The results strongly supported our hypothesis, showing that Indian and non-Indian participants had significantly different anxiety levels (Indian: M = 45.58, SE = 0.96; non-Indian: M = 35.00, SE = 2.24). Since we rejected the null hypothesis, we could be making a Type I error (falsely claiming there is a difference when there isn't) with less than 0.1% chance. This extremely small probability gives us high confidence in our finding.

- For the main effect of game type (H0: no difference in anxiety levels between cultural and non-cultural games), we rejected the null hypothesis (p = .004). The results supported our hypothesis, demonstrating significant differences in anxiety levels between cultural (M = 44.25, SE = 1.69) and non-cultural games (M = 36.33, SE = 1.75). Here we could be making a Type I error with a 0.4% chance, which still provides strong confidence in our finding.

- For the two-way interaction between time and cultural background (H0: the change in anxiety over time does not differ between cultural backgrounds), we failed to reject the null hypothesis (p = .545). This suggests that the pattern of anxiety change over time was similar for both Indian and non-Indian participants, contrary to our expectations. Here we could be making a Type II error (failing to detect a true difference), meaning there might be a real difference that we failed to detect due to insufficient statistical power. The probability of this Type II error would need to be determined through power analysis.

- For the three-way interaction between time, game type, and cultural background (H0: the interaction between time and game type does not differ by cultural background), we failed to reject the null hypothesis (p = .259). This indicates that the interaction between time and game type was similar across cultural backgrounds, which did not support our hypothesis. Again, we could be making a Type II error, potentially missing a real three-way interaction due to insufficient power. The exact probability of this Type II error would be determined through power analysis.

3. Regarding our hypothesis for Cultural Engagement (H0: no difference in engagement levels between cultural and non-cultural games), we rejected the null hypothesis (p = .003). Here we could be making a Type I error with a 0.3% chance, as determined by our significance level (α = .05) and obtained p-value.

4. Regarding our hypothesis for Age Effects for anxiety reduction and engagement
- For anxiety reduction (H0: no relationship between age and anxiety reduction, controlling for cultural background and game type), we failed to reject the null hypothesis (p = .179). Here we could be making a Type II error, with the probability to be determined through power analysis.
- For cultural engagement (H0: no relationship between age and engagement levels, controlling for cultural background and game type), we rejected the null hypothesis (p < .001). Here we could be making a Type I error with less than 0.1% chance, as determined by our significance level (α = .05) and obtained p-value.

d. If you did not need to do a power analysis for c above, conduct a power analysis now to see the likelihood you had of finding an effect as big as the one you found (also what was your effect size? – make sure you present Pearson's R or Cohen's D).

- A post-hoc power analysis was conducted for the significant time × game type interaction using G*Power software. With an effect size f = 0.459 (calculated from partial η^2 = .174), α = 0.05, total sample size of 27, and correlation between repeated measures of r = 0.195, the achieved power was 0.95. This indicates the study had excellent power to detect the interaction effect between time and game type, well above the conventional threshold of 0.80. The high power level (95.07%) suggests we had a very good probability of detecting the true interaction effect in our sample, and provides strong confidence in our significant finding. This robust power level, combined with our moderate to large effect size (partial η^2 = .174, equivalent to Cohen's d = 0.92), indicates that our sample size was more than adequate for detecting the interaction effect between time and game condition on anxiety levels.

e. Write a short discussion section like what you might see in a paper. What are the *big* take away conclusions from your results? I.e., what do they mean? Interpret them for readers. This is the commentary that you left out of b above. <u>What are the limitations of your study?</u> *For example: Did you have any confounds? Was your sample representative? Other limitations? Also mention from d above if your power was too low (If your power was high but you still didn't find an effect, what does this mean?).* **Think critically about your own design and study.**

- The present study investigated how cultural elements in video games impact players' anxiety levels and engagement, particularly focusing on the relationship between players' cultural backgrounds and game content. Our findings revealed several important patterns.
- First, the significant interaction between time and game type suggests that cultural games were more effective at reducing anxiety compared to non-cultural games. This effect was particularly pronounced for Indian participants, as indicated by the strong cultural background main effect. These findings suggest that when players encounter games featuring familiar cultural elements, they may experience greater comfort and reduced stress, possibly due to the familiarity and cultural resonance of the content.
- The strong relationship between cultural background and engagement levels (d = 1.788) further supports this interpretation, with Indian participants showing substantially higher engagement with cultural content. This suggests that cultural representation in games may enhance player

involvement and connection with the gaming experience. Notably, both cultural background and game type emerged as significant predictors of engagement, highlighting the importance of cultural matching between players and content.

- However, several limitations should be considered when interpreting these results. First, while our achieved power was excellent (95.07%) for detecting the time × game type interaction, our sample size (N = 27) was relatively small and primarily consisted of students from one university course (CSCI 526). This limits the generalizability of our findings to broader populations. Additionally, the uneven distribution between Indian (n = 23) and non-Indian (n = 4) participants may have affected our ability to make robust comparisons between cultural groups.
- Another limitation concerns the short-term nature of our measurements. Participants were exposed to the games in a single session, which may not capture the full complexity of how cultural elements influence player experience over time. The laboratory setting might also have influenced anxiety measurements, as participants may respond differently in more natural gaming environments.
- Potential confounding variables include participants' prior gaming experience, familiarity with specific cultural elements, and individual differences in anxiety sensitivity. While we controlled for age, other demographic factors like gender or gaming frequency could influence the relationships we observed.
- Future research should address these limitations by the following:

    - Recruiting a larger, more balanced sample across cultural groups.
    - Including longitudinal measurements to assess longer-term effects.
    - Controlling for gaming experience and cultural familiarity.
    - Examining specific cultural elements that most effectively reduce anxiety.

- Despite these limitations, our findings provide valuable insights into the importance of cultural representation in games, suggesting that matching game content to players' cultural backgrounds may enhance both psychological well-being and engagement.

f. Include as an appendix that includes both previous assignments (part 1 and 2), which you can update based on comments you've received and/or new understanding making sure you highlight all changes in red font. If you don't have any changes you can make, then put a note in red at the top of the appendix indicating that. As a second appendix, also provide a screenshot of G*power showing one of your power analyses. These appendices dont count towards your page "limit"…

Project Part 2

Topic: Exploring Cultural Representation and anxiety in Video Games: The Impact of Cultural Elements on Player anxiety Levels and Engagement

1. Include a short description outlining the project that you proposed in part 1.
   - This research study investigates the impact of cultural elements in video games on players' anxiety levels and engagement. Specifically, we aim to examine whether culturally relevant gaming content affects players differently when they share cultural similarities with the game's content. The study employs a mixed experimental design where participants will be randomly assigned to watch either an Indian culturally relevant game or a non-culturally relevant game (control condition).

   - Our methodology involves measuring anxiety levels before and after culturally relevant game or non cultural game using the State-Trait Anxiety Inventory (STAI), while cultural engagement and game preference will be assessed using Likert scales. Participants' cultural background (Indian vs.

Non-Indian) will be considered as a key factor in understanding the relationship between cultural representation and player experience. We will collect data on demographic information (age), cultural background, pre and post-session anxiety levels, cultural influence on engagement, and comparative preference.

- We plan to recruit a minimum of 30 participants, primarily from the CSCI 526 (Advanced Game Development) class and through broader outreach efforts. Through this research, we aim to understand if cultural representation in games can influence player anxiety and engagement levels, particularly when players share cultural similarities with the game content. This study will provide insights into the potential changes of cultural representation in video games and its impact on player well-being and engagement.

2. Describe the dataset you will have. What are the variables? Which are IVs and which are DVs? Within IVs and DVs, which are categorical and which are continuous?

    Independent Variables (IVs):
    Continuous IVs:
    - Age: This variable is measured in years and represents the participant's age at the time of the study.
    - Pre-Session State Anxiety Level: This variable is assessed using the State-Trait Anxiety Inventory (STAI) scale and represents the participants' anxiety levels before the session.

    Categorical IVs:
    - Cultural Background: This variable has two levels, categorized as Indian and Non-Indian, based on the participant's self-identified cultural affiliation.
    - Game Type: This variable is manipulated in the experimental design and includes two levels: Cultural Game and Non-Cultural Game, representing the type of game content shown to participants. [Note: This is a manipulated variable in the experimental design]

    Dependent Variables (DVs):
    Continuous DVs:
    - Post-Session State Anxiety Levels: This variable is measured on the STAI scale and represents participants' anxiety levels after the session.
    - Cultural Influence on Engagement Levels: This variable is assessed using a Likert scale and reflects the extent to which participants felt engaged with the game based on its cultural relevance.
    - Comparative Preference: This variable is also measured on a Likert scale and captures participants' preferences for the cultural or non-cultural game they experienced.

    Each participant's data will include their demographic information (age and cultural background), their anxiety measurements (both pre and post-session), and their responses to the engagement and preference scales after watching either the cultural or non-cultural game in a randomly assigned condition. All Likert scale measurements will be treated as continuous variables for analysis purposes, while cultural background and game type will be coded as categorical variables for statistical analysis.

    This dataset structure allows us to examine both the main effects of cultural representation in games and the interaction effects between cultural background and game type on anxiety and engagement levels. The combination of categorical and continuous variables helps us to conduct statistical analyses, including mixed ANOVAs and multiple regression, to address our research questions.

3. Describe the data pre-processing steps that you believe you will need to do. What data cleaning? Will you impute values from missing data? If so, how? What other pre-processing might you need to do, if any?

    Data Cleaning:

- Missing Data Handling:
  - If a participant fails to complete either pre-session or post-session anxiety measurements (STAI), their entire data will be removed as both measures are important for our analysis.
  - For missing demographic data (age), if the participant has completed all other measures, we will keep their data for analyses not involving age or use the mean of the age from the whole column of age
  - For missing responses in engagement or preference scales, if only one item is missing, we will impute the missing value using the mean from the participant's other responses on that scale.
  - If multiple items are missing from any scale, we will remove the participant's data from analyses that involve that specific measure.
- Outlier Detection and Handling:
  - We will check for age outliers using box plots, and any extreme outliers identified will be removed from the dataset.
  - We will examine pre-session and post-session anxiety scores for unusual patterns or impossible values (e.g., scores outside the STAI scale range of 20-80), and if any are found, we will exclude that participant's data from the analysis.
  - We will document all decisions related to outlier removal and ensure transparency in the reporting process.
- Data Standardization:
  - We will convert all Likert scale responses, including engagement and preference scales, into a standardized format to facilitate analysis.
  - We will ensure consistent coding for categorical variables by assigning specific numerical values to each category as follows: Cultural Background (Indian = 1, Non-Indian = 0) and Game Type (Cultural Game = 1, Non-cultural Game = 0).
- Data Validation:
  - We will Verify that all anxiety scores fall within the possible STAI range of 20-80.
  - We will confirm that all Likert scale responses are within the defined scale points for their particular scales.
  - We will check that categorical variables only contain the predetermined codes and nothing else.
  - We will ensure age values are reasonable for our target population.
- Additional Pre-processing steps:
  - We will calculate anxiety change scores for each participant by subtracting their pre-session anxiety score from their post-session anxiety score.
  - We will document all data transformations in detail and preserve the original dataset in a separate file to maintain data integrity.

4. State what kind of analysis you intend to do, and what your hypothesis is for every "test statistic" that you will generate (ie a 2 way ANOVA has a test statistic for each of the two main effects, and one for the interaction, so generate a hypothesis for each).

1. Analysis of Anxiety Changes (2x2 Mixed ANOVA)
   - The analysis of anxiety changes will involve a 2x2 mixed ANOVA with the following factors: Time (Pre vs. Post) and Game Type (Cultural vs. Non-Cultural). The test statistics and hypotheses for this analysis are as follows:

   a) Main Effect of Time:
   - H0: There is no difference in anxiety levels between pre gameplay and post gameplay conditions.

- **H1:** There is a significant difference between pre and post gameplay Anxiety levels between pre gameplay and post gameplay conditions.

b) Main Effect of Game:
- **H0:** There is no difference in anxiety levels between participants who played cultural games and those who played non-cultural games.
- **H1:** There is a significant difference in anxiety levels between participants who played cultural games and those who played non-cultural games.

c) Interaction Effect (Time x Game):
- **H0:** The change in anxiety over time does not differ between cultural games and non-cultural games.
- **H1:** The change in anxiety over time significantly differs for cultural games compared to non-cultural games.

2. Cultural Background Effects (2x2x2 Mixed ANOVA)
- This analysis will use a 2x2x2 mixed ANOVA with the factors: Time (Pre vs. Post), Game Type (Cultural vs. Non-Cultural), and Cultural Background (Indian vs. Non-Indian). The test statistics and hypotheses are:

a) Main Effect of Cultural Background:
- **H0:** There is no difference in anxiety levels between Indian and Non-Indian participants.
- **H1:** Anxiety levels significantly differ between Indian and Non-Indian participants.

b) Two-way Interaction (Time x Cultural Background):
- **H0:** The change in anxiety levels over time does not differ based on participants' cultural backgrounds.
- **H1:** The change in anxiety over time will significantly differ between Indian and Non-Indian participants.

c) Two-way Interaction (Game Type x Cultural Background):
- **H0:** The effect of game type does not differ between cultural backgrounds
- **H1:** The effect of game type will differ based on participants' cultural background.

d) Three-way Interaction (Time x Game Type x Cultural Background):
- **H0:** The interaction between time and game type does not differ by cultural background.
- **H1:** The interaction between time and game type significantly differ by cultural background.

3. Cultural Engagement (Independent Samples t-test)

   This analysis involves an independent samples t-test to examine engagement levels. The hypotheses are as follows:

   - **H0:** There is no difference in engagement levels between cultural-games and non-cultural games.
   - **H1:** There is a difference of Engagement levels for cultural games compared to non-cultural games.

4. Age Effects (Multiple Regression) Test Statistics and Hypotheses:
   This analysis will use multiple regression to explore the relationship between age and the dependent variables. The hypotheses are:

   - For Anxiety Reduction
     - **H0:** There is no relationship between age and anxiety reduction, after controlling for cultural background and game type.
     - **H1:** There is a significant relationship between age and anxiety reduction, after controlling for cultural background and game type.

- For Engagement
  - H0: There is no relationship between age and engagement levels, after controlling for cultural background and game type.
  - H1: There is a significant relationship between age and engagement levels, after controlling for cultural background and game type.

5. Include as an appendix the entire assignment from part 1, which you can update based on comments you've received and/or new understanding making sure you highlight all changes in red font. This doesn't count towards your page "limit"… also if you don't have any changes you can make, then put a note in red at the top of the appendix indicating that

Project Part 1

Topic
Exploring Cultural Representation and anxiety in Video Games: The Impact of Cultural Elements on Player anxiety Levels and Engagement

1. A short summary (1/2 page to 1 page) of:
   a. Your interests:
      I am interested in AI,ML and NLP, especially in tackling complex computational problems. My focus extends to predictive maintenance, interactive software development, and data-driven applications, all of which guides my educational goals. I also love gaming and was an esports athlete back in India.
   b. The reasons why you choose your current degree and major:
      Pursuing a Master's in CS allows me to deepen my knowledge in AI and NLP, enhancing my capability to design impactful solutions. This degree builds on my prior computer science studies and aligns with my love and passion for innovative and user friendly applications for users on a large scale. I would love to work on crosslist teams including product and engineering teams in the upcoming future.
   c. The reasons why you decided to take this class:
      The class offers skills in experimental design and ethics, equipping me to effectively analyze user engagement and ensure ethical research standards—skills essential for research.
   d. Your personal ambitions to change the world:
      I aim to contribute to AI tools that promote global knowledge sharing and accessibility, fostering inclusivity across cultures and demographics. My work focuses on bridging informational gaps and designing impactful, approachable technologies for a more connected world.
   e. The reasons why you are interested in the topic you have chosen for your project:
      This project examines how cultural elements influence player anxiety and engagement. This study aligns with my interest in AI and data analysis, as I seek to understand how game design can affect player experiences, paving the way for more inclusive gaming environments.
   f. Show me a screenshot of your CITI certification for human subjects research.
      Link for Screenshot
      (https://drive.google.com/file/d/1bVmznaVSwv3dKu4_MW54JZop8XPalyNn/view?usp=drive_link
)

2.
    a.   Show me a screenshot of your CITI certification for human subjects research.

3.   Sketch out the plan for the user study that you will conduct this term, including details such as:
    a.   What variables are you going to collect?
            We plan to collect the following variables:

1. **Demographic Variables (Age):**
The demographic variable in this study is age, which is measured in years and provides information about the participant's age at the time of the study.
2. **Anxiety Variables (Before and After Session State Anxiety Levels):**
The anxiety variables include participants' state anxiety levels measured before and after the session using the State-Trait Anxiety Inventory (STAI) scale. These variables capture the change in participants' anxiety levels due to exposure to either cultural or non-cultural game content.
3. **Cultural/Commonality Variables (Cultural Influence on Engagement, Comparative Preference, Cultural Background):**
The cultural/commonality variables include the following:
- Cultural Influence on Engagement: This variable measures the degree to which participants felt engaged with the game based on its cultural relevance, assessed on a Likert scale.
- Comparative Preference: This variable captures participants' preference for the cultural or non-cultural game, also measured using a Likert scale.
- Cultural Background: This categorical variable identifies participants' cultural affiliation, categorized as Indian or Non-Indian, and is a key factor in understanding how cultural representation impacts player experience.

    b.   What design is your study (experimental vs. correlational, if experimental, what factors are between subjects vs. within subjects)?
        Our study uses a mixed design with:
- Between-subjects factor: The between-subjects factor in this study is the type of game, categorized as a culturally relevant game versus a non-culturally relevant game. Participants will be randomly assigned to one of these two groups.
  - **Experimental Condition:** The experimental condition involves participants watching a culturally relevant game, which is designed to include elements representative of their cultural background.

- ○ **Control Condition:** The control condition involves participants watching a non-culturally relevant game, which does not include cultural elements specific to any particular group.

- Within-subjects factor: Time (Pre-session vs. Post-session anxiety measurements). All participants will complete anxiety measurements before and after gameplay.
- Limitations:
  - ○ Participants are only exposed to the game in a single video session, which may not be sufficient to fully understand the impact of cultural elements
  - ○ Players might need multiple sessions to fully engage with and appreciate cultural content
  - ○ What constitutes "culturally relevant" content may vary significantly even among participants from the same cultural background
  - ○ The pre-post design only captures immediate effects on anxiety levels and potential delayed effects on anxiety might emerge hours or days after watching that would not be measured

c. Given those answers, out of those variables which are your IV(s) and DV(s)?

Independent Variables (IVs):

Age	Cultural Background	Pre-Session State anxiety Level
~~Time Spent Gaming Per Week~~	~~Gender Identity~~	~~Engagement with Esports (Playing/Watching)~~
~~3. Nationality~~	~~Cultural Relevance~~	~~Types of Games Played~~
~~Personality Traits~~		

Dependent Variable (DVs):

Post-Session State anxiety Levels	Comparative Preference	Cultural Influence on Engagement Levels

d. What are the operational definitions going to be for your IV(s) and DV(s)? (ie how are you going to measure or manipulate the variables)?

Independent Variables (IVs):

1. **Demographic Variables (Age)**:
   - **Operational Definition**:
     - a. Age: Participants will provide their age through self-reported survey data collected as a continuous variable. Age will be measured in years and later grouped into categories if needed.
2. **Pre-Session State anxiety**:
   - **Operational Definition**:
     - a. Measured using a standardized anxiety scale (e.g., the **State-Trait anxiety Inventory**) before exposure to the cultural video game where participants will rate their anxiety level based on a Likert scale.
3. **Cultural Background**:
   - **Operational Definition**:

a. Participants will select an option from a multiple choice question which relates to their cultural background. The options will include "Indian" and "Non-Indian" and if time permits, additional categories such as "Chinese" may be included to extend the study to other cultural groups.

Dependent Variables (DVs):

1. **Post-Session State anxiety**:
    o   **Operational Definition**: Measured using the same standardized anxiety scale as pre-session anxiety, but administered after participants have been exposed to the cultural or non-cultural video game to assess changes in anxiety levels.
2. **Comparative Preference**:
    o   **Operational Definition**: Participants will rate their preference for the culturally relevant video game compared to non-culturally relevant games, using a Likert scale, with higher scores reflecting a stronger preference for the culturally relevant game.
3. **Cultural Influence on Engagement**:
    o   **Operational Definition**: Measured by asking participants to rate their level of engagement and connection with the video game, specifically in relation to its cultural elements, using a Likert scale.

e. What is your population? How are you going to get participants from that population? How many are you planning to recruit for the study?

Population: Our target population includes the general public, with a specific emphasis on individuals who engage in gaming to provide a more informed perspective.

Recruitment: Recruitment will focus primarily on students from the CSCI 526 (Advance Game Development) class, in addition to broader outreach efforts to gather participants.

Sample Size: We aim to recruit a minimum of 30 participants from Indian cultural background, ensuring adequate statistical power.

4. Sketch out your plan for analysis:
    a. State your research question(s), and discuss how it could be answered by analyzing the data that you listed in the previous question. That is, affirm for me that your research question is answerable using the data you will collect.

    Our **research question** is: "How do cultural elements in video games impact players' anxiety levels and engagement, specifically when they share cultural similarities?"

    To address this, we will:
    i. Compare anxiety Levels (State anxiety Before and After Exposure)
    By collecting pre-session and post-session anxiety levels, we can assess whether culturally specific games reduce anxiety for players with matching cultural backgrounds. Using the STAI scale measurements before and after gameplay for both cultural and non-cultural game conditions will allow us to compare anxiety reduction between conditions.

    ii. Analyze Cultural Background Impact
    By comparing anxiety reduction between Indian and non-Indian participants watching cultural games. Using demographic data and cultural background to understand how cultural similarity influences the gaming experience. This analysis will help determine if cultural matching enhances the anxiety-reducing effects of gaming.

    iii. Examine Group Differences

By comparing responses between experimental (cultural game) and control (non-cultural game) conditions, it could help isolate the specific impact of cultural elements on anxiety reduction and engagement.

The data we collect (demographic variables, anxiety measurements, cultural background, engagement ratings, and preference scores) directly aligns with answering our research question by allowing us to: Quantify anxiety changes from gaming, compare effects between cultural and non-cultural games and understand the role of cultural background in gaming - Measure engagement with cultural elements.

b. Describe in your own words what kinds of analysis could be done with the data to answer each question. Be specific about what analysis -within null hypothesis significance testing- you would use and why.

1. Analysis of Anxiety Changes (Pre-Post) Across Game Conditions:

Analysis: 2x2 Mixed ANOVA
Why: This analysis includes a within-subjects factor (Time: Pre vs. Post anxiety) and a between-subjects factor (Game Type: Cultural vs. Non-cultural).
Null Hypothesis: There will be no interaction between time and game type on anxiety levels
Explanation: This analysis is appropriate because it allows us to assess how anxiety levels change over time (pre to post) and whether these changes differ between participants exposed to cultural and non-cultural games. Anxiety is measured continuously using the STAI scale, making the mixed ANOVA suitable for the data.

2. Cultural Background Effects on Anxiety Reduction:

Analysis: 2x2x2 Mixed ANOVA
Why: This analysis includes a within-subjects factor (Time: Pre vs. Post anxiety) and two between-subjects factors (Game Type: Cultural vs. Non-cultural, and Cultural Background: Indian vs. Non-Indian)
Null Hypothesis: There will be no three-way interaction between time, game type(cultural or non cultural), and cultural background
Explanation: This analysis is appropriate because cultural background is categorical (Indian vs Non-Indian) and it allows us to test whether cultural matching influences anxiety reduction. By including three factors, we can explore complex interactions between time, game type, and cultural background on the dependent variable (anxiety reduction).

3. Analysis of Cultural Engagement:

Analysis: Independent Samples t-test
Why: This test compares engagement levels between groups defined by cultural background (Indian vs. Non-Indian) for each game type (cultural vs. non-cultural)
Null Hypothesis: There is no difference in engagement levels between cultural background groups watching cultural or non-cultural games.
Explanation: The independent samples t-test is appropriate because engagement is measured on a continuous Likert scale, and we are comparing two independent groups. This test helps us determine whether cultural background impacts engagement with the game type.

4. Demographic Variables (Age) and outcomes for Anxiety Reduction and Engagement:

Analysis: Two separate Multiple Regression
1. For Anxiety Reduction:
Why: This analysis examines whether age predicts anxiety reduction (calculated as post-session minus pre-session anxiety scores), controlling for categorical variables such as cultural background and game type.

Null Hypothesis: Age does not predict anxiety reduction, controlling for cultural background and game type
Explanation: Multiple regression is appropriate because: Age is measured as a continuous variable and anxiety reduction is calculated as a continuous score (post minus pre). Need to control for categorical variables (cultural background and game type) and allows us to examine linear relationships while accounting for other factors.

2. For Engagement:
Why: This analysis examines whether age predicts game engagement levels (measured after gameplay), controlling for cultural background and game type.
Null Hypothesis: Age does not predict engagement levels, controlling for cultural background and game type
Why: Multiple regression is appropriate because age is measured as a continuous variable and engagement is measured on a continuous Likert scale. By controlling for cultural background and game type, this method enables us to isolate the effect of age on engagement while accounting for other influences.

2nd Appendix for Power Analyses Screenshot: