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 (measured in years)
   - Pre-Session State Anxiety Level (measured on STAI scale)

   Categorical IVs:
   - Cultural Background (2 levels: Indian, Non-Indian)
   - Game Type (2 levels: Cultural game, Non-cultural game) [Note: This is a manipulated variable in the experimental design]

   Dependent Variables (DVs):
   Continuous DVs:
   - Post-Session State Anxiety Levels (measured on STAI scale)
   - Cultural Influence on Engagement Levels (measured on Likert scale)
   - Comparative Preference (measured on Likert scale)

   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 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 use mean imputation from the participant's other responses on that scale
  - If multiple items are missing from any scale, that participant's data will be removed from analyses involving that specific measure
- Outlier Detection and Handling:
  - Check for age outliers using box plots and remove extreme outliers
  - Examine pre and post anxiety scores for unusual patterns or impossible values (outside the STAI scale range of 20-80) and if found we will exclude that participant's data
  - Document all outlier removal decisions and maintain transparency in reporting
- Data Standardization:
  - Convert all Likert scale responses (engagement and preference) to a standardized format
  - Ensure consistent coding for categorical variables:
    - Cultural Background: Indian = 1, Non-Indian = 0
    - Game Type: Cultural Game = 1, Non-cultural Game = 0
- Data Validation:
  - Verify that all anxiety scores fall within the possible STAI range
  - Confirm that all Likert scale responses are within the defined scale points
  - Check that categorical variables only contain the predetermined codes
  - Ensure age values are reasonable for our target population
- Additional Pre-processing steps:
  - Calculate anxiety change scores (post minus pre) for each participant
  - Document all data transformations and maintain original data in a separate file

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)
   - Factors: Time (Pre vs Post) x Game Type (Cultural vs Non-cultural)

   Test Statistics and Hypotheses:

   a) Main Effect of Time:
      - H0: There is no difference in anxiety levels between pre and post gameplay
      - H1: There is a difference between pre and post gameplay Anxiety levels

   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 and non-cultural games
      - H1: The change in anxiety over time will differ for cultural games compared to non-cultural games

2. Cultural Background Effects (2x2x2 Mixed ANOVA)

- Factors: Time (Pre vs Post) x Game Type (Cultural vs Non-cultural) x Cultural Background (Indian vs Non-Indian)

Test Statistics and Hypotheses:

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

b) Two-way Interaction (Time x Cultural Background):
- H0: The change in anxiety over time does not differ between cultural backgrounds
- H1: The change in anxiety over time will differ between cultural backgrounds

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 between cultural backgrounds

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 will differ by cultural background

3. Cultural Engagement (Independent Samples t-test)
   - H0: There is no difference in engagement levels between cultural 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:
   - For Anxiety Reduction
     - H0: There is no relationship between age and anxiety reduction, controlling for cultural background and game type.
     - H1: There is a relationship between age and anxiety reduction, controlling for cultural background and game type.
   - For Engagement
     - H0: There is no relationship between age and engagement levels, controlling for cultural background and game type.
     - H1: There is a relationship between age and engagement levels, 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)


CITI PROGRAM

Completion Date 27-Aug-2024
Expiration Date 27-Aug-2027
Record ID 64653287

This is to certify that:

Bhuvan Shah

Not valid for renewal of certification through CME.

Has completed the following CITI Program course:

Human Research
(Curriculum Group)
Social-Behavioral Human Subjects
(Course Learner Group)
1 - Basic
(Stage)

Under requirements set by:

University of Southern California

CITI
Collaborative Institutional Training Initiative
101 NE 3rd Avenue, Suite 320
Fort Lauderdale, FL 33301 US
www.citiprogram.org

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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**)**

2. Anxiety Variables (Before and After Session State anxiety Levels**)**

3. Cultural/Commonality Variables (Cultural Influence on Engagement, Comparative Preference, Cultural Background**)**

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: Game Type (Culturally relevant game vs. non-culturally relevant game). Participants will be randomly assigned to either watch a culturally relevant game or a non-culturally relevant game.
    - Experimental Condition: Cultural game
    - Control Condition: Non cultural game
- 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. 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: Indian and Non-Indian.

b. If time permits then we will extend the study to Chinese participants.

Dependent Variables (DVs):

1. **Post-Session State anxiety**:
   - **Operational Definition**: Measured using the same standardized anxiety scale as pre-session, but administered after exposure to the video game to assess changes in anxiety levels.
2. **Comparative Preference**:
   - **Operational Definition**: Participants will rate their preference for the culturally relevant video game compared to non-culturally relevant games, using a Likert scale.
3. **Cultural Influence on Engagement**:
   - **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: Within-subjects factor: Time (Pre vs Post anxiety) - 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 we have both within-subjects (pre-post) and between-subjects (game type) factors and anxiety is measured on a continuous scale (STAI).

2. Cultural Background Effects on Anxiety Reduction:

Analysis: 2x2x2 Mixed ANOVA
Why: Within-subjects factor: Time (Pre vs Post anxiety) - 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 we can examine if cultural matching influences anxiety reduction, this allows us to test complex interactions between variables.

3. Analysis of Cultural Engagement:

Analysis: Independent Samples t-test
Why: To compare engagement levels between: Cultural background groups (Indian vs Non-Indian) watching different game types
Null Hypothesis: No difference in engagement levels between groups
Explanation: Appropriate because engagement is measured on a continuous Likert scale and we're comparing two independent groups.

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

Analysis: Two separate Multiple Regression
1. For Anxiety Reduction:
Why: To examine if age predicts anxiety reduction (Post minus Pre anxiety scores), controlling for cultural background and game type
Null Hypothesis: Age does not predict anxiety reduction, controlling for cultural background and game type
Why: 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: To examine if age predicts game engagement levels (measured post-game), 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. Need to control for categorical variables (cultural background and game type). It enables examination of age effects while controlling for other study variables.