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GameDev_Task_A.docx

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Assignment A: Investigating Technologies Used in Computer Gaming

P1 Describe social trends in computer gaming

Social trends in computer gaming refer to the evolving habits, preferences, and behaviors of players that influence how games are played, developed, and shared. These trends are often shaped by cultural shifts, technological advancements, and how people choose to spend their time. Below are some key social trends that have significantly impacted the gaming world:

1. Growth of Online Multiplayer Gaming

One of the most significant trends in recent years is the rise of online multiplayer gaming. This has transformed video games from solo experiences into highly social ones. Players can now compete or cooperate with friends or strangers globally in real-time. Popular examples include:

- Valorant, Call of Duty: Warzone, and Fortnite, which allow players to form squads, communicate via voice or text chat, and build team strategies.
- Esports has also grown alongside multiplayer gaming, turning it into a competitive profession with millions of viewers and prize money.

This trend has encouraged developers to add features such as matchmaking systems, ranking ladders, friend invites, and in-game communication tools.

2. Casual and Mobile Gaming Boom

Gaming is no longer limited to hardcore players or expensive consoles. With the widespread availability of smartphones and tablets, casual and mobile gaming has skyrocketed. This has opened gaming to a much broader audience including children, women, and older adults.

- Games like Candy Crush, Clash of Clans, Subway Surfers, and PUBG Mobile are easy to access, free to play, and addictive.
- This has led developers to adopt “freemium” models (free to play with in-app purchases), daily rewards, and short-session gameplay to keep players coming back.

This trend emphasizes convenience, accessibility, and social connection over intense competition or deep gameplay mechanics.

3. Rise of Game Streaming and Content Creation

Platforms like YouTube Gaming, Twitch, and Facebook Gaming have turned gaming into a spectator activity. Millions of viewers watch streamers play games live or view pre-recorded game content. This has caused a shift in game development in several ways:

- Developers now consider how “watchable” a game is—games with high replay value, dramatic moments, and customizable avatars tend to perform better in the streaming space.
- Games like Minecraft, GTA V, and Among Us gained massive popularity because of how frequently content creators showcased them.

Players are not just gamers anymore; many are also streamers, influencers, or part of fan communities that generate memes, fan art, and mods.

4. Social Interaction and In-Game Communities

Modern games often include built-in social features that support communication and group activities:

- Guilds/clans, global and private chats, co-op missions, and social hubs are now common.
- Games like Roblox and Second Life even allow users to build and socialize in custom virtual worlds.

In-game events such as concerts in Fortnite (e.g., Travis Scott’s performance) blur the lines between entertainment and gaming, showing how games are now platforms for digital social experiences.

5. Increased Focus on Diversity, Representation, and Mental Health

There’s growing awareness about diversity and inclusivity in gaming. Players now expect characters, stories, and settings that reflect real-world diversity:

- Games like The Last of Us Part II, Life is Strange, and Tell Me Why feature LGBTQ+ characters and address complex social themes.

- Developers also include accessibility features like colorblind modes, controller remapping, and subtitle options to support disabled gamers.
- Additionally, games like Celeste and Hellblade: Senua's Sacrifice explore mental health topics, aligning with society's increasing openness to such conversations.

P2 Describe technologies used in computer gaming

Computer games rely on a wide range of technologies to deliver immersive, responsive, and entertaining experiences. These technologies are constantly evolving, and understanding them is essential for both developers and players. The main technological areas involved in gaming include input and output devices, processing hardware, software tools like game engines, and network technologies.

1. Input Devices

Input devices allow players to interact with the game world. These devices have evolved to offer more precision, realism, and immersion:

Traditional Input Devices

- **Keyboard and Mouse:** Still widely used for PC gaming, especially in genres like FPS (e.g., Counter-Strike) and RTS (e.g., StarCraft). The mouse provides fast aiming, while the keyboard allows customizable key bindings for complex controls.
- **Game Controllers:** Used with consoles like PlayStation and Xbox. They include analog sticks, triggers, and haptic feedback (vibration), enhancing immersion.

Modern and Advanced Input Devices

- **Touchscreens:** Essential for mobile games, allowing direct interaction with game elements. Games like Clash Royale and Among Us are fully touchscreen-based.
- **Motion Controllers:** Devices like the Nintendo Switch Joy-Cons and PlayStation Move detect hand gestures and movement, enabling physical gameplay.

- **VR Controllers and Hand Tracking:** In virtual reality (VR) systems like Oculus Quest, players use hand gestures to grab objects or cast spells, providing natural control and immersion.

2. Output Devices

These devices deliver audio and visual feedback to the player, forming the core of the gaming experience:

Displays and Monitors

- **HD/4K Monitors:** Higher resolutions offer sharper images and greater detail. Monitors with high refresh rates (144Hz, 240Hz) are favored in competitive gaming for smoother motion.
- **TVs and Ultra-Wide Monitors:** Provide a cinematic experience, especially in story-rich or open-world games.
- **VR Headsets:** Devices like the Meta Quest or Valve Index provide immersive visuals in a 3D space.

Audio Output

- **Speakers and Headphones:** Games now use surround sound and 3D audio to give players spatial awareness. For example, hearing footsteps behind you in Valorant is crucial for gameplay.
- **Haptic Feedback and Vibration:** Controllers and even some gaming chairs now include feedback systems that respond to in-game actions, such as recoil or explosions.

3. Processing Hardware

The power behind modern games comes from a combination of specialized hardware components:

CPU (Central Processing Unit)

- Responsible for running the game logic, AI, physics, and background tasks.
- High-performance CPUs (e.g., Intel i9, AMD Ryzen 9) are used in both gaming PCs and next-gen consoles.

GPU (Graphics Processing Unit)

- Handles rendering of graphics, animations, shadows, textures, and more.
- Powerful GPUs like NVIDIA RTX 4090 or AMD Radeon RX 7900 enable ray tracing, ultra-HD graphics, and advanced effects.

RAM and Storage

- (Random Access Memory) allows quick access to data while the game is running—more RAM enables smoother multitasking.
- SSDs (Solid State Drives) are now standard in consoles and PCs, massively reducing load times and enabling real-time asset streaming.

4. Game Engines

Game engines are software frameworks that provide the tools needed to build and run games:

Unreal Engine (UE5)

- Known for cinematic graphics and used in AAA games like Fortnite and The Matrix Awakens demo.
- Features like **Nanite** (virtualized geometry) and **Lumen** (dynamic lighting) allow for extremely detailed environments.

Unity

- Popular for mobile, indie, and VR games. It's known for flexibility, ease of use, and wide platform support.

Custom Engines

- Some developers build their own engines (e.g., Rockstar's RAGE engine for GTA V) tailored to their game's needs.

These engines include tools for physics, animation, lighting, user interface design, and scripting, allowing developers to focus on creativity rather than coding everything from scratch.

5. Networking Technologies

These are critical for online multiplayer games and social features:

Servers and Matchmaking Systems

- Games like Call of Duty, Valorant, and League of Legends use dedicated servers for stable, low-latency gameplay.
- Matchmaking systems group players of similar skill levels together for fair matches.

Peer-to-Peer (P2P) Networks

- Some games, especially on consoles, use P2P networking where one player acts as the host. It's cheaper but less stable.

Cloud Gaming and Cross-Platform Play

- Services like **Xbox Cloud Gaming**, **GeForce NOW**, and **PlayStation Remote Play** stream games from remote servers to low-powered devices.
- Cross-platform technology enables users on different systems (e.g., PS5 and PC) to play together.

Voice and Text Chat

- Real-time communication through platforms like Discord or built-in voice chat is now expected in modern multiplayer games.

These technologies work together to shape the modern gaming experience. Advances in one area often lead to improvements across the industry. For example, better GPUs allow for more detailed graphics, which in turn push game engines to innovate, influencing game design decisions and storytelling.

M1 Explain how social trends in gaming influence the development of computer games

Social trends don't just affect who plays games — they shape how games are made, marketed, and updated. Developers actively respond to player expectations, behaviors, and cultural shifts to remain competitive.

1. Multiplayer-First Design

As more players seek social experiences, especially in competitive or cooperative settings, developers prioritize multiplayer game design:

- Games like Valorant and Overwatch are built around team coordination and player roles.
- Features like matchmaking, ranked ladders, and ping systems support smoother team play.

2. Streamability and Shareability

With the rise of Twitch and YouTube Gaming, developers now consider how their games will appear to viewers:

- Titles like Among Us, Fall Guys, and Minecraft gained popularity partly because they were fun to watch and easy to understand.
- Developers add tools like “theater modes” or replay systems for content creation.

3. Casual and Mobile Player Base

The huge increase in casual gamers has led to simpler interfaces and tutorial systems:

- Games like Clash of Clans or Subway Surfers focus on short sessions, mobile-friendly controls, and simple objectives.
- UI/UX design has become a major focus to ensure accessibility across all demographics.

4. Cultural Awareness and Inclusivity

Social demands for diversity influence character design, story themes, and representation:

- Modern games include characters of different ethnicities, genders, and identities.
- Developers also implement accessibility features to include gamers with disabilities, aligning with inclusive values.

5. Live Service and Social Events

Inspired by player engagement in social media and online communities:

- Games now host live events (e.g., Fortnite concerts or Call of Duty season launches).
- Developers use feedback from player forums, Reddit, and Discord to make updates and improvements.

M2 Explain the impact of evolving technologies on the development of computer games

As technology advances, it opens new creative and gameplay possibilities. Developers take full advantage of these changes to enhance realism, gameplay complexity, and immersion.

1. Improved Graphics and Realism

Advancements in GPUs and game engines allow for lifelike visuals:

- Ray tracing, real-time shadows, and global illumination (e.g., UE5's Lumen) make environments more believable.
- High-fidelity characters and animations make storytelling more engaging (e.g., The Last of Us Part II).

2. More Complex AI and Game Systems

Stronger CPUs and AI tools enable smarter, more responsive enemies and NPCs:

- Enemies now adapt to player strategies (e.g., Alien: Isolation).
- Simulated systems like dynamic weather, economies, and physics add depth to gameplay.

3. Faster Load Times and Seamless Worlds

Thanks to SSDs and memory optimization, games can load assets instantly:

- Open-world games like Horizon Forbidden West offer massive maps without loading screens.
- Seamless transitions between levels improve immersion.

4. Cross-Platform and Cloud Gaming

Cross-play and streaming technologies expand the audience:

- Players can compete across platforms (e.g., Xbox vs. PC) in games like Fortnite.
- Cloud services let people play high-end games on low-end devices, growing accessibility.

5. Advances in Immersive Tech

VR/AR and motion tracking have made immersive genres possible:

- Games like Beat Saber and Half-Life: Alyx couldn't exist without accurate motion input and 3D rendering.
- These technologies create entirely new forms of interaction, making gaming more physical and lifelike.

D1: Evaluate the influence of social and technological trends on the development of computer games

To evaluate the influence of trends on game development, we must look at how **social demands** and **technological progress** interact — often shaping the direction of the gaming industry together. One without the other can limit or delay innovation. Below is an evaluation of this synergy:

1. Social Trends Drive Demand – Technology Delivers Possibility

- Social interest in online multiplayer pushed developers to create games like Apex Legends, but without fast, reliable internet and powerful servers, the experience would fail.
- Similarly, demand for more inclusive and emotional storytelling led to titles like Life is Strange or The Last of Us, but these narratives depend on high-end animation, voice capture, and cinematic engines.

Evaluation: Social trends spark ideas and needs, but technology is the enabler. Without the right tech, many socially desired features couldn't be implemented.

2. Streaming and Social Media Influence Design Decisions

- As streaming became popular, game developers started prioritizing features that make games more engaging to watch — like killcams, highlight replays, and “moments” designed for virality.
- Games like Among Us exploded in popularity not because of cutting-edge graphics, but because they were simple to watch, stream, and play with friends.

Evaluation: Developers now think beyond the player and consider the viewer. This change is a direct result of social behavior, but it also relies on stable online tech and optimization for broadcasting

3. Rise of Mobile and Casual Gaming – Powered by Scalable Tech

- The growing casual audience prefers games that are easy to pick up and play. This trend led to design changes — intuitive controls, bite-sized content, and simple monetization (e.g., battle passes, daily rewards).
- On the tech side, optimized engines like Unity allow these games to run smoothly on a wide range of mobile devices.

Evaluation: Social shift toward convenience (on-the-go gaming) met technological adaptation (efficient, low-power engines). Without scalable tech, mobile gaming wouldn't be what it is today.

4. Immersion and Realism – A Shared Push

- Players increasingly want immersive, cinematic experiences, like Red Dead Redemption 2 or Cyberpunk 2077.
- Developers meet this demand using ray tracing, AI-driven physics, and detailed world simulation — all made possible by advances in GPU and engine technology.

Evaluation: The desire for deeper emotional and visual experiences is a social trend. The ability to meet that expectation depends heavily on the tech behind it.

Final Conclusion

Social and technological trends are not separate influences — they **feed into each other**:

- Players demand better experiences (social trend),

- Developers deliver those experiences as tech improves (technological trend),
- And new tech inspires new player behavior and expectations — continuing the cycle.

Games today are no longer just shaped by developer creativity, but also by community demand, cultural shifts, and the limits — or lack thereof — of available technology.