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K20: The principles, controls and workflow inherent in building, texturing, animating and rendering 3D models, including XYZ Space, scaling and transforms, and the range of uses in the real world (e.g. Architecture, Construction, Games, Immersive, Automotive, Aerospace, Medical, Space etc.)

Overview of Knowledge Gained

My experience with 3D design has grown during the later stages of my course, particularly in Year 5 during IMM200. I was introduced to core 3D concepts including spatial awareness, transformation controls, and animation basics through practical tasks in **Spline** and exploration of immersive tools such as **Skybox** and **Adobe Aero**. While I have not yet used high-end 3D modelling platforms like Blender or Maya in depth, I have developed a foundational understanding of 3D workflows and their applications across different industries.

Key 3D Principles and Workflow

XYZ Space and Transforms

I learned that all 3D models exist in a three-dimensional coordinate system (X = width, Y = height, Z = depth). Working in Spline, I used translation, rotation, and scaling tools to position and manipulate 3D objects in space. Understanding how objects interact in XYZ space allowed me to build simple environments and interactive elements that responded to user input.

Scaling and Hierarchies

In design tasks, I applied the principle of proportional scaling to maintain realism in 3D compositions, especially when placing objects relative to each other. I also began to understand the importance of parenting and grouping (hierarchies) for managing complex scenes efficiently, such as grouping a model and its animation together for coordinated control.

Texturing and Animation

Although my texturing experience has been limited to applying basic colours and materials in browser-based platforms, I gained insight into how textures can be mapped to surfaces and how lighting affects their appearance. I also explored basic animation, such as creating object rotations or movement paths and rendering these out for visual presentation.

Rendering

Spline allowed me to preview and export interactive scenes that were web optimised. This gave me an understanding of how rendering impacts visual quality and performance, especially when designing for real-time environments.

Real-World Applications

Studying 3D design has opened my eyes to its wide-ranging applications in industries such as architecture, immersive experience design, gaming, and healthcare. For example:

- **Architecture & Construction** – using 3D visualisation to showcase building layouts before construction begins.

- **Immersive Media & Games** – developing environments and characters for VR and interactive experiences.

- **Medical & Aerospace** – creating simulations to train professionals or visualise complex structures.

I found this especially inspiring as I see potential for 3D models to enhance e-learning content, which ties directly into my professional interest in learning and development.

Challenges and How I Overcame Them

A major challenge was navigating 3D space without a prior technical background. The controls felt unintuitive at first, particularly when aligning or rotating objects precisely. I overcame this by watching beginner tutorials, using grids and snapping tools, and experimenting with simple objects before moving on to more complex scenes.

Application in Practice

I applied 3D design principles in projects like IMM200, where I built a simple interactive 3D scene in Spline. I used scaling and transforms to create a balanced composition, applied colour and material to define surfaces, and experimented with basic animations to enhance user engagement. These experiences have given me the confidence to explore more advanced 3D tools in the future and consider how 3D can be used in learning design and user experience development.

Evidence by Academic Year

Year	Focus Areas	Tools Explored	Key Projects
Year 5	Introduction to 3D space, modelling and animation basics	Spline, Skybox, Adobe Aero	IMM200 – Immersive Media
Year 6	Applied simple 3D content in prototypes and research	Synthesia (for avatar animation), web-based 3D elements	CRP300 – Critical Research Project