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| **Qualification details** | | | |
| **Training Package Code and Title:** | **ICT - Information and Communications Technology (Release 7.0)** | | |
| **Qualification National Code and Title:** | ICT40120 Certificate IV in Information Technology (Gaming Development) | **State code:** | BFF9 |

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| **Assessment Title** | **AT04 Knowledge Questions (Part 2)** | | |
| **Unit National Code & Title** | ICTGAM423 Apply artificial intelligence in game development (Release 1) | | |
| ICTGAM427 Use 3-D software interface and toolsets (Release 1) | | |
| ICTGAM430 Design interactive media (Release 1) | | |
| **Date Due** | **Session 17** | **Date Received** | **16/05/2022** |

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| **Student Name** | **Xihao Chen** | **Student ID** | 30053752 |
| **Student Declaration** | I declare that the evidence submitted is my own work:    ………………………………………….. | | |

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| **Assessor Name** |  | | | |
| **Assessment Decision** | Satisfactory | | Not Yet Satisfactory | |
| **Assessor Signature** |  | | **Date** |  |
| **Is student eligible for reassessment (Re-sit)?** | No | Yes | **Reassessment Date:** |  |

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| **Feedback to student** | | | |
| *Via Blackboard (LMS) – Please check [Grade] section.* | | | |
| **Feedback from student** | | | |
| *Via Blackboard (LMS) – Please use [Comment] section during submission.* | | | |
| **Student signature** |  | **Date** |  |

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| **Assessment Instructions** |

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| **TO THE ASSESSOR** | |
| Type of Assessment | *Written Questions* |
| Duration of Assessment | *5 sessions (session 13 – session 17)* |
| Location of Assessment | *Classroom (computer lab), at home* |
| Conditions | *Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.*  *This includes access to:*   * *reference materials applicable to creating 3-D animation and digital effects* * *required hardware and software and peripheral devices* * *games engine* * *file storage* * *required 3-D modelling and animation software*   *Learners are required to complete the required tasks and submit the required evidence electronically via Blackboard.* |
| Elements and Criteria | As detailed in the assessment plan.  You are required to make sure that all students meet the elements, performance criteria and foundation skill items as outlined in the provided checklist. |

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| **TO THE STUDENT** | |
| Purpose of Assessment | You are required to show your understanding of:  *ICTGAM427 - Use 3-D software interface and toolsets*   * 3-D animation production protocols * industry standard 3-D modelling and animation software * contents and application of production brief * development process that may be used in 3-D software interface and toolsets * protocols in filing media assets * file management procedures and project configuration procedures that may be used in 3-D software interface and toolsets * fundamental research principles procedures that may be used in 3-D software interface and toolsets * principles of design and colour used in 3-D animation and digital effects environments * procedures for producing a storyboard and script * technical constraints that hardware and software impose on graphics requirements and creative visual design   You are required to meet the elements, performance criteria and foundation skill items as outlined. |
| Allowable Materials | Blackboard (Topic by topic) will include the following: Weekly Readings, Class notes, and Weekly Activities.  Internet resources must be recorded as references for the assessment. |
| Required Resources | *Computer with:*   * *Internet Access* * *Word processing software* * *Access to Learning Management System (LMS)* |
| Reasonable Adjustment | In some circumstances, adjustments to assessments may be made for you. If you require support for literacy and numeracy issues; support for hearing, sight or mobility issues; change to assessment times/venues; use of special or adaptive technology; considerations relating to age, gender and cultural beliefs; format of assessment materials; or presence of a scribe you need to inform your lecturer. |
| Assessment Submission | *All activities must be attempted.*  *Use of research tools and peers in formulating answers are acceptable – but work submitted must be your own work and must not be plagiarised.*  *Final files and documentation are to be uploaded to the appropriate area in the Blackboard course created for this unit.*  *If you are marked as NYS (Not Yet Satisfactory) on your first attempt, you will be provided with another opportunity to re-attempt the assessment.* |
| Project contents | This project consists of the following tasks:   * Answer all of the questions for each section |

**Instructions**

To the best of your ability, answer each of the following questions in full. Ensure that you have attempted to answer all questions before submitting.

**Part 2 – ICTGAM427**

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| **Question 1 – Describe the protocols involved in the procedure of producing a 3-D animation.** | | | |
| 3D animation follows a process known as a “3D Animation Pipeline” that uses resources, hardware and software to produce a 3D animated product through a sequential order of tasks.  **Conceptualisation**  Conceptualisation begins with the generation of several ideas to ensure a good quality story is produced. The initial ideas are then expanded to provide a more comprehensive view of the story, establishing the basics of the animation (characters, conflict, etc). Scriptwriting transforms the ideas into a formal story script which provides additional information on character movements, setting, timing, dialogue, etc.  **Previsualisation**   * + Previsualisation involves storyboarding, which is a visual representation of the script that portrays the intended camera angles, character poses/actions and scene events. Rough sketches are produced to get a general idea of the animation. Several 2D storyboard frames in rapid succession transforms the sketches into an animatic, which places emphasis on the timing of the storyboard drawings.   + The design aspect in the previsualisation process determines the final mood and details of the project, which includes character, outfit, concept, prop and environment considerations.   **3D Modelling**  The 3D version of the animatic from the previsualisation process is known as a 3D layout. Basic 3D attributes are included in the 3D layout with properties such as character size, form, environment, animation keyframes, etc. Afterwards, the 3D model is created by establishing the object’s surface geometry in 3D software such as Blender. This develops a critical step in 3D animation which produces most of a character’s details. The 3D model then has its texture, colour and surface properties applied.  **Rigging and Animation**   * + The 3D model is then rigged to create a bone structure for its joints, allowing for the quick and efficient manipulation of parts in the 3D model. Afterwards, the 3D model is animation, with the animator setting up the scale, movement and rotation of the joints via keyframes. 3D animation is usually the most time-consuming part of the production process. | | | |
| **Question 2 – Identify at least three (3) game development industry-standard 3-D modelling and animation programs.** | | | |
| ***1*** | Blender | | |
| ***2*** | Autodesk Maya | | |
| ***3*** | ZBrush | | |
| **Question 3 – Explain the details typically contained within a production brief, and how that information is applied in production.** | | | |
| A production brief contains information that assists with the development direction of the production pipeline. Alongside the project title, target audience and deadlines, some other details described in a production brief are:  **Project Summary**   * The project summary is a short section of the production brief that provides a concise, but comprehensive overview of the project and the objectives to achieve the goals for the project. Details such as the background/scope of the project, the provided resources and requirements are described in the project summary.   The project manager would write the project summary to assist the developers with meeting project expectations. It would also determine the development direction of the final project state, with the summary serving as the roadmap for the production pipeline.  **Deliverables**   * The production brief will have a section that covers the deliverables for the production pipeline. Deliverables refer to the quantifiable products created and provided during development, e.g. 3D models, assets and documentation. The produced materials may be tangible or intangible, and comprise part of the project’s development milestones (e.g. prototype, alpha, beta stages).   The production brief will describe what deliverables are to be created and delivered from the development team. As the deliverables are essential to the success of the project, its inclusion in the production pipeline must be comprehensive and fulfil the project’s milestones.  **Specifications**   * The specifications section in the production brief will describe how to create, implement and export the deliverables. It outlines the functionality of the deliverables and its testing procedures to ensure all produced materials are of acceptable quality.   The specifications in the production brief help ensure the development team create the deliverables within the scope of the project, and reinforcing quality control and industry standard practices. | | | |
| **Question 4 – Describe one method for enhancing your workflow processes for working with Blender and its toolsets toward game development.** | | | |
| A method for improving the workflow within the Blender software is creating a custom workspace.  The custom workspace may be created by clicking the + icon next to the default workspaces (e.g. modelling, UV editing, animating), creating a new workspace instance, then customising the panels according to user preference. The workspace is saved by going to File > Defaults > Save Startup File, allowing the workspace to be reused for new projects on Blender startup. | | | |
| **Question 5 – Explain how to export a 3-D model from Blender as an FBX and so that it’s materials and textures are embedded within the file.** | | | |
| To export a 3D model from Blender as an FBX file, go to File > Export > FBX.  The file view menu will open – On the right panel of the menu, change the Path Mode to Copy and click the Embed Textures button next to it. | | | |
| **Question 6.a – Explain how to use the following file management procedures in Blender.** | | | |
| ***Open*** | | To open a file, go to File > Open.  Locate the file directory of where the file is saved to on the left side, then select the file and open it. | |
| ***Import*** | | To import a file, go to File > Import.  The drop-down menu contains multiple options for importing files to Blender – Select the type of package to import, then import the file to the target file directory in the menu. | |
| ***Save*** | | To save a file, go to File > Save.  To save a file in a specific location, go to File > Save As.  Open the file directory to the proposed save location, then select the file and save it. | |
| ***Export*** | | To export a file, go to File > Export.  The drop-down menu contains multiple options for exporting files. Select the file type to export, edit the export options on the left side of the menu, then export the file. | |
| **Question 6.b – Explain how to configure the unit measurement for a Blender project.** | | | |
| To configure the unit measurements, click the “Scene Properties” button on the properties panel. The menu will display the “unit system” option which allows toggling between metric and imperial unit measurements. | | | |
| **Question 7 – Explain the procedures for accessing support files and support communities within Blender.** | | | |
| To access the support files/communities in Blender, go to the Help dropdown menu on the top toolbar. The dropdown menu contains the support and user community’s links. | | | |
| **Question 8.a – Briefly describe how the following principles of motion design may apply to 3-D animation and digital effects in video games.** | | | |
| ***Timing, spacing, and rhythm*** | | | Timing/spacing gives the illusion of movement with respect to physics in a 3D animation context.  **Timing** is the number of frames between character poses, which determines the speed of the animation. An example of timing is a coin taking 24 frames to move from left to right in a second (24 FPS).  **Spacing** refers to the positioning of the frames within the timing. Using the above example with the coin, if the coin frames were spaced closely, the coin would appear to move slower and vice versa.  **Rhythm** is an extension to the timing principle, using a repeated, predictable pattern of movement to synchronise the animation to various properties. An example would be synchronising the timing/spacing of the coin animation to a music track’s beat. |
| ***Eases*** | | | **Easing** refers to the simulated acceleration and deceleration of an object/character in an animation, using spacing to simulate the ease in or ease out movement to avoid abrupt motion. The use of easing can simulate the physics property of inertia in 3D animation and digital effects. |
| ***Mass and weight*** | | | Simulating **Mass** and **Weight** involves several animation principles in action; a combination of easing, follow-through/secondary action, squash and stretch, arcs and timing. For 3D animations, simulating mass and weight for characters/objects helps to improve their immersion and appeal, while digital effects can adhere to physics properties. |
| ***Anticipation*** | | | **Anticipation** refers to the movements in an animation that prepare the audience to believe an animation. In 3D animation, anticipation is applied to character movement by moving them slightly backwards before moving forwards. The anticipatory action adds momentum to the animation and informs the audience about the character’s intention to move. |
| ***Arcs*** | | | **Arcs** refers to the arcing motions that many objects in real life demonstrate when in motion, which provide smooth and realistic movements in animations. Straight line movement in animation appears robotic and stiff, which is not ideal for organic characters/objects. Using arcs in 3D animation allows animations to be more believable and lifelike to the audience. |
| ***Squash and stretch*** | | | **Squash and stretch** is the animation principle that adds flexibility to 3D characters/objects to make their animations more lifelike. In 3D animation, the principle imitates the flexibility for objects in the environment while keeping its proportions intact, such as a bouncing rubber ball. |
| ***Follow through and secondary action*** | | | **Follow through/secondary action** refers to the motion that occurs after a character/object stops moving. As most objects don’t immediately stop moving, this principle simulates drag and inertia with movement. In 3D animation, an example of a follow-through action is the antenna on a car waving about with its base moving before the top end bends over. |
| ***Exaggeration*** | | | **Exaggeration** is used to add additional appeal to animations, which can transform regular movements into supernatural, cartoonish and readable ones. It serves to enhance the animation while staying within . The principle may be applied to any 3D animation and digital effect - A character can apply more force to its push animation and a particle effect can have an explosion of particles, respectively. |
| ***Secondary and layered animation*** | | | **Secondary/layered animation** refers to the supportive actions that emphasise the main action to add more immersion to the animation, making it more convincing to the audience. The secondary action is usually subtle and may be thought of as a subconscious action. In 3D animation, examples of secondary actions include a character folding their arms while waiting and whistling while walking, etc. |
| ***Appeal*** | | | **Appeal** refers to how close an audience connects with a character/object in an animation. In 3D animation, it can manifest in the character design and the animation. Other animation principles can improve appeal, such as the exaggeration of an object’s proportions and physical traits and secondary actions for a character. |
| **Question 8.b – Describe how colour theory is used in relation to the following elements of video game design.** | | | |
| ***Mechanics*** | | | Colour theory is used in video game mechanics to distinguish between objects, as well as using colours to indicate different functionalities of an object (e.g. the TNT and Nitro blocks in the Crash Bandicoot series of games). Colours may also indicate areas where a player can or cannot traverse through. |
| ***Progression*** | | | Colour theory applies to progression in video games to change the mood/perception of time in an environment, such as a day/night cycle switching between warm and cool colours. The changes in colour help to elicit different emotions from players and improve immersion within the game. |
| ***Visual hierarchy*** | | | Colour theory influences the hierarchy of objects and the environment through colour grading (hue, saturation, value). Different shades of colours can guide the player to focus on or interact with a particular spot/entity. |
| **Question 9 – Explain the procedure for creating a storyboard and script for a 3-D animation.** | | | |
| To create storyboards and 3D animation scripts, the procedure follows three main stages:   * Generate ideas/concepts for the animation (e.g. characters, environment, animations, dialogue, etc). The ideas may be written into a script format which provides the framework for the entire animation. * Create rough storyboard sketches of the main actions, drawing keyframe poses of the animation and annotating auxiliary elements for each scene. The sketches provide the animation team with a visual reference of the script, so they understand how to create the animation. The process reiterates until the storyboards are deemed satisfactory. * The storyboard sketches are further refined into the final drawings, adding extra information such as the proposed camera angles and visual effects for the final rendering of the animation. Elements of the animation that aren’t expressed through the storyboards are pulled from the refined version of the animation script. | | | |
| **Question 10 – Explain how the 3-D software and the hardware being used in production can constrain the graphical specifications and the creative visual design of a 3-D animation.** | | | |
| The main constraint with 3D software in 3D animation production is the polygon count. Depending on the project requirements, developers may create low-poly 3D models for 3D video games for optimisation/performance considerations and cross-platform usage. For projects where real-time calculation of animation properties isn’t required (e.g. rendered films and still images), developers may create high-poly models for increased visual fidelity. Other software constraints such as the animation engine fidelity may impact the quality of 3D animations.  Hardware constraints in production will impact the rendering time/capabilities for the 3D animation. It may limit the number of visual effects used in an animation, as well as multitasking capabilities while rendering animations. | | | |