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A serious game to teach about career pathways in the games industry.

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Abstract

The games industry is one that continues to evolve and grow at an accelerated rate. Advances in technology in terms of how games are developed, the sophistication of gameplay, mechanics and their graphical representation span a multitude of game franchises. Furthermore, job roles within the games industry are as diverse as the game genres within it. One dilemma that sometimes confronts undergraduate game development students when entering university is what career path to undertake in the industry. Students in this discipline area are sometimes uncertain whether they want to pursue the aesthetical side of games development or implementational. When learning about the industry for the first time, it is important not only for students to be aware of the distinctive job roles within the industry but also how they interrelate with one another. From a higher educational standpoint, the concept of career pathways is associated with graduate employability. It is important to inform game development undergraduates from an early stage about the various routes into the games industry from a job role perspective. This paper provides an overview of some of the salient job roles in the games industry and their associated hard and soft skill sets. Focus is also provided on how to embed the concept of career pathways into games development higher educational curriculum. One proposed solution is the use of a serious game to teach students in this discipline about this topic. This paper also presents the development of a serious game designed to inform undergraduate game development students about different job roles within the games industry and what skill sets the industry requires. The paper advocates that a serious game can be one of many blended approaches to inform game development students about career pathways within the games industry. Acknowledgement is made that further empirical work is required to substantiate this pedagogical approach.

Keywords: Serious Games, Games industry, Graduate skill sets, Employability, Career pathways.

1. Introduction

The games industry is a global industry that continues to grow at an accelerated rate. According to NewZoo, in 2021, the global games industry was valued at $175.8m and is continuing to increase by 1.1% on an annual basis (ukiepedia, 2021). Furthermore, it has been stated that the video games industry, globally, will be valued at $217 billion by 2023 with the mobile sector leading the way (Aarki, 2020-21). This figure is expected to rise to $296 billion by 2026 (FutureLearn, 2021). The video games sector in the UK is the largest in Europe (TIGA, 2022). Dundee is often perceived as being the hub of Scotland's gaming industry where DMA Design formed in 1988 and went on to create games such as Lemmings and Grand Theft Auto (TalentScotland, 2022). The games sector forms a substantial part of Scotland's creative industries with the creative industries being worth about £4.6 billion in value to the Scottish economy (Scottish Development International, 2022). The economic significance of the games industry globally as well as within Scotland and the UK in general cannot be overlooked. Technological advancements regarding the various game engines and software applications used to currently develop games means that they can accommodate a multitude of diverging game genres and platforms. Developing games in a AAA studio involves the amalgamation and transparency of people working in different job roles and skill sets. There are a multitude of job roles within the games industry that range from the aesthetical to the implementation side of development. Some examples of such job role areas include game artist, game designer, game developer/programmer, animator, audio engineer, QA tester, producer, writer (Higginbotham, 2021). When commencing an undergraduate computer games development programme students in this subject area can at times be uncertain about what job role to pursue. Due to learning about the games industry for the first time, students are sometimes unaware of the diversity of job roles and the skill sets that accompany them. It is therefore important to inform

undergraduate students about the concept of career pathways in the games industry from an early stage in their degree programme. A dilemma facing educators teaching computer games development is how to embed the concept of career pathways coinciding with the concept of employability into course curriculum. This paper provides a review of some of the job roles within the games industry and identifies the key soft and hard skills associated with these positions. The concept of employability in relation to hard and soft skills is reviewed assessing the importance of these skills in the context of the games industry. The use of a serious game designed to inform undergraduate game development students about different job roles within the games industry is also presented.

2. Job roles within the games industry

According to TIGA (The Independent Game Developers' Association), the UK video games industry "…sustains highly skilled, graduate employment. A typical games development studio will have 80 per cent of staff qualified to degree level or above…". When working towards a degree on a games development programme it is important for potential graduates to be aware and familiar of the various job roles within the industry. Doing so at an early stage of their degree programme allows undergraduates to identify a chosen career pathway, allowing them to navigate towards their desired role within the industry. The BFI's Screen Business Report (2021), as mentioned by ukie, states that in 2019 the UK video games industry accommodated 73,370 full-time equivalent jobs (FTEs). 24,020 of these jobs were associated with developing and publishing roles. Choosing a games industry job role to work towards during a degree programme can be daunting if you are unaware of what positions there are and what skills you require excel in them. From a rudimentary perspective, job roles within the games industry can be split into two distinctive segments, namely, aesthetical and development. Categories within these segments include areas associated with predominately design and development.

One prevalent job position in the games industry is the role of games designer. According to Fullerton (2019, p. 3) a game designer *"… envisions how a game will work during play […] and is responsible for planning everything necessary to create a compelling player experience"*. The responsibility of the game designer is to create the *"structural elements of a system"* that when engaged by the players initiates the gameplay. Closely aligned with the role of game designer is the position of level designer. Within the games industry, level design is sometimes perceived as being applied game design where its aim is to *"… interpret the game rules, and to translate them into a construct (a level) that best facilitates play"* (Kremers, 2010, p.18). The main distinction between the two disciplines is that a level designer interprets the game rules, and a games designer formulates them (Kremers, 2010). Another aesthetical role in the games industry is that of artist often associated with creating concept art, storyboards, 2D or 3D characters and models for game environments. Where a game artist predominantly assists with the conceptual stage of design via the creation of assets for a game, it is the role of an animator to bring movement to the various assets and props within the game. Providing a good story and narrative to the game is the job of the game writer. Engaging backstories to a game can enhance the gameplay through interaction with characters such as NPCs (non-playable characters) contributing to the game's immersive focus. Focusing on the more development side of a game's team, job positions include audio designers, programmers, UI (user interface) designers and QA (quality assurance) testers.

3. Skills required for working in the games industry

The skill sets required for working in the games industry can be quite diverse particularly when considered from a technical perspective. When considering a career in the games industry predominant focus can at times be associated with technical skills and their relationship to the job role. It can however be argued that there are some generic skills sets that can be universally applied across job roles. Through the creation of online portfolios and showreels it is sometimes perceived that graduate applicants applying for jobs to game studios are already technically proficient. Technical skills are often equated with hard skills. However, in addition to being competent in hard skills such as programming, modelling, and design there is now an expectation that graduates progressing into the games industry require to be adequately equipped with soft skills. Undergraduates wanting to pursue a career in the games industry should be conscious that *"Games are rarely the product of designers' technical skills alone"* (Hamilton, 2019). It is important as educators to prepare graduates with work-ready skills and to

address the "expectation gap" (McGill, 2008, p. 90) in terms of what industry requires from graduates in terms of being ready for working in diverse, fluctuating, and dynamic work environments. In providing a distinction between hard and soft skills, hard skills are associated with characteristics such as *"…drive, rigor, vision, intelligence, analytical, and technical skills"* whereas soft skills encompass attributes such as *"…motivation, empathy, self-awareness, self-regulation, and social skills"* (Marques, 2014, p. 146). Whilst it can be argued that job roles within the games industry are distinct though interrelated, there are generic soft skills required to work in a games development team.
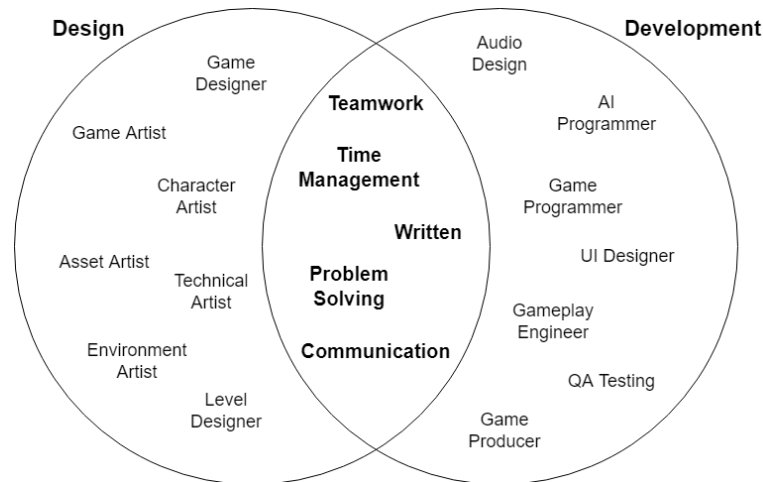

Figure 1: Soft and Hard Skills required in the Games Industry

Adapted from CGSpectrum, Game Development Careers (2022). Available at: https://www.cgspectrum.com/career-pathways/game-development.

3.1 Communication skills

Communication skills are important in the games industry due to the nature and composition of a games development team. For example, in the context of a game designer, it is important that you possess *"… the ability to communicate clearly and effectively with all the other people who will be working on your game"* (Fullerton, 2019, p.6). Not only is it invaluable to be able communicate your ideas to your team members you will also have to relay your ideas to staff members performing unique roles with different skill sets at various stages of the game's development lifecycle. Furthermore, there might be occasions where you may well have to pitch a game idea to directors in a studio. Communication skills are also relevant when having weekly team sprints where you will have to relay to the rest of the team what you have been working on in addition to updates on progress. In addition to being able to communicate, Schell (2020, p. 5) argues that the most salient soft skill associated with game design is listening. This will involve five different forms of listening that include listening to: (1) to your team when developing the game and making design decisions (2) your audience that will relate to those who will be playing your game (3) your game in becoming familiar with it having the ability to identify and issues or problems associated with it (4) the client who will be person paying to have your game designed and (5) your self in terms of self-reflection about what you are doing and why.

3.2 Written skills

Being able to communicate your ideas to members of your team using written skills is also important in the domain of game design. This could be in the form of the game or technical design documents. Other types of documents that are sometimes produced during the designing of a game can include documents relating to character design, world design, user interface, story and level progression and game script (Adams, 2014). Schell (2020) states that game documents serve two primary purposes, namely, memory and communication. These documents can become a collaborative process involving the contribution of many team members and in this sense can also aid towards accentuating team working skills. According to Macklin and Sharp (2016, p.134), design documents should be considered as *"living documents"* which should be kept current despite their constant revisions throughout the game design process.

3.3 Teamworking skills

"The creation of a video game isn't a solo project. It's the product of brainstorming, drafting, revising, and most importantly, teamwork" (Walsh, 2020). It is important that you can work well with your other team members when brainstorming and discussing design ideas. This also relates to team roles and responsibilities. Furthermore, *"It is important for the team to recognize the shared and divergent values and goals of all team members"* (Macklin and Sharp, 2016, p. 156). This is when the aspect of having a firm understanding of the different roles in a games team is required, reaching a consensus about design decisions, listening, and valuing the opinions of others throughout the game's development process. According to Schell (2020, p. 460) when making a game a team of *"tremendous diversity"* is essential and that team members will have *"...very different backgrounds and value very different things"*. Possessing solid interpersonal and social skills are relevant to have when resolving conflict within a project team. Soft skills of collaboration are required when resolving procedural, affective and substantive conflicts (Macklin and Sharp, 2016). Procedural conflicts are associated with processes in the way the team collaborates. Affective conflicts relate to personal aspects associated with team member's feelings, thinking and beliefs. Substantive conflicts are concerned with the game itself and potential conflict involving team member's divergent visions for the game.

3.4 Problem solving skills

The attribute of problem solving is also an important quality to possess when working in a game's development team. Reflecting upon issues of a technical nature that might involve a programming issue or an aspect of using a game engine and how to address them is a useful skill to have. For example, the concept of lateral thinking (Adams, 2014), is a skill that involves searching for alternative solutions and different paths to solve problems. Closely associated with this skill is that of analytical competence (Adams, 2014) having the ability to analyse and examine problems such as aspects relating to the design of the game.

3.5 Time-management

The ability to meet time critical deadlines is a relevant soft skill required when working in a game development team. The capability to be able to time and project manage your workload and deliverables is important to address the various milestones of the game's development. It is also relevant to be conscious of and to have a good awareness of the roles and responsibilities of your various team members. The reason being that project deliverables will be divided among team members differently and the time required to complete a certain task per member will vary (Macklin and Sharp, 2016). It is important to be understanding and considerate to your team members during the game design process, especially to those who might be under pressure with multiple deadlines.

4. Higher education, career pathways and the games industry

How to inform games development undergraduates about how the games industry functions, the different job roles within it and their overlapping necessity when designing a game can be considered as challenging. When devising a games development curriculum, it is important to ensure that the notion of employability is at the forefront. This is relevant to emphasise as it is the responsibility of educators to support undergraduates towards employability (Artess, Hooley and Mellors-Bourne, 2017). Furthermore, there is an importance on higher educational institutions to prepare their undergraduates for the world of work equipping them with the relevant graduate attributes required by their respective industries. The divergency of employability skills is something that can be associated with the notion of career pathways within the games industry. According to Harvey (2001, p.98), employability skills can be perceived as graduates possessing the salient skills they need, skills they have acquired beyond their generic attributes or graduate capabilities that an employer requires. Gunn, Bell and Kafmann (2010) argue that one challenge facing educators is that there is a need to ensure that in the context of employability, that the needs of employers are met through the employability skills cultivated in tertiary education.

Various approaches can be adopted towards educating and informing games development undergraduates about the necessary career pathways and skill sets required in the industry. We propose some recommendations to try and achieve this.

- **Guest talks from industry speakers**

A useful approach towards solidifying lectures about the divergent job roles within the games industry is to invite guest speakers from the industry to talk to your students. Since the onset of Covid-19, this can be done remotely using Zoom or Microsoft Teams. Hearing from people who are employed in the games industry generically discuss about their job roles, the skill sets required for them and how they established themselves in the industry is highly engaging for game development students. Students can begin to understand the importance of working cohesively in a games team and how the various job roles interrelate in the iterative design and development process.

- **Events such as game jams and Transfuzer**

Encouraging students to attend extracurricular events such as game jams or Transfuzer can provide undergraduates with good experience of working with other students from diverse backgrounds and skill sets. These events also provide students with core soft skills such as communication, teamwork, time management and general interpersonal and social skills to work in a team over a certain time.

- **Multidisciplinary team projects**

The creation of course modules that involve students from different subject areas working together is a good way to inform them about the different roles in the games industry. For example, allowing game students to work with animation and music technology students will educate them about the demands of each job role and skill sets required to perform them. Allowing students to work in a team adhering to a project specification, will provide them with key soft and interdisciplinary skills. This could be achieved by allowing individuals within the team responsible for managing the project on a rotational basis.

- **Development of course curriculum**

When developing course curriculum or a programme structure students need to be informed from their first year about what working in the games industry entails. It is important that they understand the multidisciplinary nature of the industry, the different job roles and skill sets required to work in it and how they all blend when working on developing a game. The concept of career pathways can be implemented throughout the remainder of their degree year allowing students to specialise in their chosen areas prior to graduation.
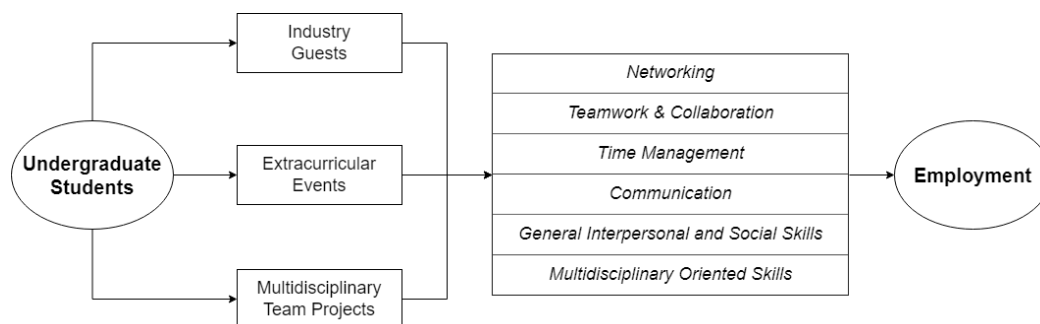
Figure 2: Teaching Undergraduates about Career Pathways and Soft Skills

5. Career pathways in the games industry: development of a serious game

The adoption of a serious game is a pedagogical approach that has been considered by the authors as a useful learning platform to inform game development students about the concept of career pathways. Serious games are games predominately designed for non-entertainment purposes. The implementation of a serious game has the potential to address the 'knowledge gap' in educating game

development students on the diversity of career paths within their chosen industry. The game will allow students to make sense and meaning of their continuing professional development and chosen career paths.

When considering how to teach the subject area of career pathways in the games industry the development of a serious game was a deemed to be a good justification. Several definitions of serious games exist in the academic literature. According to Dörner et al., (2016, p.3), a serious game can be defined as *"…a digital game created with the intention to entertain and to achieve at least one additional goal (e.g., learning or health). These additional goals are named characterizing goals."* Prior to commencing the development of the early prototype of the game, important consideration had to be given to the learning and assessment outcomes of the serious game in addition to the content integration. The development of the serious game was influenced by the game, "Game Dev Tycoon" which is a business simulation style game created by Greenheart Games. The basis of this game is that the player starts out developing games, gradually improving their skill sets, purchasing licenses for consoles, moving to office premises, and hiring staff.

5.1 Overall research aim

The primary aim of the research was to develop a serious game that would inform and educate undergraduate game development students about the different job roles in the games industry. Furthermore, the additional purpose of the game was to also educate students studying games development about the hard and soft skills required for working in the industry. The idea behind the game was also to inform students of the interrelationship and dependency of job roles when creating a game.

5.2 Gameplay aims

The gameplay aims of the serious game we proposed to develop were the following:

- To develop an entertaining and engaging game that embeds the concept of intrinsic motivation where students will play the game out of enjoyment, satisfaction, and fulfilment.
- Produce a balanced game with gameplay and mechanics that are straightforward to engage with in conjunction with the UX design of the game.
- Provide an element of challenge for the player with the embedding of puzzle and platformer elements to the game involving the player having to collect items in the studio to talk to the different NPC's.

5.2 Learning outcomes associated with the game

An important consideration related to the design principles of the game was that the gameplay provided the students with the opportunity to gain and retain knowledge about the industry. The primary pedagogical focus of the game was that of knowledge construction where it was important that the students were able to retain their knowledge learnt from the gameplay. It was therefore important that the basic gameplay and mechanics of the game adhered to the cognitive domain of Bloom's taxonomy. Learning through the gameplay would be enhanced through the theories of problem-based learning and reflection as the player progresses towards the various quizzes at the end of each level. Based on these factors, it was therefore deemed necessary that intrinsic motivation was facilitated and supported in the game. It was decided that the game would adhere to an endogenous educational game where the gameplay is informed by learning content and pedagogical theory (Winn, 2009). The learning outcomes of the game were as follows:

- Educate and familiarise the player with the basic environment of a AAA games studio.
- Inform the player about the concept of career pathways in the games industry illustrated through the different job roles in a games development team.
- Reflect upon the skill sets required to work in the games industry and what skills to improve upon.
- Reinforce learning through content integration in the game in the form of puzzles, quizzes, interactive dialogue, and feedback.

5.3 Content and assessment integration

One of the challenges associated with development of serious games is the aspect of integrating educational content. In the context of a serious game, "*The content of a game consists of assets, often designed by artists. Examples include avatars, houses, trees, other related objects, and sounds. At runtime, the content is brought to life by the game engine*" (Meham and Guthier, 2016, p.109). It was decided that the characterising goals of the game would be developed statically in tandem with the game's initial design until its completion (Mildner and Mueller, 2016). The intrinsic content of the game would adopt a linear and cyclical approach where the content moved the user along a defined path whilst embedding activities that impact on the gameplay (Aldrich, 2004, 2005). Learning will occur in the game via the incorporation of narrative and a dialogue system where the player will interact with NPC's (non-playable characters in the studio). The element of challenge will be facilitated through the gameplay where the player will have to solve various puzzles to navigate through the studio. Players will learn from each NPC about their job roles and the various skill sets required to perform them. Interacting, receiving, and digesting information from the NPC's will support the aspect of formative assessment with the quizzes at the end of each level accommodating summative assessment and student learning.
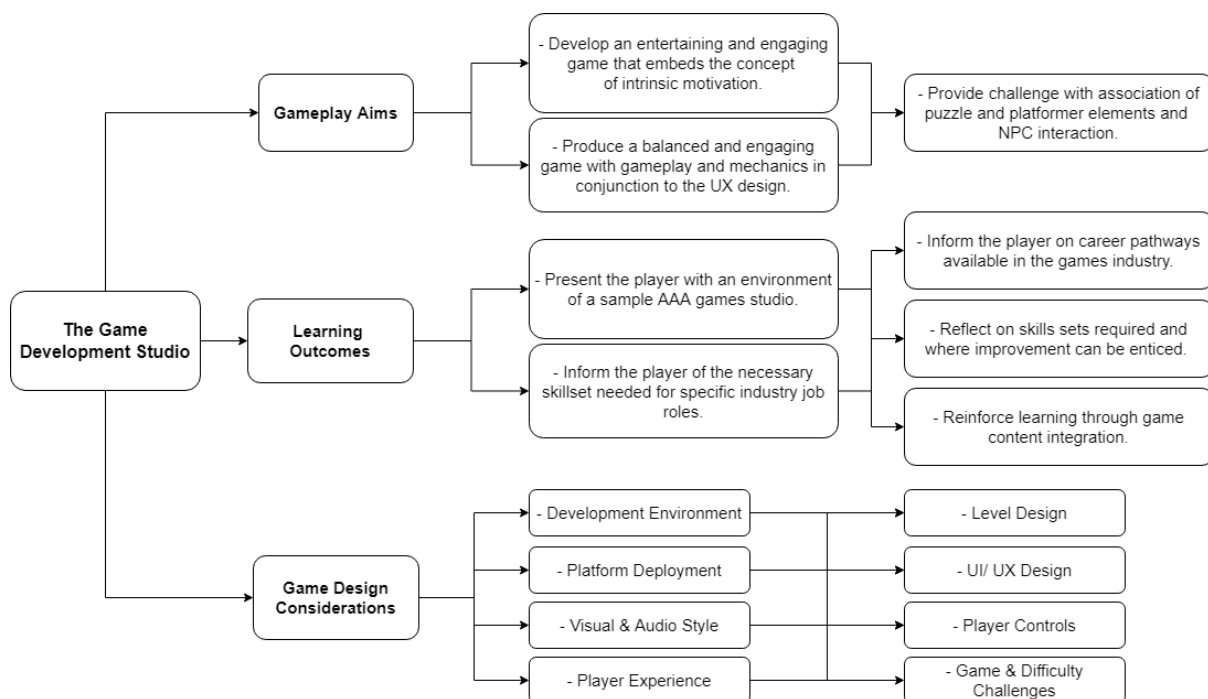

Figure 3: The Game Development Studio Game Considerations

5.4 Basic game design considerations

Some of the game prototype development decisions for the game are mentioned in table 1.

Platform	Windows PC
Development Environment	Unity Game Engine
Asset Packs used	Unity Asset store, Standard Assets from Unity
Visual Style	Realistic replication of games studio
Audio Style	Use of diegetic sounds
Level Design layout	Semi-linear and open layout
User Interface (UI) design	Clear and intuitive user interface
Controls	W,S,A,D and use of mouse
Player Experience	Immersive, replication of game studio
Challenge and difficulty	Puzzle elements, game narrative, Quizzes

5.5 Early visuals of prototype
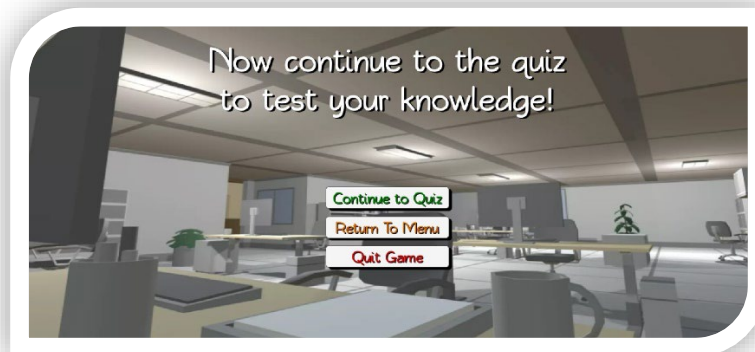

Figure 4: Main menu of game

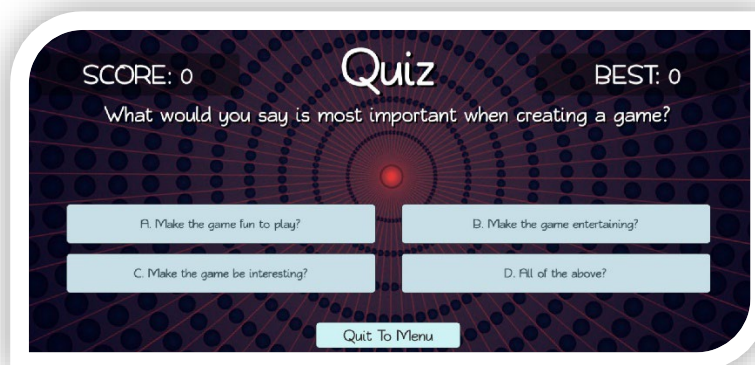**Figure 5:** Commencement of quiz element of game

Figure 6: Example of interactive quiz

6.   Future directions and developments of the game

The serious game presented in this paper is still at an early prototype stage with several improvements and development iterations required. The primary pedagogical aim of the serious game is to inform and educate game development students about the various job roles and skill sets required in the games industry. A basic game system has been utilised using the Snaps prototype office and distant land free

characters from the Unity asset store. The rudimentary prototype of the game has been designed to test the feasibility of the game idea which has yet to be fully evaluated.

Future developments will involve enhancing the gameplay by including additional platformer elements at various stages of the game and a set of levels included in the game that the player must navigate through. The studio office environment will be redesigned with increased narrative and greater interaction with NPCs. It will be important to make the game fun and engaging for the player. Increased immersion in the game will be achieved through the inclusion of various genre elements such as platformer levels, the player having to search for clues and solve puzzles to talk to the NPCs.

The game will be evaluated from a mixed methods perspective utilising open-ended and closed questions in questionnaires designed to evaluate the gameplay and learning outcomes. Focus groups will also be employed to explore participant views based on the questionnaires. The focus groups will provide additional feedback designed to aid the continued iterative development of the game.

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