

## Game Music – Element D2b Jake Pinnington

I have worked as a secondary music teacher, in comprehensive schools, for ten years. Within that time, I have on occasions, been staggered at the inability of education establishments to embrace technological advances. Rather than explore new and exciting opportunities for learning, I often witness the regurgitation of arguably dated resources. As technology outside of secondary education develops and moves so quickly, my experience has been that schools shy away from adaptation. There are undoubtedly financial, training and cultural discussion points around this which would extend to a lengthy document, beyond the scope of this assignment. The exploration of integrating technology into education, however, has driven the focus of my electronic musical instrument.

At my current school, we offer a BTEC Level 2 Music course, as an equivalent to GCSE music. Last year the course specification changed, and the content is split into three component areas (simply named Component 1, 2 and 3). For each component, students are tasked with creating a piece of work to show their ability and understanding in response to a specific brief. Component 1 requires students to create a portfolio of work which details their understanding of musical elements from music of four different time periods:

### BTEC Tech Award Level 1/2 in Music Practice (Appendix 1)

#### Tasks

##### Task 1 – Styles portfolio

Compile a portfolio of evidence that demonstrates your understanding of **four** different styles of music. You can select a maximum of two styles from popular music.

For each style you should consider the use of compositional features:

- melody
- harmony
- tonality
- rhythm
- structure

For each style you should also consider the use of sonic features:

- instrumentation
- texture
- timbre
- production.

Your portfolio should include an individual commentary to support your points.

#### A1 Musical styles

- Iconic composers, artists, bands and producers who have influenced and impacted musical styles.
- Impact of technology on musical styles, instruments, production and recording.

Through the exploration of the above content, learners are required to explore at least five musical styles, with three coming from popular music and two from other styles.

- Popular music styles – a minimum of one from each of the following groups:
  - group 1: 50s and 60s, e.g. rock 'n' roll, British invasion, folk revival, Motown and soul, psychedelic
  - group 2: 70s and 80s, e.g. heavy metal, prog, punk, disco, reggae, synth pop, hip-hop, post punk, hardcore
  - group 3: 90s to present, e.g. grunge, Britpop, rave, techno, house/techno, drum and bass, nu-metal, pop punk, dubstep, reggaeton, grime, trap.
- Other music styles – a minimum of one style from two of the following groups:
  - group 4: world music and fusion, e.g. samba, bhangra, African drumming, gamelan
  - group 5: music for media (film, TV or computer games), e.g. jingles, theme tunes, soundscapes, ambient music, Foley, diegetic, non-diegetic, motifs and leitmotifs, thematic development
  - group 6: western classical styles of music, e.g. baroque, classical, romantic, orchestral, leitmotif, minimalism, serialism
  - group 7: jazz and blues, e.g. delta blues, trad jazz, bebop, swing/big band, modal jazz.

#### A2 Musical elements, stylistic features and characteristics (create three)

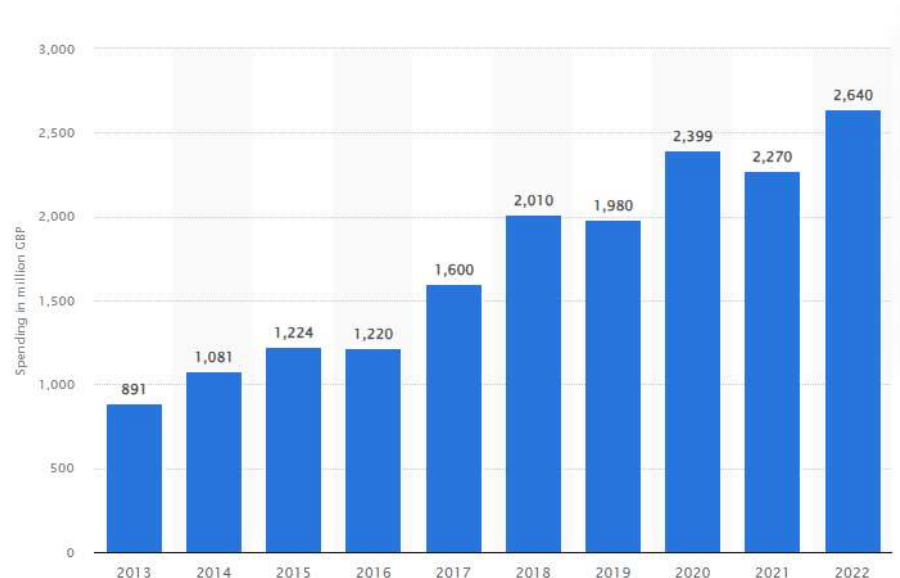
Students are set a certain amount of time to complete the portfolio of work and allowed to use notes they have created in taught lessons. Problems sometimes occur with students who struggle to write notes (through varying reasons), with students who make notes but forget the context or with students who have not heard enough musical examples through absence.

Having spent a large amount of time working with young adults, I often hear the latest names in computer gaming and witness the enthusiasm students show for playing them, I know of several students who have stayed off school to play the latest release of FIFA! According to Baker (2023), 'Remarkably, more than nine out of 10 (91%) of UK children aged between 3-15 play games on some type of device, ranging from personal consoles to mobile phones'.

I decided to explore the possibility of developing a computer game, relevant to today's gaming market but which also supports student learning, specifically in relation to the BTEC Music Level 2 course. I felt

this could also be commercially viable given the rise sales figures for gaming products since 2013 to 2022.

Consumer spending on digital console and online games in the United Kingdom (UK) from 2013 to 2022 (Clement, 2023).



As my intention was geared towards the BTEC Level 2 Music course, I felt it pertinent to understand the market in terms of students enrolled on the course. I was able to obtain this information from Edexcel regarding the BTEC Level 2 music course and other BTEC Level 2 courses:

#### **BTEC Tech Awards - 140,000 learners completing (Appendix 2)**

| Sector                         | Completion |         |
|--------------------------------|------------|---------|
|                                | 2020/21    | 2021/22 |
| Health And Social Care         | 47,100     | 37,900  |
| Enterprise                     | 39,700     | 28,500  |
| Performing Arts                | 21,200     | 19,100  |
| Digital Information Technology | 23,800     | 19,000  |
| Creative Media Production      | 12,200     | 10,800  |
| Engineering                    | 11,600     | 8,900   |
| Sport, Activity And Fitness    | 6,900      | 5,700   |
| Music Practice                 | 2,800      | 3,100   |
| Travel And Tourism             | 2,700      | 2,700   |
| Art And Design Practice        | 2,400      | 2,600   |
| Child Development              | 1,900      | 2,200   |

Music practice only forms a small percentage of Level 2 learners across the BTEC course so if the game were to be developed on a commercial level, a degree of analysis would need to take place and ensure it would make commercial sense to develop. If not as a standalone product it could be included in a suite of BTEC software or encompass BTEC course material and other exam boards.

To ensure my initial theory that a learning-based music game could have a place within an education environment, I researched recent studies regarding computer games in education:

Educational benefits of teaching with digital games have been highlighted for years (Huizenga et al., 2017; Mayer, 2019; Van Eck, 2009) and have been confirmed by meta-analyses on digital game-based learning (Clark et al., 2016; Tsai & Tsai, 2020). Digital games can be considered as a form of curriculum (Foster & Shah, 2020), can be integrated into existing curricula (Barab et al., 2012; Chee, 2016) and can be guiding principles of schools (Quest to Learn, 2021).

Ruth, M., Birke, A. and Kaspas, K. (2021, p2)

This statement taken from, 'Teaching with digital games: How intentions to adopt digital game-based learning are related to personal characteristics of pre-service teachers,' inspired me as it reinforced my observations and thoughts about computer game use in education. My original vision for a learning-based music computer game was based around students taking part within a classroom situation. In reading the paper, 'Computer Games in Education,' an alternative perspective presented itself:

Every day, in households across the world, parents tell their children that they can play their video games after they do their homework. However, imagine a world in which playing video games is the assigned homework, as first suggested by Celeste Pilegard (Pilegard & Mayer 2018). Researchers studying computer games for learning are busy investigating the feasibility of using educational computer games to improve student learning of academic material and relevant cognitive skills.

Mayer, R E. (2018, p523)

Both articles equipped me with enough evidence of a reason to explore creating a music based educational game. The challenge would be how I organise the game so that it meets my ambition and is also engaging for students to play. In response to the BTEC Level 2 criteria for Component 1 (Appendix 3), I wanted the game to achieve two things:

- 1) Ensure students listen to music from specific time periods
- 2) Remind students of key technical features of the music from that time period

I am completely new to the world of computer game audio design but do have some experience in sound recording and so the course text, 'Game Audio with FMOD and Unity', seemed like an ideal starting point to learn:

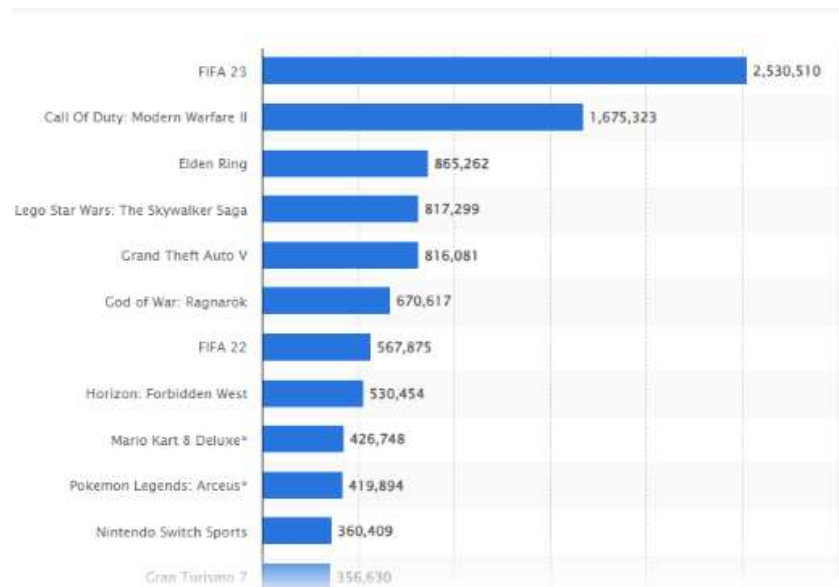
Aimed at readers with a background in audio production who wish to expand into the area of computer game sound (though it will also be useful for game makers who wish to learn more about audio design and implementation).

Robinson, C. (2019, pxi)

Given the scope of the assignment, I felt could use the techniques explained in 'Game Audio with FMOD and Unity' to create an engaging game that met my two key requirements.

As the guide in 'Game Audio with FMOD and Unity' is based around a first-person shooter style game, I decided to adopt this approach. A first-person shooter game would also make good commercial sense as in 2022, Call of Duty Modern II was the second highest selling game.

### Best-selling video games in the United Kingdom (UK) in 2022, by unit sales (Clement, 2023)



With the core genre of game established, my original idea was to have a large terrain area with four zones, similar to a Fortnite map.



Fortnite (2023)

Within each zone, a particular era of music would sound as the player entered, ensuring students heard music from the times periods as listed in the BTEC music spec. I had also envisaged that each zone would appear stylistically accurate for the era. For example, one area would be based around 1960's London with various characters speaking with a Southern accent and dressed in Mod based fashion. I began designing the game in this format but quickly hit several stumbling blocks:

I would require a huge amount of assets to create at least four time period correct zones within a map. This would include characters based on fashion from the 1960's to the 2000's plus a range of scenery to reflect the era. I could have prevented having to redesign the core game plan with sketching out an idea of terrain layout, assets required and sound.

My initial game idea also felt like it didn't have a clear goal for players to try and achieve. Within Fortnite, the areas seem relevant as you work through them in an online battle to be the last person standing, all while the world shrinks. As I did not have the game building knowledge to create a game in this format, my idea seemed to be a little fruitless. The result would be my first-person shooter walking around shooting things in various areas but with no clear target to complete the level.

I had planned to include authentic characters who would pose a threat to the first person and would need to be destroyed in order to progress through the game. I did not feel comfortable with this been a game designed for education and felt the characters should be replaced with something non-human.

I overcame these problems by firstly establishing a goal with the game. I decided that the aim of the game would be to get your first-person shooter to a live music concert. To ensure the game sat within the first-person shooter category, I decided to use the drone ideas taken from 'Game Audio with FMOD and Unity' (Robinson, 2012. pg 128). This seemed to sit much better in an education environment. To add further interest to the game plot, I wanted to add a reason for the first-person shooter to reach the live concert and came up with the idea that a small town had been overrun with AI drones who will only play synth-based music from the 80's. To overcome this, the first-person shooter must destroy them all while listening to 1980's music, collect guitars on the way and reach the Oasis (Britpop) concert to complete the game.

To remind students of the features of 1980's music, I located a robot voice maker online (Narakeet, 2018) and generated phrases which state key facts about 1980's music. I imported those audio files into FMOD and set them up to play infrequently. This could be expanded to add further levels with relevant features for each era of music.

## **Sound Design**

The aim of the game is to shoot your way through the small town, destroying the drones, collecting guitars, and reach the live music concert. It was my intention that students would be exposed to an example of typical 1980's music but also include appropriate sounds and effects synonymous with modern day computer games.

### **Ambience**

I originally set up ambient audio in FMOD to play the original version of Sweet Dreams by The Eurythmics. However, having the song as ambient audio meant it become quite monotonous and there was no way to break from the audio in the game. To provide an end to that audio in the game, I set it to a transmitter in a large drone which must be destroyed before you can progress to the concert.

I reduced the monotony of the audio by creating a MIDI version of Sweet Dreams on a range of synths in logic. I then imported these into FMOD and adjust the percentage (Robinson, 2019. Pg 210) of which tracks play so the listener frequently hears a slightly different version and reduces the risk of over familiarity. I triggered the break section in Sweet Dreams to the first-person player score using parameter control (Robinson, 2019. Pg 207), so that when the player collects 4 guitars the music doesn't feel as busy suggesting to the player, they are making good progress.

In addition to the ambient music, I designed sounds to enhance the virtual experience. Some of the main sound elements include footsteps which adapt to the surface and when the first person walks between buildings (Robinson, 2019. Pg 123). There are knock sounds triggered by the first person when they walk into solid objects and ambient sounds added to the water/trees as the first person walks around the map.

An area I did find quite tricky was in mixing the robot voices emitted from the drones, these voices remind students of key features of 1980's music. Simply having the drone emit the voices on a repeated pattern became very repetitive and diminished the atmosphere in the game, indeed, 'repetition destroys immersion.' (Robinson, 2019. Pg 14) I reduced the number of times the drones would say the phrase and optimized their use by only having them sound when near the first person (Robinson, 2019. Pg 245).

To provide greater clarity of drone audio when walking around the map with the 1980's music playing, I used side chaining. Here the drone sound would trigger a compressor to reduce the ambient audio volume and allow it to be heard clearly (Robinson, 2019. Pg 168).

### Reflection of the Instrument

The final product is playable game which supports student learning about music from the 1980's and 1990's. The reminders from the drones about key musical features in the 1980's works in reinforcing the key technical elements of music from that time. The core design of them game i.e. a first-person shooter provides an obvious foundation for student engagement in the topics.

To add more interest in the goal, he game could include exclusive live band performances, increasing its appeal. This would attract licencing fees and factors to consider in revenue.

### Competition

In terms of learning-based computer games, there is a plethora of free online games for core subjects like maths. However, these games still present themselves as an 'add-on' to normal classroom learning and do not provide the immersive experience most young gamers will be familiar with. A quick Google search of maths shooter games brings up, quite a different experience to Fortnite:

Mathsframe (2023)



Fortnite (2023)



Music games are also limited in their development and application. Several games exist which rely on the user hitting certain keys at the correct time, magic tiles (Magic Tiles, 2023). Incredibox (Incredibox, 2023), relies upon the user dressing a character to combine a mix of beat patterns to create a track. There are games which develop music theory also.

There are no specific games designed to support the learning of a specific course in an immersive game environment, comparable to the bestselling titles.

### **Testing**

Once I had completed the game, I tested it myself to check for obvious errors in the sound balance and audio environment. I also checked the operation of the game so the FPS could move around and function correctly.

The first issue to address was the balance of sound, the first run of the game made it obvious that the Sweet Dreams music was far too high in the mix as none of the sound effects could be heard. The result of this meant that the game seemed less realistic i.e. no footsteps could be heard. I mixed the audio in real time (Robinson, 2019. Pg 180) so that I could adjust levels correctly and achieve a better balance of sounds, I wanted the music to be heard but not at the detriment to other ambient and sound effects.

Another problem I encountered was the rockets from the launcher would explode as soon as they were fired. After rereading the (Robinson, 2019. Pg 107). I realised they were impacting on the rocket launcher itself as soon as they were fired and exploding.

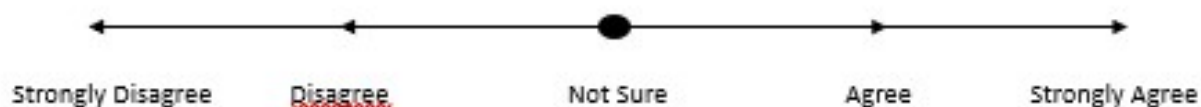
Once sound levels were set, I looked at optimizing the game further. While testing I had encountered a handful of times where my FPS had walked too close to the edge of the terrain and fallen off the map. I addressed this by placing trees up the side and devising a walkway through the terrain which would hopefully guide the students. I also placed an ocean textured block behind the tide to stop the FPS falling off at that edge.

### **Beta Testing**

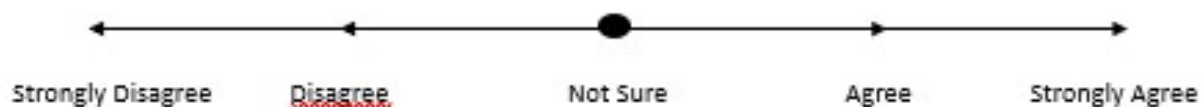
After I had tested the game myself and felt it was at a playable standard, I decided to undertake a form of beta testing. To do this I called upon my Year 10 BTEC Level 2 music class who the game was hypothetically designed for.

## BTEC Level 2 Game Testing Survey

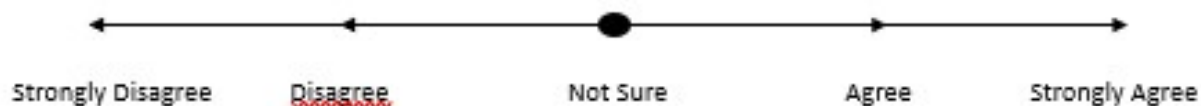
1) I found the game fun?



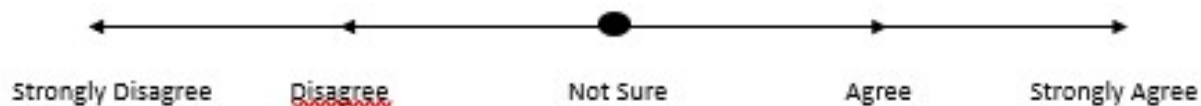
2) I found the game challenging?



3) The game helped me remember music facts?



4) The game made helped understand what music was like in the 1980's?



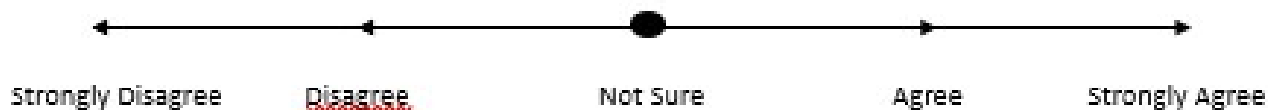
5) The game made helped understand what Britpop music sounded like?



6) I thought the layout of the game was good?



7) I could hear the music in the game clearly?



8) I could hear the sound FX in the game clearly?



9) Any comments or suggestions:

### Summary of Testing Results

All of the students agreed that the game was fun to play however not all of them felt it was challenging enough. Some students felt the level should be longer over more terrain with more drones to destroy. One student suggested it would be harder if the drones bounced around or moved about.

All students agreed that it helped them remember music facts and get a better idea of how 1980's music sounded. Several students commented that they particularly liked how the music in the game was the same as the music we had learned/analysed in class, and it certainly helped them remember how it sounded. A couple of students reported that they couldn't hear some of the drones speaking while playing the game.

Most students agreed that the game helped them understand how Britpop music sounded, although one said he completed the game without properly listening to the song.

Again, most students agreed that the layout was good, the main feedback is that they would prefer a larger terrain model to play in. Several also mentioned that the crowd looked a bit like a group of scarecrows as they didn't move much.

All students agreed or strongly agreed that they could hear the music and the sound FX in the game except a few who could not hear the drone robot voiced clearly. A couple of students commented on how they liked the sound of the waves at the start of the game and the crowd noises when you walked into the people.

Further feedback suggested that students would like to play the game online with their friends rather than just as a solo player.

### **Testing Fixes**

Due to the focus of this assignment being the audio design of the game, I opted to fix only any major playability or sound design issues. To address the drone voice problem, I added a side train trigger to the drone voice channel which activated a compressor on the music channel. This meant that the music volume decreased enough to hear the drone voices. I also added a little EQ to the drone voices, emphasising the higher frequency range and added a high pass filter to the main music channel, also triggered when the drone voice sounded. The result of this ensured drone voices could be heard much more clearly than before as they previously seemed to get a little lost in the music.

To address the issue of players not hearing enough of the Oasis song, I simply relocated the fort which triggered the end of game. The fort was initially near entrance point to the concert so I moved it towards the rear left, meaning the player had to walk through the crowd and listen to much more of the song.

### **Summary**

As this is the first game I have ever built, I am fairly pleased with the initial product but even more so that I was able to successfully adapt the game a little and integrate my own audio; I feel like I have developed the introductory skills in game audio design, using Unity and FMOD. The intention of my game was to help support learning at BTEC Music Level 2 by integrating musical facts and examples to students though a first-person shooter. I believe the concept of learning through gameplay certainly has potential as all the students who trialled my game were completely engaged in the task, even students who explained that they didn't spend much time outside of school playing computer games. There are many things to consider in fully introducing this technique into an educational setting however, including facilities, costs, game development and how much time students could potentially spend playing games.

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