Langley Park School for Boys

Music Technology PLC

Area of Study 1 Recording and Production techniques for both corrective and creative purposes

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| **Topic** | **Content** | **Skills, Knowledge and Understanding** | **RAG** | **Evidence** |
| 1.1 Software and Hardware | 1.1.1 The core and Advanced  functions of a digital audio workstation (DAW) | ALL FUNCTIONS BELOW |  |  |
| 1.1.2 Names, purposes and functions of hardware | Microphones (D112, NT2A, NT5, SM57,  SM58) |  |  |
| Audio Interfaces |  |  |
| Microphone pre-amps |  |  |
| DI Boxes |  |  |
| Mixing desks |  |  |
| Outboard effects |  |  |
| Guitar pedals |  |  |
| Controller keyboard |  |  |
| 1.1.3 Other programming environments and new and  emerging software | Awareness of new, alternative software  environments used in music production. Ableton, Logic 9, Logic X, Cubase, Protools |  |  |
| MIDI |  |  |
| OSC |  |  |
| 1.1.4 The impact of new and emerging software of music  production | The contribution of new music technology to music production practices |  |  |
| 1.2 Capture of Sound | 1.2.1 Gain structure and how it affects noise and distortion | Setting gain to maximise signal-to-noise ratio |  |  |
| Avoiding clipping, interference and hiss |  |  |
| Checking input and output levels when several effects/pieces of hardware are  chained together |  |  |
| Pre-amp controls such as phantom power,  gain, pad, high pass filter, polarity, clip/activity LED |  |  |
| 1.2.2 The Characteristics and suitability of microphone types | Dynamic microphones |  |  |
| Condenser microphones |  |  |
| Ribbon microphones |  |  |
| 1.2.3 The suitability of microphone placement  techniques | Suitable distances/ angles (mic placement) |  |  |
| Recording instruments using 1 microphone  (vocals, wind/brass/strings, guitar amps) |  |  |
| Recording instruments using multiple  microphones, e.g. drum kit |  |  |
| 1.2.4 The advantages and | On-axis and off-axis frequency responses |  |  |
| Directional: cardioid, hypercardioid, figure of  8 |  |  |
| Omnidirectional |  |  |

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|  | disadvantages of microphone  types in terms of polar pattern and frequency response | Advantages and disadvantages of different  polar patterns |  |  |
| Proximity effect |  |  |
| Frequency response and transient response  of microphones |  |  |
| 1.2.5 Advanced microphone techniques | Understand phase relationships between  multiple microphones |  |  |
| Coincident pairs |  |  |
| Spaced stereo pairs |  |  |
| 1.2.6 How microphones work | Sensitivty |  |  |
| Electromagnetic induction |  |  |
| Capacitance |  |  |
| Diaphragms |  |  |
| Moving coil |  |  |
| Plates |  |  |
| Phantom power |  |  |
| Microphone switches (pad, high pass, polar  pattern switch) |  |  |
| Microphone accessories (pop shield,  elastic/suspension cradle) |  |  |
| 1.3 Synthesis | 1.3.1 How synthesis is used to create sounds | Selecting and mixing sine, triangle, pulse,  square and saw waveforms |  |  |
| white noise |  |  |
| Low frequency oscillator (LFO) |  |  |
| Low pass/ high pass filters |  |  |
| Envelopes |  |  |
| 1.3.2 How timbre is affected by a wider range of parameters | Cut-off frequency |  |  |
| Resonance |  |  |
| ADSR/ AHDSFR amplitude envelope |  |  |
| Mapping envelope and LFO to filter cut-off  and pitch |  |  |
| Oscillator tuning (Octave, course , fine) |  |  |
| Pitch bend range |  |  |
| Monophonic synthesiser |  |  |
| Polyphonic synthesiser |  |  |
| Portamento |  |  |
| Arpeggiator |  |  |
| 1.4 Sampling | 1.4.1 Pitch mapping | Transposing |  |  |
| 1.4.2 Editing samples | Cutting and trimming |  |  |
| 1.4.3 Looping | Loop points |  |  |
| Zero crossings |  |  |
| Cross-fade looping |  |  |
| 1.4.4 Advanced parameters | Sample rate |  |  |
| Bit depth |  |  |
| Using synthesis parameters on samples (e.g.  filter and envelope) |  |  |
| Setting pitch key zones |  |  |
| Velocity layering |  |  |
| Time-stretch |  |  |
| Reversing samples |  |  |

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| 1.5 Sequencing | 1.5.1 Real-time input | Using a MIDI controller keyboard |  |  |
| 1.5.2 Non-real time input | Step grid (drum editor/ piano roll) |  |  |
| Using the pencil tool to draw in notes |  |  |
| 1.5.3 Quantise | Hard quantise values, e.g. 1/8, 1/12, 1/16,  1/32 (and note length equivalents) |  |  |
| Swing/ percentage quantise |  |  |
| Snap/ Grid |  |  |
| 1.5.4 Editing skills | Velocity and note length |  |  |
| Piano and list editor |  |  |
| Cutting, looping and duplicating |  |  |
| 1.5.5 How MIDI works by studying data bytes | Note on/off |  |  |
| Pitch |  |  |
| Controllers (controller keys) |  |  |
| Pitch bend |  |  |
| Most Significant Bit and Least Significant Bit (MSB and LSB) - The prioritising of values when transmitting MIDI in binary code. |  |  |
| Tempo data in bpm |  |  |
| 1.6 Audio editing | 1.6.1 Truncating | Scissor tool/ split |  |  |
| Lead-in and lead-out times |  |  |
| 1.6.2 How to remove clicks and noise | Removing hiss, hum and plosives |  |  |
| Fades and cross-fades |  |  |
| 1.6.3 How and why clicks and  other noises occur | Examples include discontinuous waveforms  and plosives |  |  |
| 1.6.4 Audio editing functions | Normalising |  |  |
| Inverting waveforms |  |  |
| 1.7 Pitch and Rhythm correction and manipulation | 1.7.1 How to correct inaccuracies in pitch | Retuning a vocal part with automatic tuning |  |  |
| Manually tuning individual notes by drawing  in pitch |  |  |
| Manually tuning by playing via MIDI |  |  |
| Replacing small errors with material from  elsewhere in the song |  |  |
| Manually tuning by using offline processes  such as a pitch shifter |  |  |
| 1.7.2 How to correct inaccuracies in rhythm | Tightening drum parts using audio quantise |  |  |
| Replacing small errors with material from  elsewhere in the song |  |  |
| Manually cutting and moving notes that are  out of time |  |  |
| Pitch: Use of autotune as a creative effect |  |  |
|  | Pitch: autotune response time |  |  |

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|  | 1.7.3 Parameters that allow greater control and creativity | Pitch: selectong different algorithms |  |  |
| Pitch: formant shifts |  |  |
| Pitch: fine tuning in cents |  |  |
| Pitch: polyphonic retuning |  |  |
| Rhythm: Transient detection threshold |  |  |
| Rhythm: Groove templates |  |  |
| Rhythm: Selecting different algorithms |  |  |
| Rhythm: time-stretch |  |  |
| 1.8 Automation | 1.8.1 How to use volume and pan automation | Fades |  |  |
| Movement in the stereo field |  |  |
| 1.8.2 Automating parameters  of plug-ins | For example: cut off frequency and delay  feedback |  |  |
| 1.9 Dynamic processing | 1.9.1 Uses of compression and gating | Situations when you would use a  compressor and/or gate |  |  |
| Limiting |  |  |
| Expansion |  |  |
| De-essing |  |  |
| Pumping |  |  |
| 1.9.2 Core and advanced parameters of a compressor  and gate | Compressor threshold |  |  |
| Compressor ratio |  |  |
| Compressor make-up gain |  |  |
| Compressor attack |  |  |
| Compressor release |  |  |
| Compressor knee |  |  |
| Compressor side-chain |  |  |
| Gate threshold |  |  |
| Gate reduction/ range |  |  |
| Gate attack |  |  |
| Gate release |  |  |
| Gate hold |  |  |
| Gate side-chain |  |  |
| Drawing graphs of compression and gating |  |  |
| 1.10 Stereo | 1.10.1 Pan | Setting pan positions for individual parts  (tracks, instruments and/or vocals) in a |  |  |
| 1.10.2 Panning law, mono-  summing and mid-side  processing | stereo widening |  |  |
| Mono compatibility |  |  |
| 1.11 EQ | 1.11.1 Different types of EQ used in a recording | High-shelf |  |  |
| Band |  |  |
| Low pass filter |  |  |
| High pass filter |  |  |
| Band pass filter |  |  |
| Parametric EQ |  |  |
| Graphic EQ |  |  |
| Correcting problems including sibilance,  noise and resonances |  |  |

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|  | 1.11.2 How different parameters affect the sound | Gain |  |  |
| Frequency/ cut-off |  |  |
| Q |  |  |
| Slope |  |  |
| Resonance |  |  |
| Drawing graphs of EQ |  |  |
| 1.12 Effects | 1.12.1 Core and Advanced parameters | Wet/ Dry and bypass settings |  |  |
| Using sends and inserts |  |  |
| Core and advanced parameters as listed for  each effect |  |  |
| 1.12.2 Reverb | Room |  |  |
| Hall |  |  |
| Plate |  |  |
| Spring |  |  |
| Gated |  |  |
| Reversed |  |  |
| Reverb Time |  |  |
| Pre-delay time |  |  |
| High frequency damping |  |  |
| 1.12.3 Delay | Single and multi-tap delay |  |  |
| Slapback |  |  |
| Timed delay |  |  |
| Ping-pong delay |  |  |
| Delay time |  |  |
| Feedback |  |  |
| Number of repeats |  |  |
| Delay pan and EQ |  |  |
| Automatic double tracking (ADT) |  |  |
| 1.12.4 Modulated delay | Flange |  |  |
| Chorus |  |  |
| Phaser |  |  |
| LFO Rate |  |  |
| LFO Depth |  |  |
| LFO Feedback |  |  |
| Comb filtering |  |  |
| 1.12.5 Wah wah pedal | Band pass filter |  |  |
| 1.12.6 Distortion | Overdrive |  |  |
| Fuzz |  |  |
| Gain/drive |  |  |
| Tone |  |  |
| Amp modelling parameters |  |  |
| Amps and speaker types |  |  |
| Virtual mic type/placement |  |  |
| 1.12.7 Tremolo | LFO rate; LFO depth |  |  |
| 1.12.8 Vocal Effects | Vocoder/ Talk box |  |  |
| 1.13 Balance and Blend | 1.13.1 Balance | The relative balance of parts (tracks,  instrument and/or vocals) |  |  |
| 1.13.2 Blend | How blend is affected by compression, EQ  and effects |  |  |
|  | 1.14.1 Percieved volume | Limiting |  |  |

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| 1.14 Mastering | 1.14.2 Mastering parameters | Limiter gain |  |  |
| Fade in/ fade out |  |  |
| 1.14.3 Understanding how EQ is used in the mastering  process | Master EQ (e.g. high shelf boost and rumble (high pass) filter) |  |  |

Area of Study 2: Principles of audio and sound technology

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| **Topic** | **Content** | **Skills, Knowledge and Understanding** | **RAG** | **Evidence** |
| 2.1 Acoustics | 2.1.1 How the live room acoustics affect the recording | Room size |  |  |
| Absorption |  |  |
| Reflection |  |  |
| Diffusion |  |  |
| Isolation booths for vocals, drums and amps |  |  |
| 2.1.2 Acoustics parameters | Describing a reverb tail: Pre-delay time, early and late reflections, reverberation time,  resonant frequencies |  |  |
| 2.2 Monitor Speakers | 2.2.1 The characteristics of different monitor speakers | The frequency range of tweeters |  |  |
| The frequency range of woofers |  |  |
| The frequency range of subwoofers |  |  |
| 2.2.2 How monitor speakers  work | Electromagnetic induction |  |  |
| 2.2.3 How different types of monitor speakers affect mix  translation | Checking mixes on different monitoring (i.e. headphones, speakers with pronounced mid range, and systems with subwoofers) |  |  |
| 2.3 Leads and Signals | 2.3.1 How leads work | Balanced connections |  |  |
| Unbalanced connections |  |  |
| 2.3.2 Connectivity including signal path and signal types | Aux sends |  |  |
| Insert points |  |  |
| Sub-groups |  |  |
| Mixer channel strips |  |  |
| 2.3.3 The different types of leads | Jack |  |  |
| XLR |  |  |
| MIDI Cable (5 pin) |  |  |
| Digital ins/outs |  |  |
| Computer cables (USB, firewire) |  |  |
| Using balanced connections to avoid noise  issues such as hum, hiss and rumble |  |  |
| Using DI boxes |  |  |
| 2.3.4 Impedance | Signal levels: Mic, Line, Instrument |  |  |
| 2.3.5 The advantages and disadvantages of different  leads and connectivity | Comparing balanced and unbalanced |  |  |
| Comparing analogue and digital connections |  |  |

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|  |  | Comparing computer data connections (USB  vs Firewire) |  |  |
| 2.4 Digital and Analogue | 2.4.1 The differences between digital and analogue  technologies | Frequency response |  |  |
| Signal to noise ratio |  |  |
| Headroom |  |  |
| Digital clipping |  |  |
| Analogue Clipping |  |  |
| How components such as valves and  transistors affect the sound |  |  |
| 2.5 Numeracy | 2.5.1 How to display and interpret information  graphically | Waveforms |  |  |
| EQ Curves |  |  |
| Compressor responses |  |  |
| Amplitude envelopes |  |  |
| Interpreting frequency response diagrams  how sound quality is affected |  |  |
| Interpreting polar response graphs to  understand how sound quality is affected |  |  |
| 2.5.2 Technical Numeracy | Parameter settings and associated units of  measurement |  |  |
| Levels in Db |  |  |
| Frequency in hertz/kilohertz |  |  |
| Delay time in milliseconds/ note values |  |  |
| Tempo in bpm |  |  |
| Synthesiser octave settings in feet |  |  |
| Course tuning in semitones |  |  |
| Fine tuning in cents |  |  |
| Feedback and effects mix percentages |  |  |
| Understand binary, formulae and logarithms and how they are used in music technology |  |  |
| 2.5.3 How to make calculations to describe sound waves | Waveform frequency |  |  |
| Waveform phase |  |  |
| Waveform amplitude |  |  |
| 2.6 Levels | 2.6.1 Principles of levels and metering | Management of levels to prevent distortion and maximise signal-to-noise ratio |  |  |
| 2.6.2 Levels and metering scales | Decibel scales: when to use peak metering |  |  |
| Decibel scales: when to use RMS metering |  |  |
| Psycho-acoutics related to percieved volume |  |  |
| 2.6.3 The scpecifications of digital recordings and how they  affect sound quality | A/D and D/A conversion |  |  |
| Sample rate |  |  |
| Bit depth |  |  |
| Streaming bit rate |  |  |
| Uncompressed PCM Audio formats (e.g.  WAV) |  |  |

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|  |  | Data compressed formats (e.g MP3) |  |  |

Area of Study 3: The development of recording and production technology

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| **Topic** | **Content** | **Skills, Knowledge and Understanding** | **RAG** | **Evidence** |
| 3.1 Software and Hardware: Digital | 3.1.1 Digital hardware/ software attributes | The differences between digital and  analogue recordings |  |  |
| The advantages and disadvantages of digital  hardware/software |  |  |
| Graphical user interfaces (GUI) |  |  |
| Sampling theory and converters |  |  |
| 3.1.2 Digital sequencing and digital audio workstations | Core and advanced functions of a DAW |  |  |
| Real-time (native) processing |  |  |
| Software instruments |  |  |
| Non-destructive editing |  |  |
| Non-linear editing |  |  |
| Convolution reverb |  |  |
| Amp modelling |  |  |
| 3.1.3 Digital consumer formats | CD |  |  |
| MP3/ M4a |  |  |
| High definition masters |  |  |
| Emerging technologies |  |  |
| Data bit rate |  |  |
| 3.1.4 Digital recording and sampling hardware | Digital multitrack formats |  |  |
| Sampling with limited available memory |  |  |
| 3.2 Hardware: Analogue | 3.2.1 Analogue hardware attributes | The difference between analogue and digital  recordings |  |  |
| The advantages and disadvantages of  analogue recordings |  |  |
| Valves |  |  |
| Soft clipping |  |  |
| Tape saturation |  |  |
| Solid State (Transistor) amplifiers/ distortion  for hard clipping |  |  |
| Maintenance issues and variations in  frequency and pitch: Wow and Flutter |  |  |
| 3.2.2 Tape machines | Editing and splicing |  |  |
| Multitrack tape formats |  |  |
| 3.2.3 Analogue consumer formats | Vinyl |  |  |
| Cassette tape |  |  |
| Mono and stereo releases |  |  |
| Mixing and mastering principles for  analogue formats (e.g. vinyl and casette) |  |  |
| 3.2.4 Analogue effects | Delay: Tape |  |  |
| Delay: Bucket Brigade |  |  |
| Mechanical reverbs: plate |  |  |
| Mechanical reverbs: spring |  |  |
| Rotary speaker (Leslie) |  |  |
| Vinyl scratching |  |  |

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|  |  | Pitch changes using vinyl and tape |  |  |
| Reversing using vinyl and tape |  |  |
| 3.2.5 Analogue synthesisers | Advantages and disadvantages of analogue  synthesisers |  |  |
| modules and patching (modular synethisers) |  |  |
| 3.2.6 Electric instruments | Electric guitar |  |  |
| Electric bass guitar |  |  |
| Theremin |  |  |
| Mellotron |  |  |
| Electric organ |  |  |
| Electric piano |  |  |
| Clavinet |  |  |

Component-specific knowledge

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| **Topic** | **Content** | **Skills, Knowledge and Understanding** | **RAG** | **Evidence** |
| 4.1 - Component 3 | 4.1.1 Understanding of the instruments and sounds  associated with the following styles: | Jazz |  |  |
| Blues |  |  |
| Rock 'n' Roll |  |  |
| Rock |  |  |
| Metal |  |  |
| Punk |  |  |
| Soul |  |  |
| Disco and Funk |  |  |
| Reggae |  |  |
| Acoustic and folk |  |  |
| Commercial pop |  |  |
| Urban |  |  |
| Electronic and dance |  |  |
| 4.1.2 History and development of recording and production  technology through the following eras: | Digital audio workstations and emerging technologies (c. 1996-present day) |  |  |
| Digital recording and sequencing (c. 1980-  present day) |  |  |
| Large-scale analogue multitrack (c. 1969-  1995) |  |  |
| Early multitrack recording (c. 1964-69) |  |  |
| Direct to tape mono recording (c. 1930-  1963) |  |  |