Action Research Into Music Technology Engagement

by Steven Edwards

Teaching Musician MA Personal Project

Abstract

My project consists of two main parts. The first part involves investigating how other instrumental teachers use technology.
The second part involves creating teaching resources based on the findings.
I aimed to identify the key aspects that instrumental music teachers needed to learn to upgrade their teaching practice in the digital age. I assessed the current level of music technology used by instrumental teachers and identified ways to improve their knowledge and use of technology. I hoped to provide insights into the challenges faced by music teachers in integrating technology into their teaching practice and offer training material to help with improving their technological expertise.
This is a project based around a design thinking process. The Iterative cycle enabled improvement and insight at each stage.
This approach helped me in defining and framing the initial idea of how to help teachers in teaching technology, with new goals, constraints, and insights emerging as part of the creative problem-solving process.[1] Also to learn about teachers' requirements, behaviors, and motivations. It was important to create solutions 'deeply rooted in real human needs and contexts.'[2]

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[1] Hwee Ling Koh, Joyce • Chai, Ching Sing •Wong Benjamin • Yao Hong, Huang Design Thinking for Education Conceptions and Applications in Teaching and Learning DOI 10.1007/978-981-287-444-3 p12

[2] Interaction Design Foundation - IxDF. (2016, May 25). What is Design Thinking (DT)?. Interaction Design Foundation - IxDF. https://www.interaction-design.org/literature/topics/design-thinking

CONTENTS

1. Context

The idea for this project was formulated by observing how some students engaged far more with their instruments when using technology often leading them to progress quicker on their instruments.

I feel that if teachers were more aware of the technology available to them, this has the potential to streamline and improve their practice. If an acoustic, orchestral instrument such as the violin is taught, the teacher may not rely on technology as much and not embrace it. However, I feel it is a responsibility to the student, most cases, a young person who has grown up with technology and is already quite skilled in use and application. One of my aims is to find out how classical teachers currently use technology and if there are any particular areas that technology could help with.

I aimed to create a practical solution to help instrumental tutors who feel they lack the technological expertise required to enhance their teaching by offering an online resource that teachers can access easily, even during lessons.

A key component is to create a community feeling, encouraging users to upload projects they have done with their students, and also as a portal to share teaching ideas and resources, and to suggest future instructional videos.

Technology classes for music educators should not only introduce them to the tools available for music teaching and learning but also provide practical instruction on how to effectively use them in educational settings. Mastery of technical skills is essential for advanced technology integration and for teachers to base their teaching on technology as the primary medium for music learning. However, if these classes only focus on technical acquisition, they fail to address the pedagogical uses of technology. Therefore, it is important that technology classes for current and future music teachers include instruction on how to apply technology in educational settings, rather than solely focusing on procedures.[3]

Technology is increasingly being used in performances alongside live performers. In the realm of live concerts, a crucial aspect in keeping performances sounding and looking current, is the creation of audiovisual material using computers. Often, this involves manipulating prepared materials, rather than direct production. Expert musicians rely on sophisticated programs, such as Ableton Live for complex musical parts. Additionally, generative software employs rule-based algorithms that generate media output that participants can customize via parameters. An example of this would be the Traktor DJ

[3] Dorfman, Theory and Practice of Technology-Based Music Instruction.

studio. MP3's can be manipulated digitally using non-destructive methods (ie non permanant manipulation such as cutting or increasing the tempo) whereby the original audio qualities are maintained.[4] Typically 'Click Tracks' are created for musicians to play along to, which is synced up to the pre-produced video to be played or projected onto screens for the performance. In a simlar way to how voiced audio is typically synced up to captured film in a production studio post filming. I think it is very important to introduce music students to the myriad of ways in which technology is used within production, and its influence within live concerts and media production.

2. Literature Review

Dorfman asks 'Do certain forms of technologically-enhanced learning work better than others for students, and how do students' individual characteristics infuence technology's effectiveness?'[5]

He discusses the importance of using the right materials when teaching. It can make all the difference in what students experience and what they learn. These materials can be listening examples, composition examples, or examples of technological techniques applied in musical settings. Technological materials such as software and hardware used in teaching and learning must also be considered.[6]
'Teachers must be well versed in both musical materials and technological materials to make good choices for their students.'[7]
Assessing music teachers' work is important because technology-based music instruction is relatively new. Early attempts at technology integration often used

[4] Gary E. McPherson, and Graham F. Welch. 2018. *Creativities, Technologies, and Media in Music Learning and Teaching : An Oxford Handbook of Music Education pp.236-237*

[5]Dorfman, Jay, 2013 Theory and practice of technology-based music instruction, Oxford University Press p30

[6] Dorfman, Jay, 2013 Theory and practice of technology-based music instruction, Oxford University Press p30

[7] Dorfman, Jay, 2013 Theory and practice of technology-based music instruction, Oxford University Press p30

computers as a substitute for human teachers. Even experienced music teachers are new to the content and methods of technology-based instruction. To improve their teaching, music teachers should reflect on their practices and encourage critical and logical evaluation.[8]
There is also the question of using technology for its own sake; teachers must ask themselves if certain technology is actually relevant to the subject they wish to convey

'Teachers can use their knowledge of and experiences from their own classrooms to determine when technology-based learning will be effective in helping their students to achieve learning objectives.'[9]

Himonides argues that we must critically examine our practice and consider how different tools and technologies can serve our goals, values, and philosophies. Therefore, he suggests that we view music technology from a meta-perspective, as a means of enhancing our musicianship and understanding of music, facilitating teaching and learning, promoting access and inclusivity, and advancing research and theory in music education. He hopes to encourage a more meaningful and impactful use of technology in music education by advocating for a more holistic and reflective approach to music technology.[10]
I understand Himonides' description of *meta-perspective* to mean that each teacher must use technology in their own way and how they see fit in order to enhance learning. To focus on the outcomes and objectives of each student individually and utilise suitable technology to facilitate this. The problem in not conducting generic Music technology lessons as such, but integrating relevant aspects into learning, is that the experimental and compositional nature can be lost. I believe that Himonides is trying to steer clear of a more 'closed' idea of pedagogy, as he advocates 'to challenge the world, challenge

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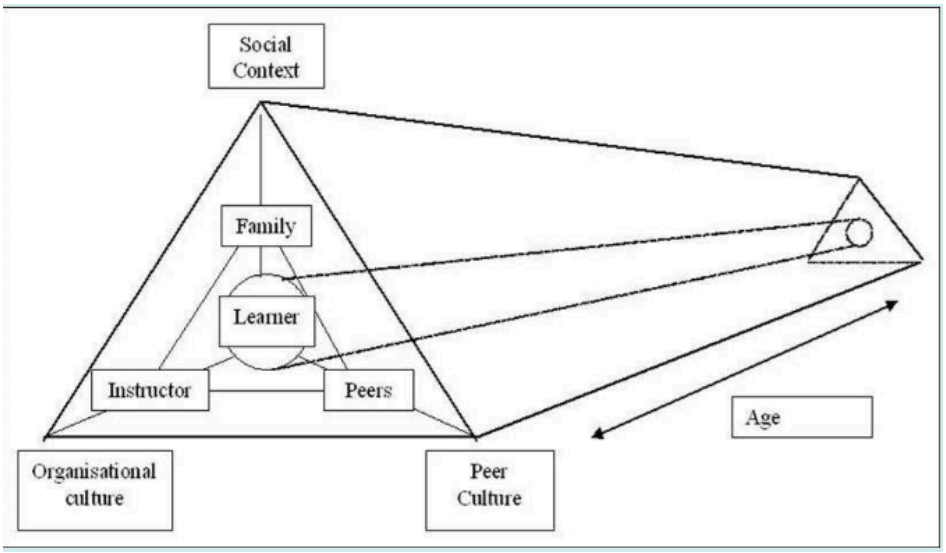
[8]Dorfman, Jay, 2013 Theory and practice of technology-based music instruction, Oxford University Press p31-33

[9]Dorfman, Jay, 2013 Theory and practice of technology-based music instruction, Oxford University Press p31

[10] Gary E. McPherson, and Graham F. Welch. 2018. *Creativities, Technologies, and Media in Music Learning and Teaching: An Oxford Handbook of Music Education, Volume 5*. Creativities, Technologies, and Media in Music Learning and Teaching. New York, NY: Oxford University Press. pp.115-117

certainties, increase awareness, shape attitudes, and foster communication'[11] through the use of technological tools.

According to Himonides, technology is not a separate entity from traditional music. Rather, it should be seen as an integral part of the musical engagement, development, and educational processes.



The TLRP 'Lifelong learning in society' concept [12]

Also according to Himonides and Purves[13], and evidence from ten years of thematic research into all education sectors from Early Years through to Higher Education and Workplace learning by the TLRP [14], the ten holistic principles advocated through evidence based research should be considered when examining technology application within education:

1. *Equipping learners for life in its broadest sense*
2. *Engaging with valued forms of knowledge*
3. *Recognising the importance of prior learning and experience*

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[11]Gary E. McPherson, and Graham F. Welch. 2018. *Creativities, Technologies, and Media in Music Learning and Teaching: An Oxford Handbook of Music Education p.139*

[12] https://www.oecd.org/education/ceri/37107828.pdf Teaching and learning research programme 2006 P.67

[13] Himonides, E., & Purves, R. (2010). The role of technology. In S. Hallam and A. Creech (eds.),Music education in the 21st century in the United Kingdom: Achievements, analysis and aspirations. London: Institute of Education.

[14] Teaching and Learning Research Programme. (2023, January 12). In *Wikipedia*. https://en.wikipedia.org/wiki/Teaching_and_Learning_Research_Programme

4. *Requiring the teacher to scaffold learning*
5. *Needing assessment to be congruent with learning*
6. *Promoting the active engagement of the learner*
7. *Fostering both individual and social processes and outcomes*
8. *Recognising the significance of informal learning*
9. *Depending on teacher learning*
10. *Demanding consistent policy frameworks with support for teaching and learning as their primary focus*

2.1 The advantages of using Score writing software

Figure 6.1
Spectrum of TBMI Lesson Content

Dorfmans 'Spectrum Of Lesson Content' idea is that lessons blend together music and technology, sometimes shifting from one to the other. This allows students to see how technology can be applied to music and vice versa. The teacher may use non-technological methods to teach a musical concept, then use technology to enhance it. By combining the two approaches, the lesson achieves a balance between music and technology. Lessons shift from one end of the spectrum to the other, perhaps exhibiting more than one shift within a class period. Sometimes it is necessary to explore a musical concept in non-technological ways, then shift to a technological technique that will further address that concept. [15]

Dorfmans' Cycle of Mastery paradigm below illustrates my ultimate goal of introducing score writing basics to a teacher's potential student.

[15] Dorfman, Jay, 2013 Theory and practice of technology-based music instruction, Oxford University Press p99-102

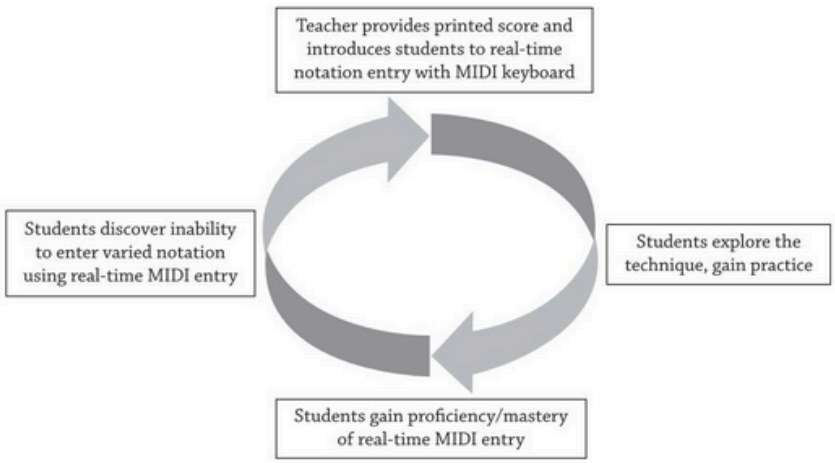

Figure 6.6
Cycle of Mastery with Notation Software

2.2 **The advantages of using a DAW**

I found Fein's ideas around using Improvisation as an important skill that combines theory, ear training, and technical ability applicable, particularly when tackling manipulation of already recorded material, such as loops. Fein states that it is important to experience improvisation on your main instrument to better understand its challenges. He also discusses that while technology may change, improvisation concepts endure. He stressed the importance of investing time in learning technology tools that meet your needs but not letting it consume too much time within lessons.[17]

[16] Dorfman, Jay, 2013 Theory and practice of technology-based music instruction, Oxford University Press p99-102

[17]Fein, Michael, 2017, Teaching musical improvisation with technology, Oxford University Press p186-187

‘Avoid letting the technology consume too much of your time, taking away from the ultimate musical goal of teaching improvisation’[18]

Dorfman discusses the use of theory in tech-based music teaching, and how to help teachers develop the right mindset for natural and effective teaching, and advocates that successful tech-based music teachers are those who recognise their students' technological abilities and creativity, and are willing to modify their beliefs to let students develop their musical skills and knowledge.[19]

2.3 **Positives of tech use in lessons**

In the 2008 study ‘Self-regulation strategies used by student musicians during music practice’ by Amanda Leon-Guerrero[20] Students were able to reflect on their performance and progress by watching a video recording of themselves during a music lesson. This helped them identify areas where they needed improvement and set goals for the future. An analysis of verbal reports and music practice data showed that the most common category was repetition.
According to the more recent study on ‘Slow practice and tempo-management studies’[21] slow practice is a common and structured approach used by both classical and non-classical musicians. Almost all classical musicians and a large majority of non-classical musicians reported using this method. Slow practice was found to be more commonly used than other techniques such as chunking and rhythm variation. The study also revealed that technical goals were more prevalent than expressive goals during slow

[18]Fein, Michael, 2017, Teaching musical improvisation with technology, Oxford University Press p187

[19]Dorfman, Jay, 2013 Theory and practice of technology-based music instruction, Oxford University Press p30-31

[20] Leon-Guerrero, Amanda (2008) Self-regulation strategies used by student musicians during music practice, Music Education Research, 10:1, 91-106, DOI: 10.1080/14613800701871439

[21] Allingham, E., & Wöllner, C. (2022). Slow practice and tempo-management strategies in instrumental music learning: Investigating prevalence and cognitive functions. *Psychology of Music*. https://doi.org/10.1177/03057356211073481

practice. Gradually increasing tempo was the most commonly used technique for tempo organisation, followed by alternating between two tempos and practicing at random tempos.
‘Our findings that reported use of slow practice was highly prevalent across expertise levels and that diverse musical goals were frequently reported during slow practice challenge the notion that slow practice is only used in the early stages of learning.’[22]

Slow practice combined with rest or sleep, aids the production of Myelin-[23] a fatty protein produced by nerve cells that speeds up and enhances the transmission of electrical impulses within the nerve cells.[24]
Myelin doesn't differentiate between correct and incorrect. Its function is to coat the neurons that are involved in the behaviour being practised. This coating improves the speed and efficiency with which the neurons responsible for that behaviour can fire, regardless of whether the behaviour is correct or incorrect.[25] Therefore slow, deliberate practice is essential.

‘Recording and playing back is sooooo helpful to develop the skill of “self taping” and being realistically critical of mistakes that can be corrected’ [26]

Brown and Dillon state that a well-rounded musical education should include various ways for students to engage, helping them gain a deep understanding of music and develop a diverse set of musical skills. Generative systems such as loops and software synths provide a useful framework for accessibility. They allow for direct control of the

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[22]Allingham, E., & Wöllner, C. (2022). Slow practice and tempo-management strategies in instrumental music learning: Investigating prevalence and cognitive functions. *Psychology of Music*. https://doi.org/10.1177/03057356211073481

[23] Coyle, Daniel (2009), The Talent Code, Bantum p37-46

[24] The Science of Practice: New Ways to Develop Your Musical Skills, https://www.ableton.com/en/blog/science-practice-new-ways-develop-your-musical-skills/

[25] Harnum, Jonathan 2014, Sol Ut Press, The Practice of Practice p23-26

[26] Questionnaire participant

generated music and intermittent interaction and listening that can support cognitive musical development. [27]

Conway et al state that a major advantage in using a DAW is the allowance for individual assessment of students' performance skills without losing valuable rehearsal time. Students can also self-assess their performance and practice at home. With regard to notation software, it can help students compose music and hear their creations instantly. It eliminates the need for a copyist and allows students to create and revise original work easily. With mobile computing and cloud computing, students can work on their compositions anywhere. These approaches can be used in music theory courses, method courses, and fieldwork settings. [28]

2.4 **Screen-Time**

In a study by Lui and Wong in 2012, the aim was to measure the potential differences between high and low digital media multitaskers.

'Heavy media multitaskers have been found to perform poorly in certain cognitive tasks involving task switching, selective attention, and working memory.'[29]

I would argue that it is these exact skills which we try to nurture in young musicians. Many studies have found that spending too much time on digital devices can have negative effects on our physical, psychological, and neurological health. Research is also showing that the effects of screen time are influenced by factors such as how long we spend on devices, the content we view, and how many devices we use. Too much screen time can lead to poor sleep, which in turn can increase the risk of cardiovascular diseases, obesity, and other health issues. It can also cause problems with eyesight and

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[27] Brown Andrew R. and Dillon Steven C. Chapter 15 COLLABORATIVE DIGITAL MEDIA PERFORMANCE WITH GENERATIVE MUSIC SYSTEMS IN McPherson, Gary E and Welch. Graham F. 2018. Creativities, Technologies, and Media in Music Learning and Teaching : An Oxford Handbook of Music Education, Volume 5. p243

[28] Dammers, Richard J., 'The Role of Technology in Music Teacher Education', in Colleen M. Conway, and others (eds), *The Oxford Handbook of Preservice Music Teacher Education in the United States*, Oxford Handbooks (2019; online edn, Oxford Academic, 6 Nov. 2019), https://doi.org/10.1093/oxfordhb/9780190671402.013.17,

[29] Lui, K.F.H., Wong, A.CN. Does media multitasking always hurt? A positive correlation between multitasking and multisensory integration. *Psychon Bull Rev* **19**, 647–653 (2012). https://doi.org/10.3758/s13423-012-0245-7

bone density. Spending too much time on digital devices has also been linked to depression and ADHD-related behaviour. Exposure to violent content can be particularly harmful, increasing the risk of antisocial behaviour and decreased prosocial behaviour. The use of digital devices excessively can lead to addiction-like symptoms, which can harm their ability to cope socially. Excessive screen time can also lead to changes in our brains. Research suggests that it can affect our ability to regulate cognitive control.[30]

A study conducted in 2007 as part of the national survey of children's health[31] showed that individual born between people born between 1996 and 2010 (Generation Z) are seeing their friends in person an hour less a day than Millennials did at similar ages.[32] The survey also found that 20.8% of 6 to 11-year-olds and 26.1% of 12 to 17-year-olds engaged in excessive screen time, with having a TV in their bedroom being strongly associated with excessive screen time and obesity for both groups.
The average 16-year-old student spends approximately 6 hours a day on screens, including texting, the internet, and social media. [33]Excessive screen time contributes to a sedentary lifestyle, leading to reduced physical activity, lower fitness levels, and an increased risk of being overweight. Spending too much time on screens can have negative effects on adolescents. It can lead to difficulty in controlling emotions and cause irritability. It can also result in uncooperative attitudes, lower productivity and social awkwardness. Studies have linked excessive screen time, lack of sleep, and decreased in-person interactions to poor mental health.[34]

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[30] Lissak, G. (2018). Adverse physiological and psychological effects of screen time on children and adolescents: Literature review and case study. *Environmental Research*, *164*, 149-157. https://doi.org/10.1016/j.envres.2018.01.015

[31] Ethington H, Pan L, Sherry B. The association of screen time, television in the bedroom, and obesity among school-aged youth: 2007 national survey of children's health. Journal of School Health. 2013; 83: 573–581.

[32] Twenge, J. M., Krizan, Z., & Hisler, G. (2017). Decreases in self-reported sleep duration among U.S. Adolescents 2009–2015 and association with new media screen time. *Sleep Medicine*, *39*, 47-53. https://doi.org/10.1016/j.sleep.2017.08.013

[33]Twenge, J. M., Martin, G. N., & Spitzberg, B. H. (2019). Trends in U.S. Adolescents' media use, 1976–2016: The rise of digital media, the decline of TV, and the (near) demise of print. *Psychology of Popular Media Culture, 8*(4), 329–345. https://doi.org/10.1037/ppm0000203

[34] Digital dementia in the internet generation: excessive screen time during brain development will increase the risk of Alzheimer's disease and related dementias in adulthood
Manwell Laurie A., Tadros Merelle, Ciccarelli Tiana M., Eikelboom Roel DOI:10.31083/j.jin2101028

Chronic exposure to excessive screen time can have detrimental effects on brain development. Prolonged sensory stimulation from screens can increase the risk of cognitive, emotional, and behavioural disorders in young adults. Some of these effects are similar to those seen in adults who show early signs of dementia. Excessive screen time has also been shown to alter the grey matter and white volumes in the brain and increase the risk of mental disorders. Chronic sensory overstimulation during brain development can also increase the risk of accelerated neurodegeneration in adulthood, leading to conditions like amnesia and early-onset dementia. This research serves as a warning to limit screen time and prioritise brain-healthy activities [35] such as playing music within an ensemble.

Humans have a limited capacity for sustained attention, which varies depending on the nature of the task alongside interest and motivation. The constant notifications, updates, and scrolling feeds can distract, and create a state of perpetual partial attention. This is known as “continuous partial attention” and can lead to a superficial understanding of information and reduced productivity, memory retention, and increased stress levels.[36]

‘Digital dementia’ is used to describe the decline in cognitive abilities that can result from excessive use of digital technology. This is becoming more concerning among the younger generations who are more connected to digital devices. Research has shown that digital dementia can lead to a range of cognitive impairments, such as memory loss, attention deficit, reduced communication skills, and impaired decision-making abilities. Also, the constant flow of information through digital tools can also hinder our ability to retain information over time.[37]

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[35] Digital dementia in the internet generation
Manwell Laurie A., Tadros Merelle, Ciccarelli Tiana M., Eikelboom Roel DOI:10.31083/j.jin2101028

[36] Shanmugasundaram, M., & Tamilarasu, A. (2023). The impact of digital technology, social media, and artificial intelligence on cognitive functions: A review. *Frontiers in Cognition*, *2*, 1203077. https://doi.org/10.3389/fcogn.2023.1203077

[37]https://www.neurocenternj.com/blog/digital-dementia-how-screens-and-digital-devices-impact-memory/

3. METHODOLOGY

My project has two main parts. The first part was to find out how other instrumental teachers used technology. I formulated questions to investigate instrumental teachers' experiences of technology across all genres.

The second part of the project was to create a set of teaching resources defined by the results.

I used an interpretivist approach to my Quantitative questions as a subjective understanding of teachers' daily interactions and the priority of patterns of their interaction with students would give valuable insight.[38]

I created an online survey using Surveyplanet[39] to collect the questionnaire data. Survey Planet allowed me to triangulate data between the participants cognitively and visually.

I distributed the link via Facebook. Using Facebook allowed the link to be shared to other teachers outside of my network, which allowed me to gather a wider range of data.

I gathered 24 respondents, and the results were implemented into relevant material for the videos. It was important to engage respondents that were within my community of practice. Costley et al state that 'There are three distinctive characteristics of a community of practice; Domain (a shared competence), Community, and Practice (specific equipment, experiences and stories)' [40] and by using sharable link on Facebook, it helped with 'Cognitive Access' [41]as credibility could be gained by studying my profile, mutual friends and CV.

The respondents were teachers who taught a cross-section of instruments and genres peripatetically at secondary schools. This would give me a better chance of consistency amongst age ranges and would make the data collected more consistent to aid in more reliable triangulation. I didn't feel the need to differentiate between state-run and independent schools, as from my experience teaching in both environments, any materials or, indeed, technology used would be the responsibility of the teacher and have little to do with the faculty department with regard to facilities and equipment.

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[38] Leavy, Patricia. 2017. *Research Design : Quantitative, Qualitative, Mixed Methods, Arts-Based, and Community-Based Participatory Research Approaches*. [N.p.]: The Guilford Press. https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,shib&db=nlebk&AN=1497395&authtype=shib&site=eds-live&scope=site. p127

[39] https://app.surveyplanet.com/results/65e5df4875706c97c9a0a5a0

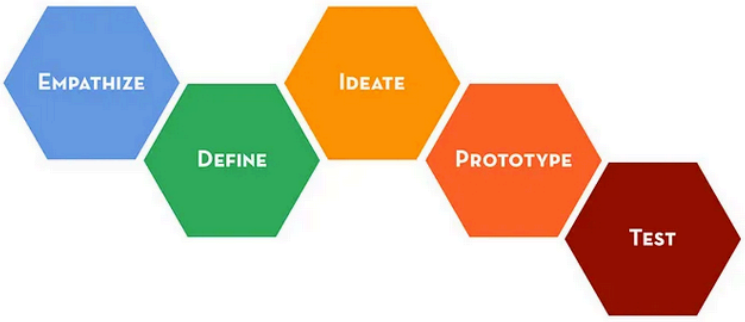
[40] Costly C, Elliot G, Gibbs P Doing Work Based Research SAGE 2010 P51

[41]Costly C, Elliot G, Gibbs P Doing Work Based Research SAGE 2010 P51-52

According to Reips [42] internet-based experiments have an advantage over laboratory and conventional experiments due to the following:
They have 'Greater generalizability because of their wider sampling, Demonstrate greater ecological validity as typically they are conducted in settings that are familiar to the participants and at times suitable to the participant, and that they have a high degree of voluntariness, such that more authentic behaviours can be observed.' [43]
This was a positive factor as I wished the data collected not to be influenced by any external factors.

A design thinking approach appealed to me as a type of research as it emphasises the improvement of practice through incremental changes to the product being tested, rather than maintaining a static intervention model.[44]
Cohen et al discuss the positive factors, stating This approach considers the complex, real, and multivariate world of learning, teaching, and education. It's messier than conventional experiments, accounting for numerous variables and contexts. It ensures that what's effective in the design phase is also effective in practice.[45]

I used the Plattner and Kelley Human Centered Design Process[46] as a design thinking approach, used within an Iterative cycle.



[42] Reips, U.-D. (2002b) Standards for internet- based experimenting. Experimental Psychology, 49 (4), 243–56. IN Research Methods In Education. (London: Routledge, 2018),

[43] Cohen, L, Manion,L and Morrison K. Research Methods In Education. (London: Routledge, 2018), p332

[44] Cohen, L, Manion,L and Morrison K. Research Methods In Education. (London: Routledge, 2018), p331

[45]Cohen, L, Manion,L and Morrison K. Research Methods In Education. (London: Routledge, 2018), p330-332

[46] https://libhof.medium.com/10-models-for-design-thinking-f6943e4ee068

The repeated cycles of the process would allow me to develop ‘Cycles of refinement’ [47] through testing and feedback.

There are currently online resources which offer links to downloadable resources for teachers to use in the classroom. These sites are aimed at classroom teaching and offer free access and downloadable content, however these are not specifically aimed at Instrumental teachers as such, with more focus on classroom teaching. Initial research on YouTube channels yielded similar results; there seemed to be generic score writing and DAW instruction but very little material specifically aimed at instrumental tutors and, subsequently, often unsuitable material.

The Dorico YouTube channel is an excellent resource for learning all aspects of the program[48] I researched into material to consider, and observed the production techniques such as on screen narration, and decided on using this technique.

3.1 Empathise

My own reflective practice played a key part in the initial stages of the process. I wanted to ascertain an inductive hypothesis by questioning the role of technology currently used within instrumental lessons. In order to learn about my ‘audience’ (i.e., teachers), I need to observe practices already in place and decide whether technology can help or hinder. There may be some variations in the data collected determined by the age and/or ability level of the student.

I wanted to explore whether technology can play a role in educational advancement, and create material to assist teachers in this process.

I took an idiographic approach aimed at teachers who wish to maximise their teaching potential through the use of technology. I was aware of the benefits that introducing the use of technology into instrumental lessons had greatly benefitted my own students (of all ages and playing levels) in certain aspects of learning. I was keen to explore ways in which my positive experience of using tech in lessons could benefit other instrumental

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47 Cohen, L, Manion,L and Morrison K. Research Methods In Education. (London: Routledge, 2018), p350.

48 www.youtube.com/@dorico

teachers and if the genre or instrument taught affects their use. In order to learn about my 'audience' (ie teachers) I observed practices already in place via the questionnaire. Specifically, I am interested in understanding what takes place during instrumental lessons. I wish to ascertain the following from my research:

- *Whether teaching experience, genre taught, ability taught, and age range of students has any bearing on the level of technology used*
- *Current uses of technology*
- *Percentage of technology use*
- *If teachers typically have time to tackle learning new software*
- *Which aspects of technology would be useful in gaining skills in using*
- *If technology had helped or hindered any aspects of learning*
- *Any negative experiences using technology*

3.2 DEFINE

A YouTube channel will be used as a medium, as the material can be accessed anywhere with an internet connection.Webster and Williams state that 'Addressing basic music technology skills provides the foundation for applying music technology in pedagogy' [49] and have compiled a list of 11 essential tech skills by surveying US college level music faculties in 2018:

- Enter and edit music using notation software
- Understand the basics of digital audio and how to edit digital audio files
- Record and mix a performance with digital audio software
- Demonstrate an understanding of copyright and fair use
- Create a music presentation with production software and appropriate hardware
- Create a streaming audio file (sharing recordings)
- Demonstrate an understanding of MIDI and its applications, including performing with electronic, digital, and nontraditional instruments

[49] Dammers, R. J. (2019). The Role of Technology in Music Teacher Education. https://doi.org/10.1093/oxfordhb/9780190671402.013.17

- Demonstrate setting up a computer music workstation/problem-solve technical issues
- Demonstrate an understanding of acoustics and audiology
- Create and edit a simple music video
- Use and manage a variety of social music sharing tools

[50]

I will use these competencies combined with my research findings as a framework for scaffolding my instructional material.

3.3 Ideate

The key technical issues that had to be considered when producing instructional material were as follows:

- *Content to be taught is at a level which the students find engaging, and supportive of school curriculum*

- *A suitable and stable medium to which all teachers have open access*

- *Availability and ease of access.*

- *Reported issues of tech failure such as glitches and the need to reboot hardware need to be taken into account*

- *Issues of poor wifi and low internet connection*

[50] Webster, P. R., & Williams, D. B. (2018).Technology's role for achieving creativity, diversity and integration in the American undergraduate music curriculum: Some theoretical, historical and practical perspectives. Journal of Music, Technology & Education, *11*(1), 5–36.

Using YouTube would allow streaming directly negating the use of specialised hardware or software, and the ability to download before a lesson if there were internet connectivity problems at the lesson venue.
I combined the answers for the questions on ‘app’ and ‘tech’ use as the terms are quite similar, and it made sense to combine the data.

3.4 Prototypes

I used iMovie, Garageband, Dorico SE software, and an Apple camera to record and edit videos. I also used the Mac Screencapture facility to capture my instructions on screen in real time. I narrated each step in the process.I decided to name the channel "Peripatech," combining the words "peripatetic" and "technology."
Based upon the collected research data, I produced the following videos:

An Introduction to Garageband:

This is a tutorial that demonstrates how to set up a project and connect a MIDI keyboard to create a simple 8-bar sequence. The tutorial covers how to adjust the tempo and metronome, add bass using software instruments, and include drums using the auto-drummer feature. It also shows how to correct mistakes made while playing, use quantising, and loop recorded material. Finally, it explains how to export and share the finished track.

Using loops in Garageband

This video covers how to select a synthesised bass, inputting a bass line, adjusting tempo, playing a basic bass line over a Dm chord 4 bar riff, quantising, looping the bass line, selecting a suitable drum loop, creating different musical sections such as the bridge and chorus, adding percussion to different sections of the track, adding piano and other harmonic elements, and lastly, adding atmospheric sound effects.

Introduction to Dorico SE

The idea is to create a scales resource for the piano in the scale of G major using crotchets in treble and bass clef. Firstly, this video covers how to download the software. It then explains the following steps: - Starting a new project - Explaining the control panel - Inputting key signatures - - Creating a time signature - How to input notes - Note options - Using shortcuts to input notes - Using the computer keyboard to input notes - Inputting chords - Using the transpose function to transpose the notes into A major - How to title the project - Printing and saving the finished project.

3.5 Test

For initial testing, the plan was to identify a teacher demographic for the research results. Three suitable teachers were selected to take part in the final research phase. They were asked to watch the four videos in full, then dedicate part of a lesson to using the technology instructed with the student. It was imperative that the teachers had little or no previous knowledge of Garageband or Dorico, as this would help me triangulate collected data to improve the current and future material.

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4. Data Analysis

Qualitative questions were constructive in gaining insight to how teachers are currently using technology in their teaching. Students found it advantageous to be able to hear themselves playing by recording onto a DAW (45% of teachers found DAW use beneficial in lessons) The main points being that students could critique their own playing, could change the tempo. Being able to loop a section and gradually increase in tempo was found to be a useful tool. The slowing down of a recorded passage was shown to help identify issues in pitch, phrasing and articulation, improving critique skills.

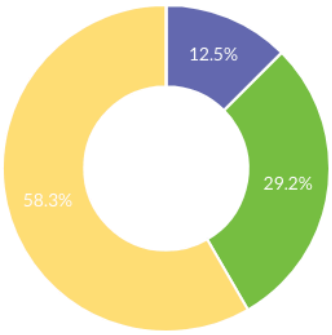
A total of 61.1% were students taught at the level from late primary education through to University. This was a good starting point for planning the content and level of tasks to be implemented into the videos. Whilst the videos aren’t particularly aimed at students, it is

important that the content to be taught is at a level that the students find engaging and supports school study.

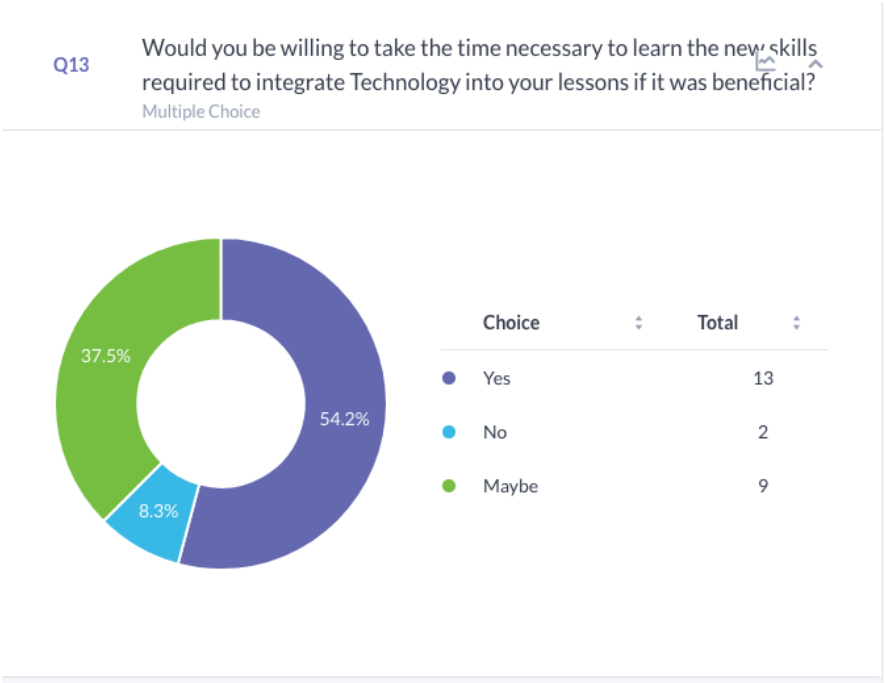
For the score writing tutorial, Question 4 on the level being taught gave some useful insight. 46% taught were Beginners (Grades 1-4) and 30% Intermediates (Grades 5-7) giving a total of 76%. As only 24% were considered advanced (Grade 8+), It made sense to implement instruction on how to create resources that would be useful to this demographic.

47% currently use YouTube as part of their teaching already, so it made sense to use this as a medium.
58% said that the ratio of technology used in their lessons was typically 30%, with the remaining 70% focussed on the playing of the instrument. 13% described a typical lesson was 50% Tech use, 50% Playing. From these results, familiarity with technology use within lessons is apparent, and the hardware is already in place, which would suggest there is scope to offer further training material in certain aspects of technology. 17% had no knowledge of integration between DAW's and score writing, whilst 50% had basic knowledge. It made sense to include examples of how this is done within the material.

54% were willing to take the time necessary to learn the new skills required to integrate Technology into their lessons if it was beneficial, whilst 37% answered maybe. As only 8% said they wouldn't, I felt pursuing the idea of integration further, was worthwhile.



Choice	Total
50% Technology 50% playing	3
100% Tech	0
100% playing	7
30% Tech 70% playing	14
70% Tech 30% playing	0

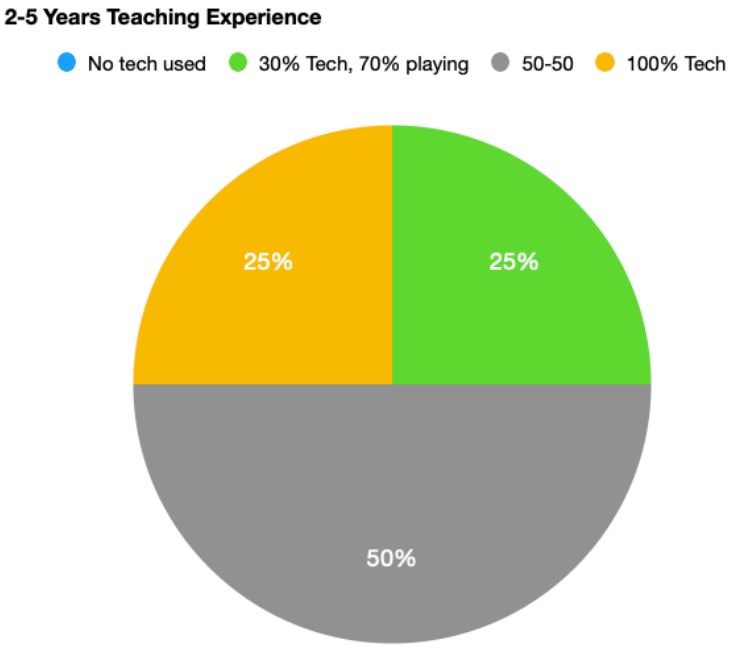


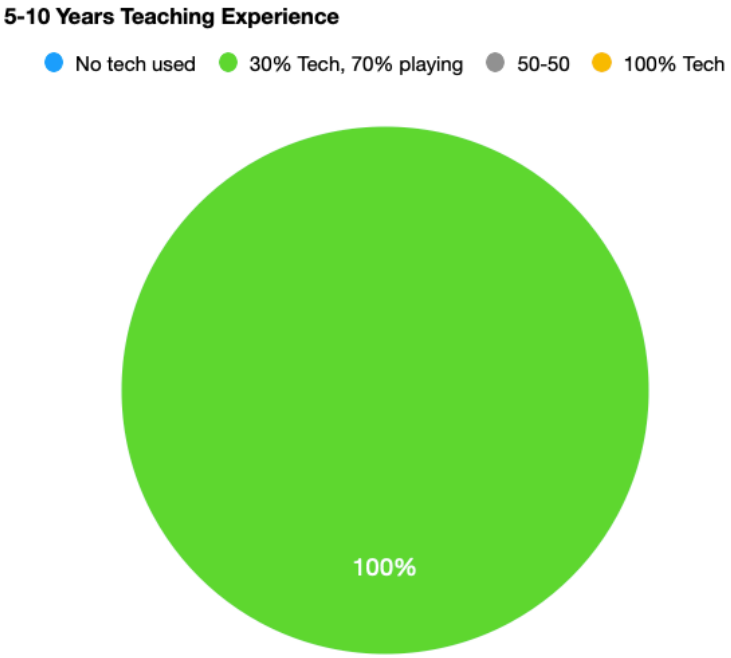
60% stated that they would like to gain further tech skills in recording using a DAW or a score writing program. 45% wished to further their DAW knowledge, highlighting the ability to record backing tracks, recording elements of lessons, and mixing better as specifics.

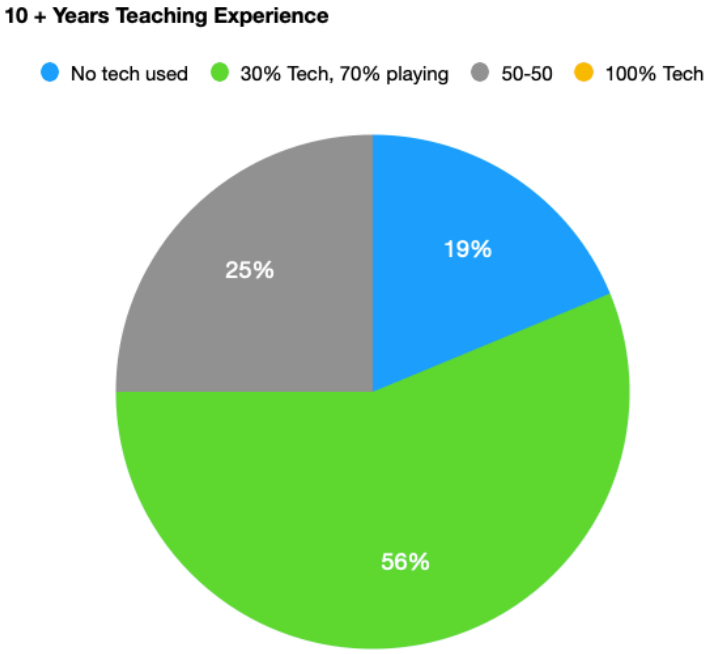
25% wished to further their knowledge of using a score writing program.

The results show that 58.3% of teachers typically use a ratio of 30% technology being used within a lesson and 70% instrumental playing.

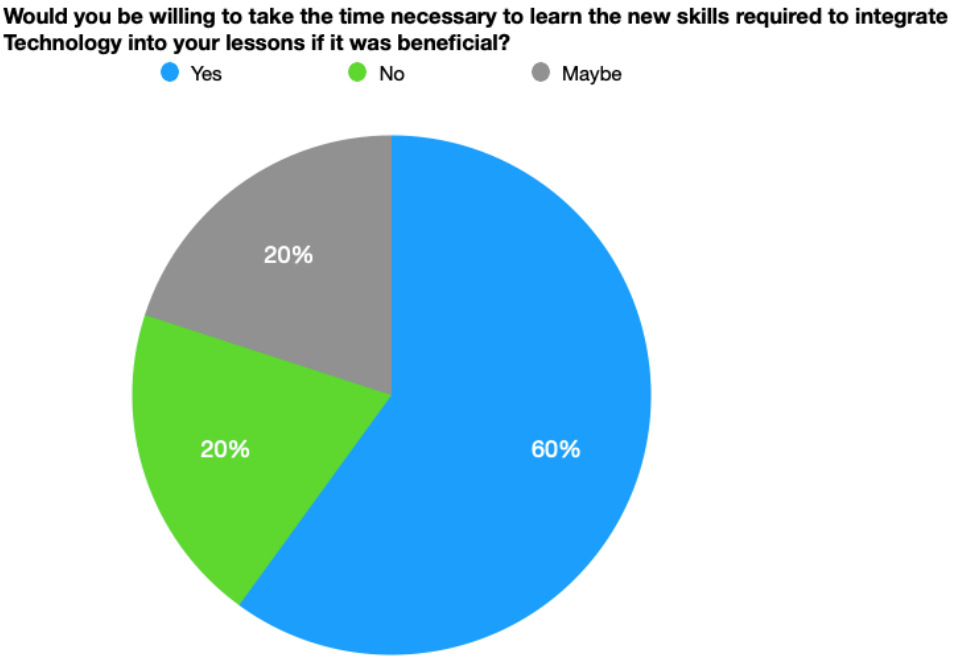
A key observation being that teachers who had been teaching for between 5 and 10 years used this method 100% of the time within lessons. Only 25% of teachers who had the least teaching experience used this method, and the majority of the most experienced teachers (56%) also employed this method the most within their teaching.

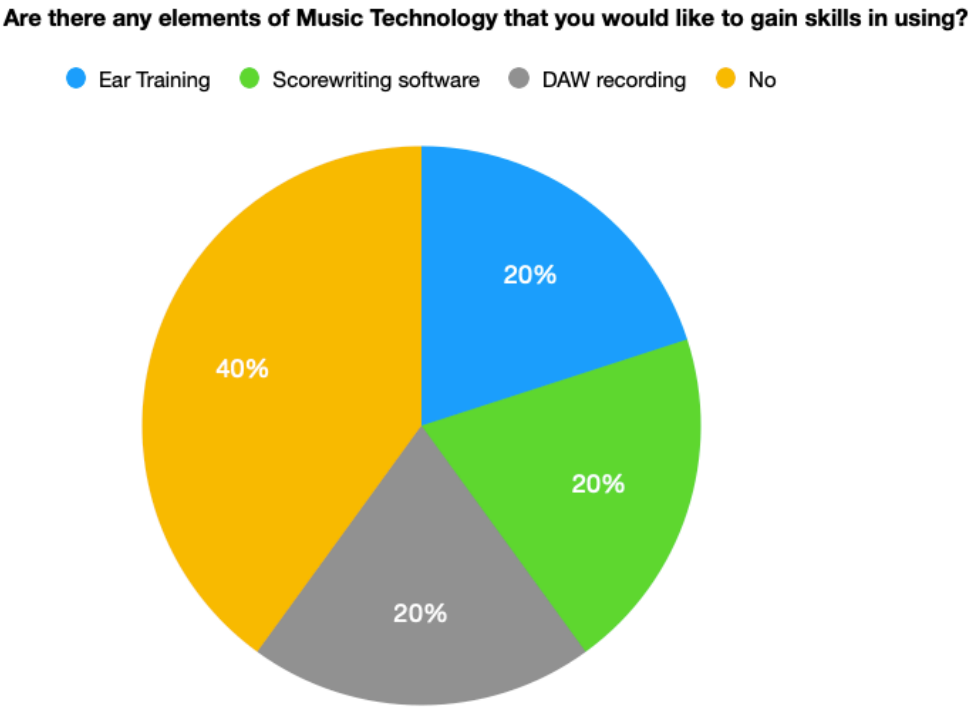




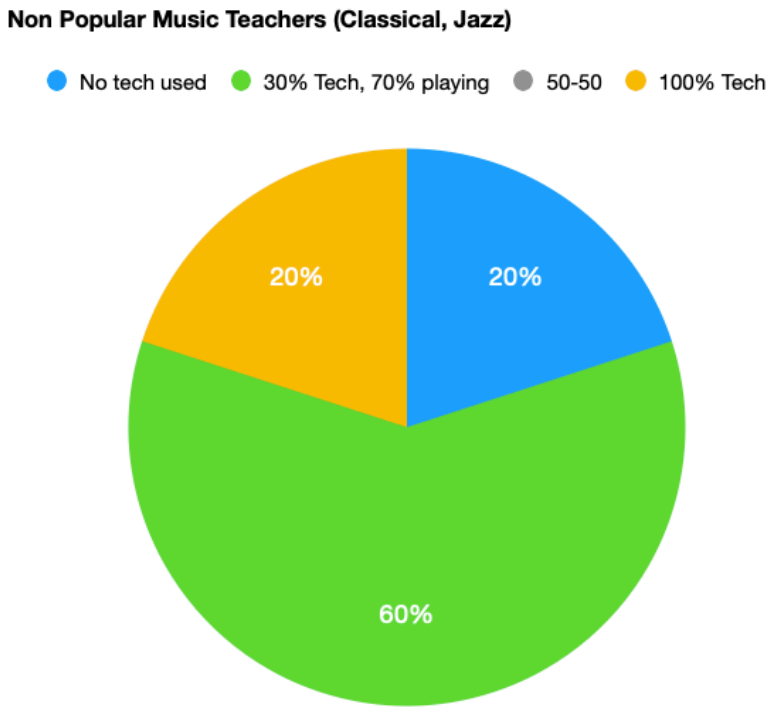


I analysed the results below specifically for **non-popular** music teachers, in order to quantify their willingness to incorporate elements of technology into their lessons. Interestingly, 40% stated that they would not like to gain skills in using any elements of music technology, whereas 60% would be willing to take the time necessary to learn the new skills required to integrate tech into their lessons.





Another major part of the research was to find out how teachers of the classical genre are using technology in lessons. This aspect was important in order to obtain a demographic. The majority (60%) also employed the 30/70 ratio between tech use and playing.



A notable observation was that the majority of respondents were extremely versatile with their teaching. 66% taught more than one genre, which meant I had to consider this when producing content. The research found that a majority of students taught were in the age range of late primary education through university level. I felt that the videos created should be engaging for students of this level, although they are not specifically aimed at them. The score writing tutorial was aimed at beginners and intermediates, with instruction on how to create resources for advanced students.

The majority of teachers had experience in using Sibelius software, but instruction material for the basics of using Dorico was created as it is more advanced and intuitive.

YouTube was found to be the most commonly used medium for teaching.

Most teachers were willing to take the time to learn new tech skills if they were beneficial.

Recording using a DAW or score writing program was desired by most teachers, with recording backing tracks and mixing being specific examples of what they wished to learn.

The majority of teachers (46%) had experience in using Sibellius software, compared to 21% Musecore and 17% Dorico. Whilst I also use Sibellius, Dorico is the latest and most advanced score writing software that offers far better integration with MIDI, and in my opinion, is far more intuitive than Sibellius. For these reasons I chose to create instruction material on the basics of using Dorico. This would benefit the majority who are currently using Sibelius and wish to learn a more up-to-date program.
The research data suggested that I should aim my material at a Beginner and Intermediate level and create material that is accessible for multiple genres. A notable observation throughout my research was that all teachers surveyed taught a wide range of ages and genres. It was important to code and define the data carefully to avoid disregarding the positive and practical aspects of incorporating technology into teaching. If overly specialised material is introduced, it may not be used at all and could have a negative impact. Based on the results of this research, it was evident that there was a growing interest among music teachers to incorporate technology into their lessons. The majority of teachers who participated in this research used technology in their lessons, with a ratio of 30% technology use and 70% playing. The most commonly used software among the teachers is Sibelius, but there seemed a growing interest in learning Dorico, which is a more advanced score writing software. The use of DAWs in lessons had also proven to be beneficial, allowing students to record and critique their own playing.

4.1 KEY RESULTS

- The videos should be designed for the age range of 10 to 18 years old.
- The score writing tutorial to be taught to students between Grades 1 and 7
- To use YouTube as a delivery platform
- To cater to Classical and Jazz as well as Popular music teachers.

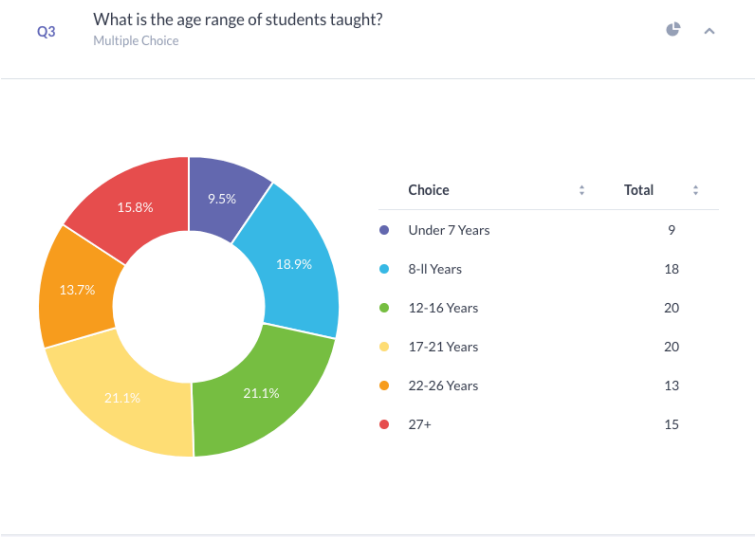
5. ETHICAL CONSIDERATIONS

With programs such as Garageband, the big advantage is that one student can make music on their own, deciding all the variables of the composition themselves. They don't necessarily need to involve other students in their music making. This can become a disadvantage as it negates the need to make social connections, doesn't allow for other individuals' input, and essentially gives the opposite of what is essential when performing….communication. The student can become more isolated as a result.

A DAW such as Garageband often has functions such as quantise and autotune, which allows the student to sound more proficient at certain musical tasks than they actually are! We must be careful when introducing this type of tech, and emphasise the point that it exists to assist in music making and learning, and not to take over the pursuit of learning an instrument.

It was important to convey that the technological advantages that can be associated with essentially using pre-recorded material to create compositions (i.e. loops) be used alongside composition and theory knowledge. I believe that manipulating pre-recorded material should be linked to praxis, and be explained in a musically theoretical way.

Due to the majority of the intended age group being under 22 (70%) and the use of screens for information delivery, the potential negative effects of excessive screen-time use for children and young adults was a key consideration.



A large proportion of technology learning is delivered through the use of screens in one way or the other, which can lead to less interaction with the teacher and, in some cases, distraction due to devices having the capability to run social media apps alongside educational ones.

‘Activation of the phone (chime, ring, or vibration) will cause student to lose focus no matter

how invested he/she may be in class lecture’[51]

‘One of the most significant challenges the digital world poses for attention is attentional overload. Attentional overload occurs when the demands of the environment exceed the capacity of an individual's attentional resources.[52]

From my research, 25% found that students would be easily distracted by their phones, whether it be because they are using them for a music based task and notifications would interrupt, or just having them to hand in lessons.

6. PROJECT DELIVERY

Methodology: Design Thinking First Cycle

- Read and researched literature and devised suitable questions
- Researched existing online material
- Prepared questionnaire and distributed

[51] Fitzula, Michelle 2019 https://stockton.edu/ctld/documents/facres/mobile-devices-in-the-classroom.pdf

[52] Shanmugasundaram, M., & Tamilarasu, A. (2023). The impact of digital technology, social media, and artificial intelligence on cognitive functions: A review. *Frontiers in Cognition*, *2*, 1203077. https://doi.org/10.3389/fcogn.2023.1203077

Methodology: Design Thinking Second Cycle

- Gathered and quantified results and feedback from research
- Produced instructional videos.
- Constructed a dedicated YouTube channel.
- Distributed the videos to the targeted demographic. I targeted a demographic based on the research results. It was imperative that the teachers had little or no previous knowledge of Garageband or Dorico, as this helped me triangulate collected data to improve the current, and future material.

Methodology: Design Thinking Third Cycle

- Made any necessary edits or adjustments to material within the videos from feedback given in Phase 2.
- Concluded from feedback and research
- Considered future material
- Worked on producing future content from the results

6.1 Second Cycle: ***Empathise***

An observation was that there were a few gaps in the narration whilst I was demonstrating the task on screen. The feedback was that the viewer may lose interest as the flow of the narration was interrupted.
I also taught some of the concepts to my own students, and gained the following feedback:

Student A, (Bass Guitar, Beginner level) Video- ‘Using Loops In Garageband 1’):

‘*I liked using the drum loops with my bass lines, I thought it sounded very good instantly. I also liked adding and experimenting with percussion to change the feel of my piece. I would like to record some keyboard chords and maybe some vocals’*

Student B, (Bass Guitar, Intermediate/Advanced level) Video- ‘An introduction to Dorico SE’:

‘*I found it difficult to input the notes manually, it was much easier with the midi keyboard. I was able to play things in slowly, then speed it up to tempo. It will be useful when transcribing bass lines as I can digitally archive it for the future’*

My reoccurring problem was that teachers were preparing students for exams and didn’t have time to introduce a new learning method. Instead, they agreed to watch the videos themselves and give critiqued feedback.
This feedback would be used to improve any aspects of the material required.

6.2 Second Cycle- **Define**

After receiving feedback from the initial testing phase, I identified areas where improvements could be made to the production elements of the videos. I focused on increasing engagement by simplifying the content to make it easier to follow, and ensuring that the overall structure was linear and logical.
The feedback was that the videos seemed a bit too long overall. I edited them down to important key points and further edited the gaps between the narration so that the general flow of the instruction was improved. This was a general observation throughout all the videos; I edited them all in a similar manner.

Some positive feedback was given with regard to the ‘Introduction to Garageband’ video. All 3 respondents said they had learned how to use some of the more advanced features they were unaware of.

6.3 Second Cycle- **Ideate**

It was felt that the ‘*Using Loops In Garageband*’ video was too long (around 20 mins) so I created two separate videos which tackled different aspects. The first video looked at using and manipulating loops on their own, the second was focussed around using loops and recording an instrument alongside. I also felt that separating the two subjects would have a broader appeal as some teachers may have to teach in a situation where recording an instrument isn’t possible. From my personal observations, not all schools have specialised recording hardware, but most have a midi keyboard as an input device.
My initial idea for phase 2 of testing was for a teacher to teach a student some of the material contained within the videos and to collate both student and teacher observations. The advantage of this would be to observe a final student project, and be able to tell which skills have been learned.

6.4 Second Cycle- **Test**

Unfortunately, I received no responses from respondents, so no data could be collected at this time. However, as this project is ongoing, any feedback will be considered for future improvement.

7 CONCLUSION

I have learned that gaining research data from busy professionals within a specific timeframe is a challenging task.
Although no data was gathered for the final testing stage, I felt that I accomplished my goal using the Design thinking process, and it was the correct choice of methodology. A key question at the start of this project was to find out if technology use was lacking in the classical field of instrumental teaching. Classical teachers used the same 'technology use' ratio in lessons as the popular music teachers. The design thinking approach helped me to focus on more general instructional material, rather than aimed at a specific genre. My assumptions were challenged in this regard, and I felt that the final videos would have more impact on a wider audience as a result. The research findings indicated a growing interest among instrumental teachers in using technology in their lessons, alongside the need for easily accessible online resources. Technology use is increasing exponentially within education as more and more traditional problems are sought to be resolved by the use of technology. With technology becoming more affordable and accessible, I believe it is important for teachers to embrace the positives of technology use alongside instrumental learning, and implement in such a way that is complimentary to their teaching. It is my hope that this project has provided useful insights into current technology use and inspires future ways to incorporate technology into musical learning.

8 Future Considerations

I intend to create further additional material to add to the YouTube channel. I am currently working on an instructional video series on how to play and record a well-known tune or song. This will tie all components of previous videos together, and increase exposure to the website by bringing traffic to the channel. Given that the YouTube channel is publicly accessible, I have the potential to incorporate additional phases into the iterative cycle based on viewer comments and observations, which will enhance the overall user experience.

I'm hoping that this can become an ongoing venture and, over time, a portal to share ideas with other teachers by creating a community feel to the website. This may even lead to collaborations with specialists to create more advanced content.

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TITLE Design Issues in Qualitative Research: The Case oi:
Knowledge Utilization Studies
INSTITUTION Abt Associates, Inc., Washington, DC.
SPONS AGENCY National Inst. of Education (ED), Washington, DC.
PUB DATE Aug 82

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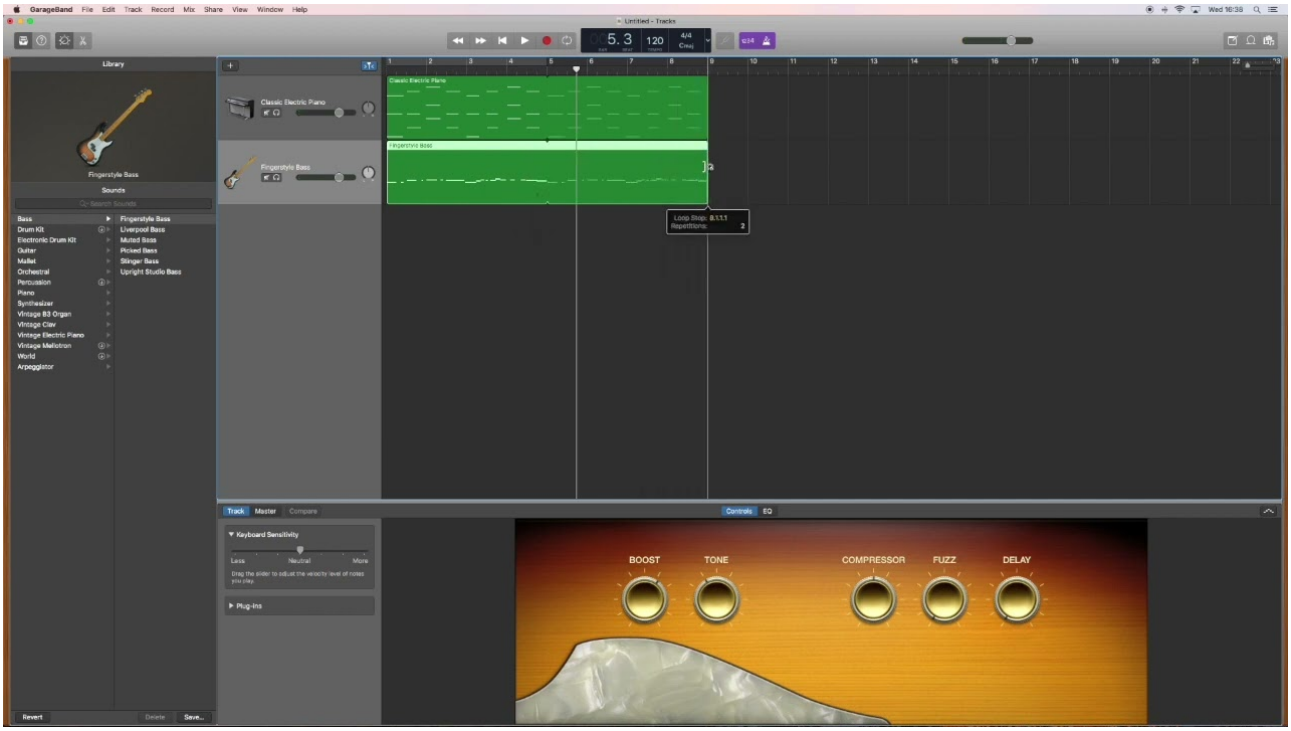
10. Appendix i

Links to Video Resources:

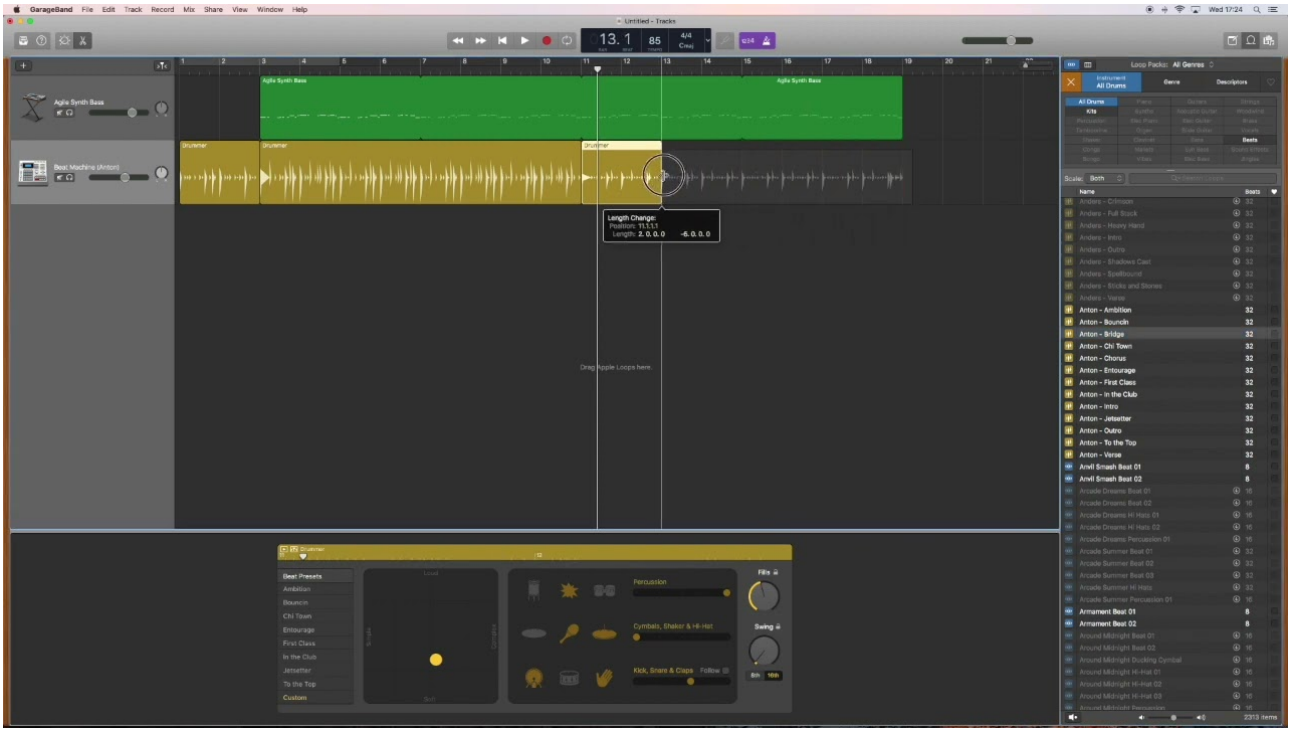
Peripatech Channel:

https://www.youtube.com/@Peripatech-ed7kq

Introduction to Garageband:

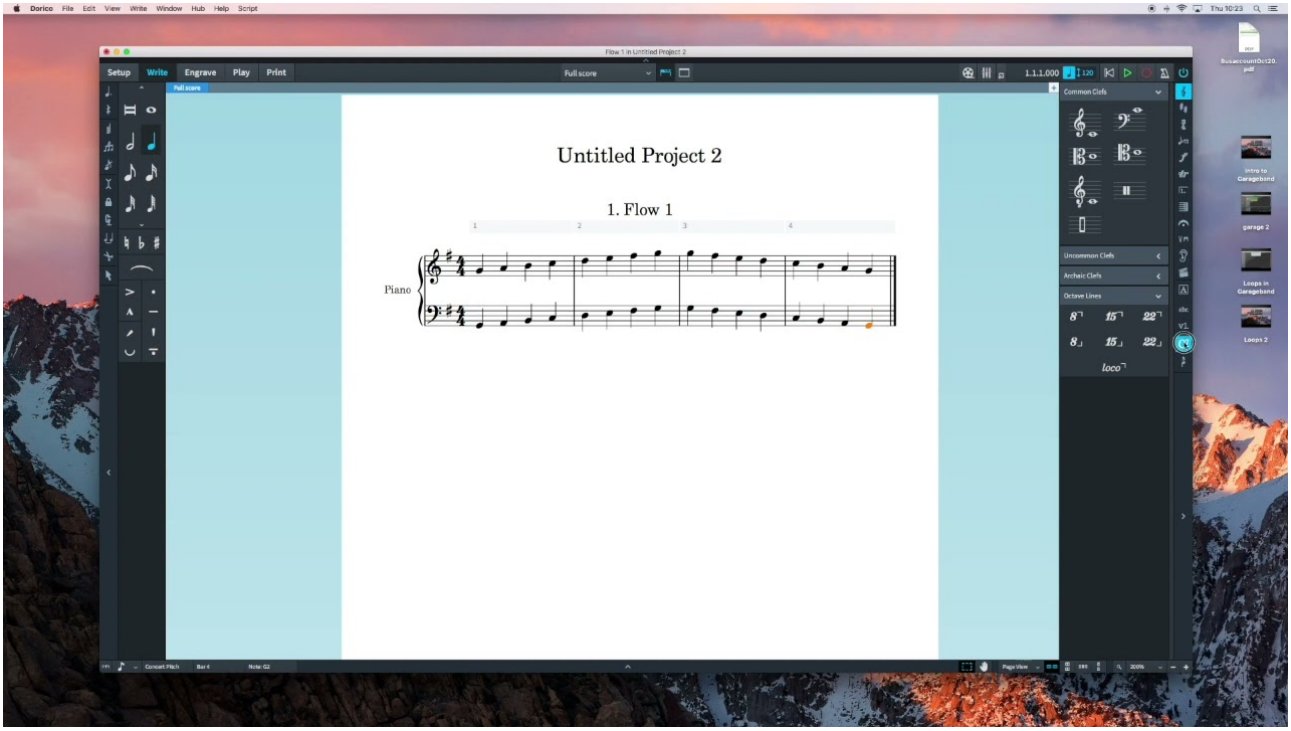


Using Loops in Garageband:



Using Loops In Garageband Part 2:

An Introduction to Dorico SE:



11. Appendix ii: SURVEY RESULTS

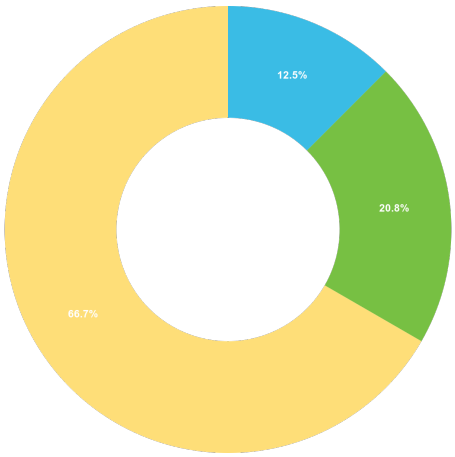
iii: Data

surveyplanet

Technology In Teaching

This survey is part of my MA research into technology currently used in instrumental music teaching. Thanks so much for agreeing to take part, its a short 3 minute survey on current teaching practices. Steve x

Q1 How many years of teaching experience do you currently have?*



Triangulation Chart 1

Appendix iv: Data Triangulation Chart 2