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The impact of the pandemic on musicologists' use of technology

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Abstract

This paper discusses findings of a global survey of nearly 600 musicologists in 35 countries in 2022, asking about their uses of technology during the pandemic. The survey focused on participants' frustrating and rewarding experiences, risks, limitations and benefits of technology, and highlighting changes they would keep after the pandemic. There was a preference for digital resources over physical counter-parts, apart from where physical books were more popular than e-books. Zoom and other video conferencing software were frequently mentioned in both positive and negative terms, particularly around music performance and fieldwork, conferences and collaborations. Access and availability of online resources was positive, due to availability, and negative due to losing the "analogue experience". Methodologies had also been impacted on, allowing researchers to ask new questions, while shaping and limiting these questions. There was impact of technology on community-building and enhancing the ability to meet across borders while limiting networking opportunities. The shift to teaching online impacted on teaching music performance, and heavy teaching loads were prioritised over research, highlighting the interconnected roles of the musicologist researcher in teaching and learning. This research contributes towards an understanding of the complex nature of the information behaviour of musicologists. Insight into how musicologists' attitudes and practices have changed and fulfil their multiple roles suggests they are moving closer to the digital humanities field in their practices.

1. Introduction

The Covid-19 pandemic forced many people online to engage with their work, their clients, friends and family during long periods of isolation in lockdowns. The music sector benefits particularly from in-person encounters in teaching, listening, performing and enjoyment, while music researchers are generally considered to prefer engaging with physical sources such as manuscripts and books in situ rather than online. [Ros-Fabregas 2020] Although performance, music education and music listening all received notable attention from researchers keen to explore the impact of the online pivot, eg [Spiro et al. 2021]; [Rossel et al. 2021]; [Octaviani 2021]; [Spahn et al. 2022], the impact of the pandemic on musicology research is as yet relatively unexplored. 1

In terms of the scholarly study of music, musicology research studies various aspects of music: history, role in society, structure, aesthetics, perception and performance [American Musicological Society 2023]. This has led to a segmentation of the field into a large number of specialisations, the main ones being: Historical musicology and critical editing, Cultural musicology, Popular music studies, Music theory, Analysis and composition, Music psychology, Sociology and neuroscience, Music performance studies, Systematic musicology, Ethnomusicology, Computational or digital musicology, Music libraries and Archives. This segmentation acknowledges the wide role music has in society and leads to the adoption of a variety of research practices and information behaviours [Inskip and Wiering 2015]. Digital tools and resources are increasingly being adopted by musicologists. Research exploring images, encoded scores, audio and metadata have been supported by rapid developments in the capability of technology, allowing new questions to be asked by musicologists across the spectrum of specialisations. Although this increase in the use of text and data mining and the availability of digital tools and resources brings musicology closer to the digital humanities field, it has been suggested at times that musicology is not strongly embedded in large-scale data creation efforts and general methodological discussions in digital humanities [Döhl 2020]. Other evidence suggests however that the digital elements of musicology are increasingly being recognised as being part of the field of digital humanities [Burgoyne et al. 2016]. 2

The paper explores the practices of musicologists during the pandemic, while exploring the differences and commonalities with those of other humanities researchers. A global online survey was designed to explore the impact of the pandemic on the information behaviours of self-identifying musicologists, associated scholars and facilitators such as librarians and archivists, and key factors are discussed: the place of technology within musicological and adjacent disciplines; and shifting to online work. The findings demonstrate that the pandemic forced the community to attain a technical skill set that enabled online communication in many forms and provided access to a wealth of resources, which has widened horizons in terms of collaboration and networking, resources, tools and research topics and methodologies. 3

2. Literature Review

As in other humanities disciplines, sources for musicologists are primarily text (reviews, concert programmes, scholarly articles, popular press), image (including manuscripts and music notation), audio (commercial and field recordings) and video (concert recordings, promotional clips). The range of sources includes digital books and journals, physical books and journals, digitised archives and manuscript collections, physical archives and manuscript collections, music audio on computer, phone, mobile device, music audio on tape, record, CD, physical collections of music editions, digital collections of music editions and online music audio collections [Inskip and Wiering 2015]. The use of digital and physical/analogue sources 4

varies according to the speciality. Until the digital impact on accessibility of music resources, researchers had to track down and visit collections of physical materials and audio sources, or request copies or scans. Access to digital resources was hindered by strict copyright regulations surrounding contemporary recordings in particular [Döhl 2020] and special issues surrounding optical music recognition which have caused it to trail behind text-based and audio work [Pugin 2015]. Previous research has explored how musicologists used technology in their research practices, finding that while the participants described themselves as mostly comfortable with digital resources in their research, they would benefit from ongoing support with their digital information skills and from reliable and usable technology [Inskip and Wiering 2015]. These findings seemed to align with other digital humanities research of the time [Bulger et al. 2011] [Warwick 2012], which demonstrated how "humanities scholars are not luddites; they simply behave differently from scientists, and many social scientists when interacting with physical and digital information" [Warwick 2012, 2]. In the years since, it is said that the field of musicology has broadened from a focused computational analytical approach towards a "bigger tent" similar to that identified by Urberg [Urberg 2017, 137]. The expansion of digital humanities research to include "digital publishing, philosophies of digital research, and 'born digital' projects that cannot exist outside of a digital medium" [Urberg 2017, 134] is said to have led to a field where researchers can ask new questions and inter-disciplinary work can be facilitated. In musicology, the ongoing development of digital analytical tools has been catching up the rapid and mature development of tools for text analysis, leading to wider access to digital musicological resources, databases and formats. This is exemplified by the AHRC Digital Transformations project *Transforming Musicology* in the UK, which ran between 2013–2017, with the aim of bringing in together musicologists and associated researchers and facilitators to "explore how emerging technologies for working with music as sound and score can transform musicology, both as an academic discipline and as a practice outside of universities" [Transforming Musicology n.d.].

The gradual shift to encompass the digital in research practices highlights the creative tensions between musicology and the digital. Findings suggest that while scholars prefer physical monographs over e-books, they are happy to read electronic journal articles or book chapters [Chrzastowski and Wiley 2015], they may work with scanned artefacts but also have the urge to visit the original, and they will experience a live music event and will listen to mp3s or CDs in the car on the journey home. These fragile balances may have been disturbed by the recent pandemic. 5

From the outset of the pandemic, apart from what could be done at home, the analogue was almost removed from the landscape. News items identified the popularity of singing on one's balcony or organising online concerts [Ros-Fabregas 2020]. Concerts were cancelled and some music workers suddenly ceased to have any income [World Intellectual Property Organization 2023]. Early in 2020, courses and classes were moved online, travel was limited, physical resources locked down. It is suggested that the impact on the in-person nature of music-making, -listening and -learning was lengthy and profound, cementing the "digital turn" [Camlin and Lisboa. 2021] which had already been taking place for a number of years in teaching and other aspects of music-making and consumption. 6

Musicology research was also impacted, not least because many higher education institutions required their academic staff to shift their teaching online [Bowman 2022], which required many of those doing non-Covid-related research to pause their research activities to enable them to focus on teaching [Gao et al. 2021]. Studies indicate that this pause was further limited by travel and access limitations and has been found to have notable impact in a variety of research disciplines, broadening the gender gap in publishing [Lewis 2021] [Madsen et al. 2022], negatively affecting mental health [Lewis 2021] and reducing collaborations [Gao et al. 2021], community-building [Pursell and Iiyoshi 2021] and social capital [Froehlich 2021]. Due to the wide-ranging formats and pursuits, the impact of the pandemic on music-related activities could be wider and more complex than other disciplines. The challenges of moving conferences [Merrick and Johnson 2020] and fieldwork online have already been discussed [Ozah 2022], particularly where the music being studied is not from a recording [Onyeji and Onyeji 2022], chiming with the findings of Pokhrel and Chhetri (2021) in their review of the impact of the pandemic on teaching and learning in developing countries [Pokhrel and Chhetri 2021]. 7

As we approach a global humanities discipline [Crymble 2021, 161–170], the concept of global musicology recognising the variety of its nature and the distributed make-up of its community, its fluidity, and the importance of its community [Chua 2022] is possibly becoming ever-more in reach. Bohlman describes a two-dimensional "global musicological moment", where "a change of revolutionary proportions takes place" [Bohlman 2020, 14] and where this paradigm shift also changes the understanding of historical processes, both in the past and in their future unfolding. This article considers the impact of the pandemic on the digital practices and resources of musicology in an attempt to determine the extent of this so-called musicological moment, and the way ahead. 8

3. Methodology

This study is part of our research line "What Do Musicologists Do All Day" (abbreviated WDMDAD)[1]. Its aim is to investigate the daily use of digital technologies by musicologists and their attitudes towards these. We conducted a world-wide survey in 2014–2015, the outcomes of which were published in Inskip and Wiering (2015) [Inskip and Wiering 2015]. In 2022, we did a follow-up survey with the following two research questions: 9

1. To what extent has the use and acceptance of digital technology by musicologists changed since 2015?
2. What was the impact of the pandemic on musicologists' use of technology?

This article focusses on the second question, looking at the changing role of technology during the pandemic and the expected impact on future use of technology in musicological research. On the launch page of the survey (see Appendix 1), we listed a range of technologies commonly used in musicology, with an emphasis on digital technology. We decided not to provide a strict definition of (digital) technology in order to give respondents the freedom to answer in accordance with their own understanding of the term.

3.a Data collection

An online survey was designed, using Opinio, using questions from the previous survey which were revised to make them relevant to the pandemic. The survey home page stated (see Appendix 1): 10

> We are looking at the research practices of musicologists and other music researchers to gather information which can be used in the development of technologies relevant to these practices. This survey will provide some insights into how you have responded to the Covid-19 pandemic.

The research was approved by the University College London Department of Information Studies Ethics committee (16 February 2022) and GDPR (Z6364106/2022/02/129) approved on 23 February 2022. As with the previous survey, which was run in 2014–2015 and had 621 usable responses, the survey link was made available to musicologists via musicology societies mailing lists, and social media. The survey ran from Tuesday 1 March 2022 – Friday 10 June 2022 and delivered 584 usable responses. The responses were gathered into Opinio and subsequently downloaded as an Excel spreadsheet, which was imported into NVivo.

3.b Sample

Efforts were made to encourage participation from around the world by approaching local musicology societies and asking them to circulate the link to their members. The survey was anonymous although it is recognised that some participants could be identifiable through their research topics, and these have been redacted where necessary. The invitation was widely circulated via musicology societies and networks. Participants were invited to complete the survey if they had an involvement with musicological research. This led to the inclusion of musicology-focused librarians, archivists and scholars in adjacent disciplines, recognising the wide scope of the segmented discipline, as noted earlier. Some previous participants had provided their contact details separately from their data and were notified of the survey and asked to take part. 11

3.c Data Analysis

When the survey was closed the data was downloaded from Opinio and imported into NVivo for analysis. One researcher was using NVivo for Mac, the other NVivo for PC. Coding was done by both the researchers over a period of months, with access to a password-protected shared drive and regular online discussions taking place. Both researchers were coding the whole dataset, and it was planned to merge both coding sets; however, technical incompatibilities meant that this was not possible, so the two separate coding books were compared and reviewed to ensure consistency. The numerical data was analysed separately from the textual data, using basic Excel spreadsheets and charts to visualise relevant results. 12

The approach to coding the qualitative data was partially derived from grounded theory and followed two stages: open and axial [Corbin and Strauss 1990]. In the open coding stage, the responses were initially organised by their associated questions (e.g. Q13: Tell a story about a frustrating experience with technology during the Covid-19 pandemic), open coding allowing the researchers to immerse themselves in the responses to each of the questions and identify themes within each set of responses: frustration, reward, risks, limitations, benefits, changes. During axial coding, the links between each of the themes were then identified and compared between researchers to find commonalities and outliers. The texts were visualised using word cloud, text search and cluster map features in NVivo, helping the researchers identify patterns in the word usage. 13

4. Findings

4.a Questionnaire

The full questionnaire can be seen in Table 1 below: 14

No	Question	Response Type
1	Did you participate in the previous WDMDAD survey?	Y/N
2	Please identify your location from this list.	List
3	What is your level of education?	List
4	How confident would you say you are using digital systems and materials to find, organise and analyse research materials, and create and disseminate your findings? Please indicate your confidence on a scale of 1 – 5, where 1 is low (not at all confident) and 5 is high (very confident).	Scale
5	Are you affiliated with an institution?	Y/N
6	Where do you usually do your musicology research? (You can choose more than one of these options if you like.)	List + open
7	What is your speciality? (You can choose more than one of these options if you like.)	List + open
8	What are you currently researching?	Open
9	Which are the top five information or music resources you use most in your musicology research and writing?	List
10	Following on from the previous question, which specific information or music resources do you use the most? Please mention the most important ones, you do not have to be exhaustive.	Open
11	To what extent has your preference for using digital or physical resources in your work change during the pandemic?	Scale
12	Why do you think this is?	Open
13	Tell a story about a frustrating experience with technology during the Covid-19 pandemic.	Open
14	Tell a story about a rewarding experience with technology during the Covid-19 pandemic.	Open
15	What do you think are the risks of the use of technology in musicology research during the pandemic?	Open
16	What do you think are the limitations of the use of technology in musicology research during the pandemic?	Open
17	What do you think are the benefits of the use of technology in musicology research during the pandemic?	Open
18	Which of the changes you have been forced to make are you going to keep after the pandemic is over?	Open

Table 1. Questionnaire

4.b Demographics

In comparison to the earlier survey [Inskip and Wiering 2015], there was some similarity between the demographics of the participants. There were 584 usable responses, (previous 621). Only 51 are sure that they participated in 2015, while 71 doubt if they did: nearly 80% thus participated for the first time (Q1). Spread over continents is rather similar (Q2), though showing a dip in North American and increase in European participants (Table 2).

Location	Count (2015)	Percentage (2015)	Count (2022)	Percentage (2022)
Europe	306	49	352	60
North America	248	40	148	25
Australasia	38	6	26	5
South America	13	2	16	3
Far East	6	1	16	3
Africa	4	1	14	2
Middle East	4	1	8	1
Central Asia	2	0	3	1
Total Responses	921	100	583	100

Table 2. Location of participants (2015, 2022)

Similarly to the previous survey, over 70% claimed to be confident in their use of digital systems (Q4), and materials. In both participant groups, a large majority hold a PhD and are employed at an academic institution (Q3, Q5). The spread of musicological specialities (Q7) is also very similar (Figure 1): 16

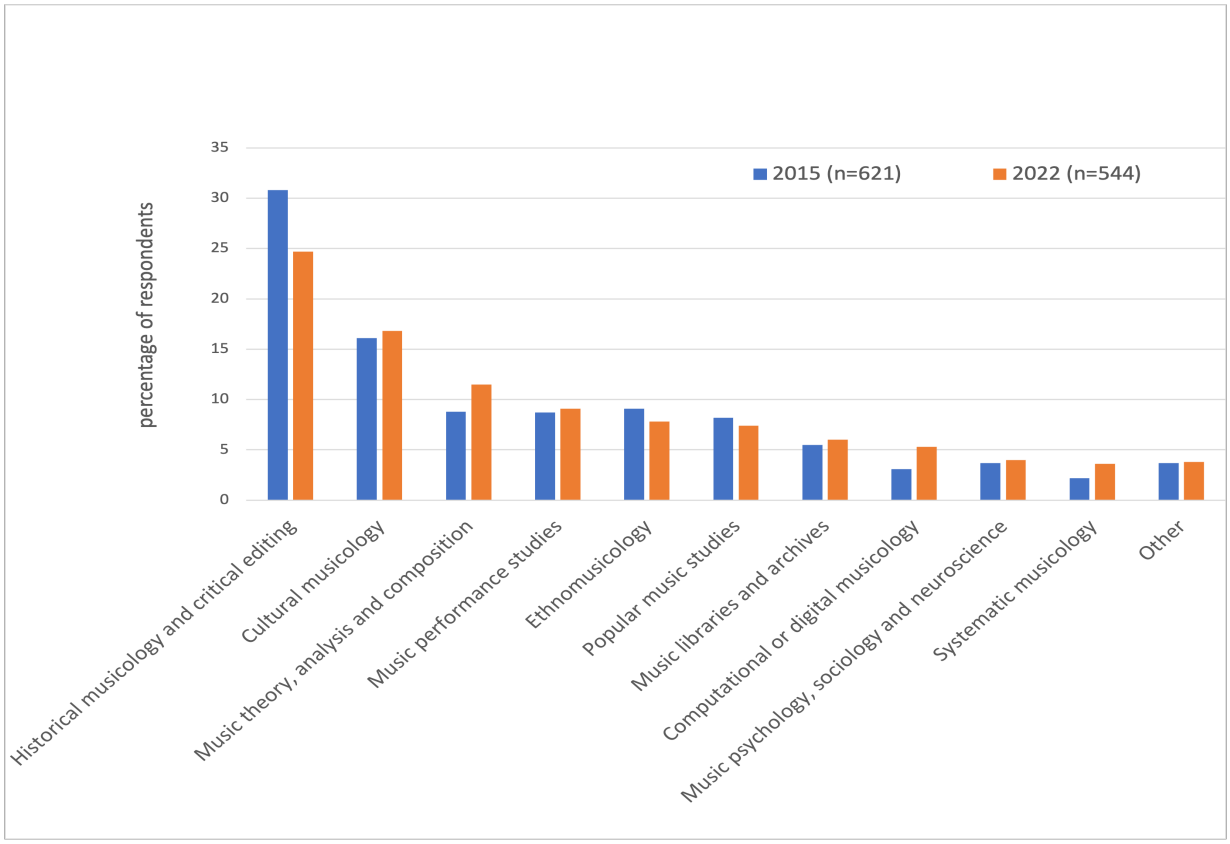

Figure 1. Specialities (2015, 2022). Participants could indicate multiple specialities: on average participants reported 2.4 specialities.

And their self-evaluated digital skills (Q4) related to their speciality were again similar (Figure 2, cf. [Inskip and Wiering 2015, Figure 3]): 17

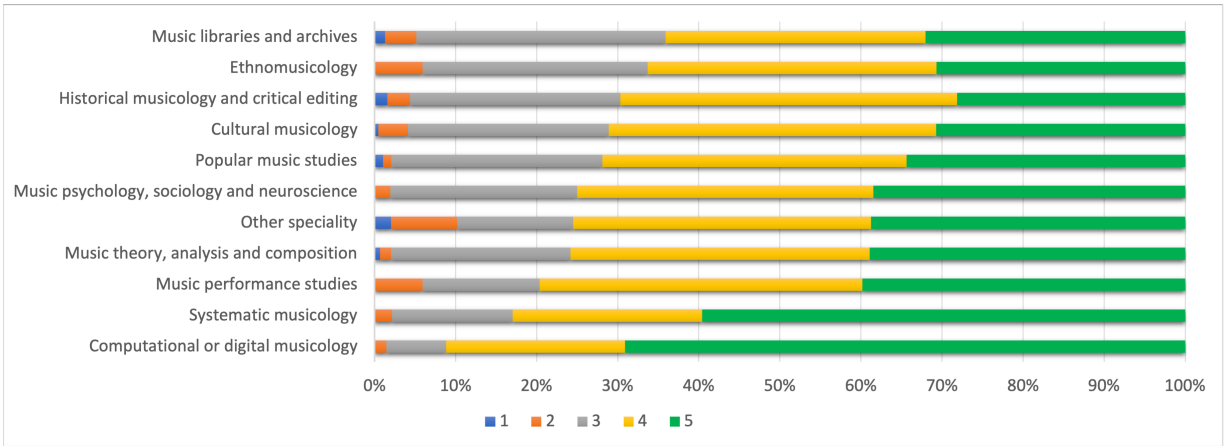

Figure 2. Self-evaluated digital skills per speciality (2022) n=544. Skill levels range from 1 (not at all confident) to 5 (very confident).

The preferred type of resource (Q9) demonstrated a general preference for digital over physical, although physical books were preferred to e-books (Figure 3). 18

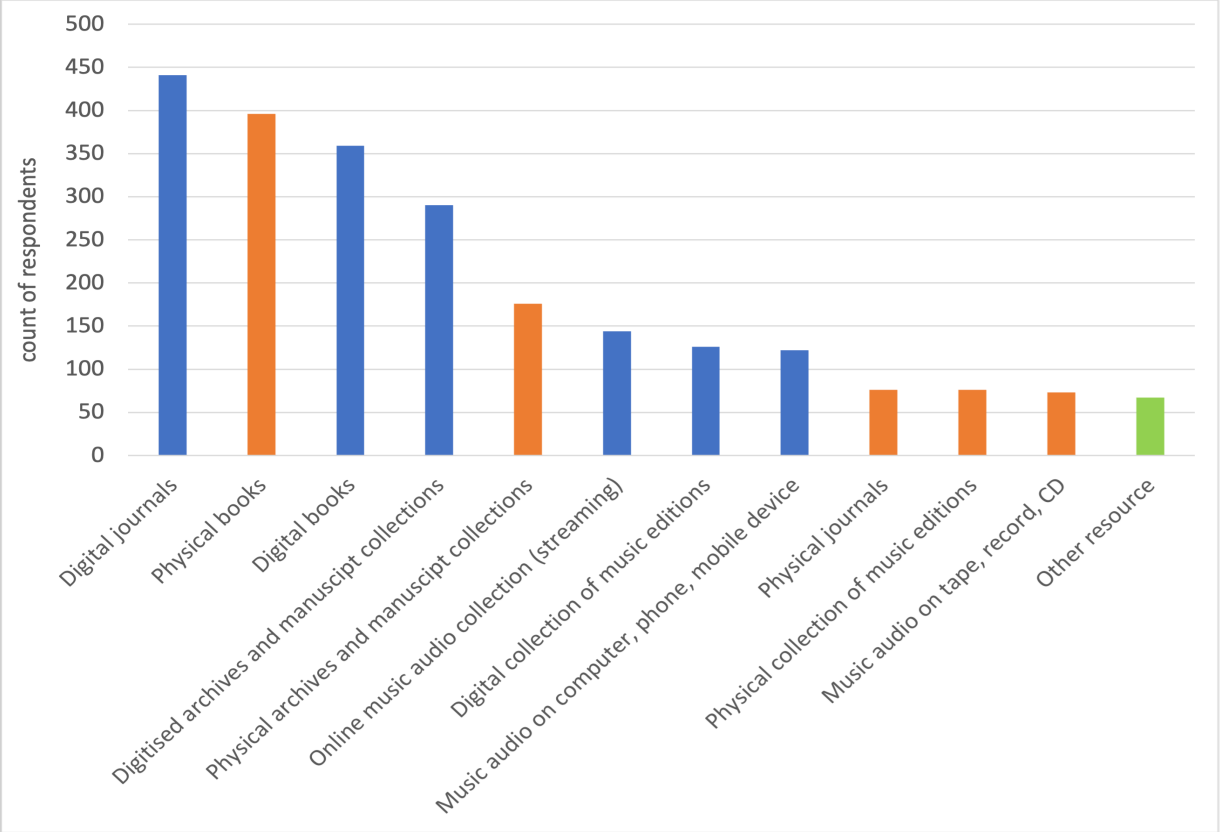

Figure 3. Resource preference (2022) n= 499, on average participants reported 4.7 preferred resources

Perhaps not surprisingly, preferences differ between specialities (Figure 4), suggesting that preference for digital materials is higher in more empirical specialisms and lower in the ones that focus on musical heritage and cultural context. 19

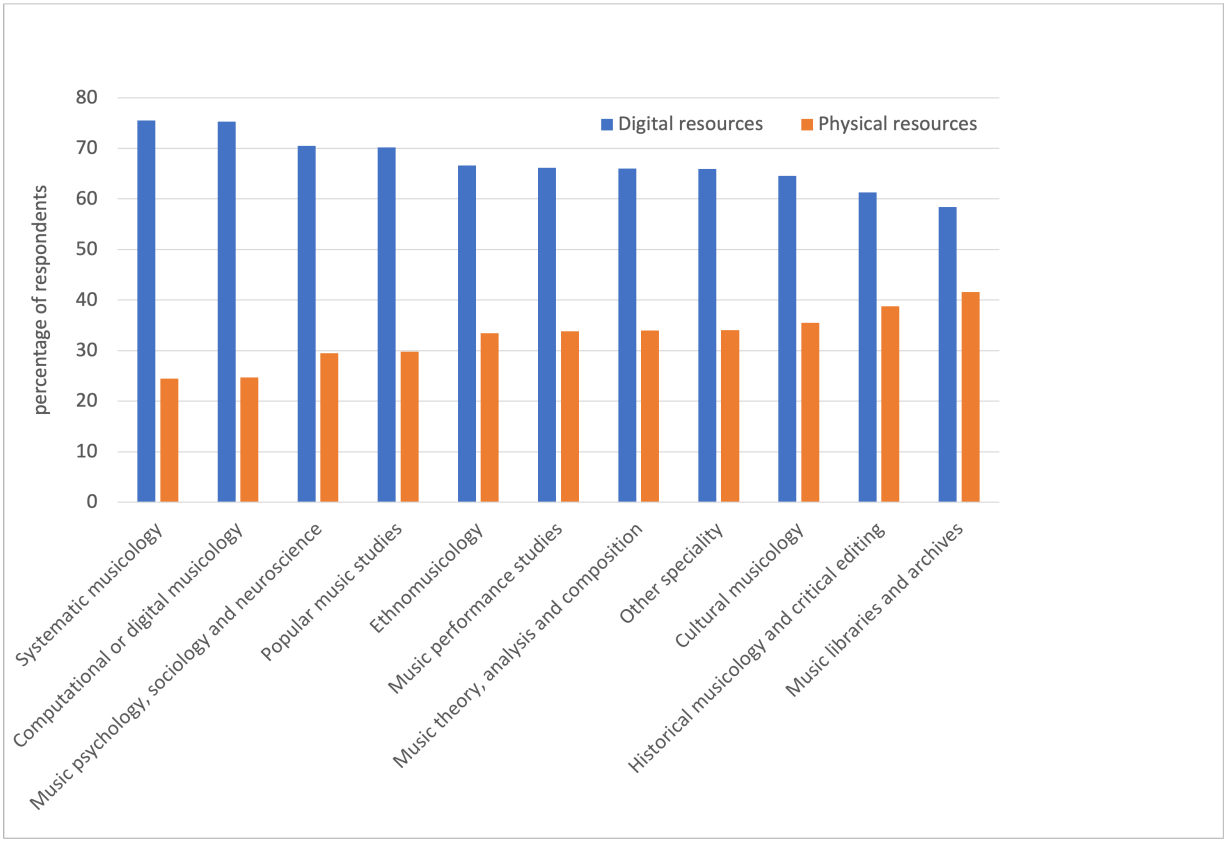

Figure 4. Preference per speciality (percentage)

4.c Qualitative analysis

The data was gathered together under each question, and open coding was used to identify trends and patterns in the full text responses. As an example, the tables in the Appendix 2 shows the open and axial coding for Q13 and Q14 by one of the authors. 20

In response to Q11 and Q12 (To what extent has your preference for using digital or physical resources in your work changed during the pandemic? Why do you think this is?) it was found that although a proportion of participants had changed a lot (n=75), a larger proportion had changed not much (n=193) or some (n=150). The ten most frequent reasons for changing format preference are listed in Table 3 below. 21

Reasons for changing	Count
More availability of digitised materials	47
Cannot access library or archive	46
Cannot travel to library or archive	31
Work from home	23
Preference hasn't changed	11
Accessibility	10
Convenience	7
Easier	7
Had no choice	5
Changed research question to adapt to online	4

Table 3. Ranked reasons for changing format preference (a lot)

The top ten reasons for those whose preference had not changed much are seen in Table 4. 22

Reasons for not changing	Count
Already working with digital	102
Prefer physical	28
Prefer digital	16
Used more digital	15
No impact	10
Use physical and digital equally	8
Not available digitally	7
Use inter-library loan	6
Lack of digital resources available	6
Had access to library	5

Table 4. Ranked reasons for not changing format preference

These ranked reasons help to highlight the dynamic nature of the findings of the survey. The conflicting responses across the dataset underpin observations from the quantitative data that the underlying segmented and specialised complexity of the "musicologist" term covers a wide set of research practices and beliefs. 23

The responses to the text questions were closely analysed and discussed repeatedly to identify patterns and address inconsistencies. Codes were drawn together into a set of over-arching themes: individual changes, social aspects, changes in the discipline, learning new skills, interaction, teaching and learning. These are presented and discussed below. Survey quotations have had minor edits, highlighted in square brackets, but are otherwise presented as provided by the participants. 24

4.c.i Individual changes

Whereas Q11 and Q12 concern changes made during the pandemic, Q18 (Which of the changes you have been forced to make are you going to keep after the pandemic is over?) is about expectations for the future. Table 5 presents a high-level overview of the 317 responses. Many respondents chose to answer this question categorically, most often with "none" (26 times) or "nothing" (5 times), less often with "all" (11 times) or "many" (3 times). 25

Amount of Change	Count
(almost) none	73
specific change(s)	210
most or all	19
don't know	9
unclear or unusable	6
Total	317

Table 5. Overview of responses to Question 18

Fifteen respondents were critical about the use of the word "forced," stating, for example, that "I don't feel I have been 'forced' to make any changes during the pandemic — I just adapted to my new reality" [157]. Voluntary changes in technology use may therefore be underrepresented. In addition, six respondents mention doubts about the pandemic being over soon or explain that they "…cannot for[e]see the future, even not my own" [415]. 26

Table 6 zooms in on the areas of change. Specific remarks that were mentioned in responses coded as "(almost) none" and "most or all" are included in this analysis as well. Many respondents commented on multiple areas of change. Note that their remarks may express positive as well as negative attitudes or experiences. 27

Area of Change	Sub-Area	Count
human interaction		136
	teaching	29
digital and physical materials		76
remote work, travel		50
hardware, software, services		24
other changes		21
	skills and attitudes	13
	health	5

Table 6. Areas of change in responses to Q18. There were 301 unique participants; codes are not mutually exclusive so add up to more than the number of unique participants. Sub-areas are subsets of the area above it.

The most prominent area is thus human interaction, which is mainly about the use of video conferencing services in various contexts, one of which is education. Digital and physical materials, focussing on the issue of access, comes second. Location of work and travelling also attract a lot of comments, whereas technology itself is less discussed. Table 7 compares the responses from Q18 with the changes in preference reported in Q11: 28

	Preference change		
Area of change	not much	some	a lot
human interaction	71 (48.3%)	45 (39.5%)	20 (35.7%)
digital and physical materials	19 (12.9%)	34 (29.8%)	23 (41.1%)
remote work, travel	19 (12.9%)	25 (21.9%)	6 (10.7%)
hardware, software, services	11 (7.5%)	9 (7.9%)	4 (7.1%)
other changes	6 (4.1%)	11 (9.6%)	4 (7.1%)
unique participants	**147**	**114**	**56**

Table 7. Area of change (Q18) split by preference changes (Q11). Percentages are calculated over columns: they relate the number of comments in an area of change (Q18) to the number of participants with a particular preference change (Q11). Percentages don't add up to 100% due to (a) responses that don't mention an area of change and (b) responses that mention multiple areas of change

Two interesting patterns seem to emerge. One is about human interaction: The less the respondents' preference has changed, the more human interaction seems to be an issue. In other words, their most important experience of technology may have been the use of different modes of communication. This is supported by the frequent mention of Zoom in the responses, for example that "For better or for worse, Zoom is here to stay" [156]. 29

Another pattern concerns resources, which are mentioned much more often by those reporting a strong preference change and may indicate an increased use (or wish to use) digital resources. Some remarks suggest a changed working practice: "My thesis has made the turn towards digital archives and will continue in this direction" [59], while other suggest a mixed approach: "Use of digital sources in the first instance to establish if the content merits an 'in-person' follow up visit" [45]. 30

Other patterns are apparent but are weaker, such as that respondents reporting some preference change relatively made most remarks about remote work and travel. 31

4.c.ii Social aspects

Social distancing measures and travel restrictions deeply impacted collaboration, conferences, concerts, fieldwork and communication. In the words of respondent 289: "Without technology such as Zoom or other platforms, we could not have any interaction." Delving deeper into responses from Q18 about human interaction can tell us something about how musicologists expect these changes to affect their professional lives in the future. Table 8 gives a breakdown of these responses. 32

Aspect	Sub-Aspect	Count
professional interaction		114
	general	8
	teaching	29
	research, work	68
	individual, informal	21
	fieldwork, participants	7
conferences		42
discipline in general		6
musical events		4

Table 8. Aspects of the social structure of the discipline. There were 136 unique participants; codes are not mutually exclusive so add up to more than the number of unique participants. Sub-aspects are subsets of the aspect above it.

We'll focus here on the two largest categories, professional interaction and conferences. Discipline in general is the topic of the next section, while the comments on musical events are too few to draw a conclusion from. From the respondents speaking about online conferences, the large majority either appreciates them or at least intends to keep participating. Appreciation speaks from remarks such as "Zoom conferences/research meetings are pretty cool" [381] or just "Remote conferences!" [211]. They extend networks: "We just organized a hybrid conference. I would do that again at any time, since it brought scholars from all over the world to the event" [115] and remove barriers for participation: "Zooming with collaborators and some online conference/seminar attendance have been really useful, and where possible would be good to keep. It can make conferences much more accessible." [236]. Conversely, online may just be a last resort: "I guess attending conferences and other meetings online will remain an option, to be used only in situations when it's ABSOLUTELY IMPOSSIBLE to attend in person" [484]. Several respondents take a middle position: "Limiting my attendance at overseas conferences" [289] or expecting that "I would return to in-person conferences, but continue to 'go' to online events that are short and to which I would never travel" [391]. Future conference organisers may want to take these sentiments into account. 33

Many respondents stress the advantages of working online, mentioning the benefits of staying at home: "Virtual meetings are extremely comfortable. I don't want to do 3 hours of public transportation for only 1 hour of meeting anymore" [431]. The type of meeting matters: "maybe some private meetings on online platforms; certain forms of online-meetings, like board meetings, are easier and maybe worth considering" [147], as does finding the right balance: "We are looking at ways of blending in-person and online research interaction and presentation which will attempt to keep the best of both worlds wherever possible" [129]. Some respondents mention specific collaborative activities such as "co-writing with collaborative software" [292] and participation in a "Zoom writing group" [231]. Especially for long-distance collaboration, working and meeting remotely has become a viable alternative: "I'll continue my international collaborations using Zoom "[477]. 34

At a more individual and informal level of interaction, we found several remarks, mostly with a positive slant, about "The possibilities to share and communicate without going somewhere physically" [229] with "colleagues and academic friends from all over the world" [286]. Interestingly, some suggest an increased openness in communication, for example a "brave attitude in approaching people I don't know about a Zoom call (in the past one would need to wait and hope that one would 'accidentally' meet at a conference to make that 'entry')" [373]. Others however plan "to make it a regular practice to connect informally with colleagues in person "[100] or to resume travelling to maintain their personal network (and do research): "The limitation of travel to engage in research activities is not something I will continue with — it was extremely limiting to my work, and to my networking" [312]. Finally, there is a small but interesting group of responses addressing fieldwork and participant research, noticing on the one hand a turn to "online and hybrid ethnography" [51] while on the other still feeling an urge for "real fieldwork with real interviews" [468]. 35

4.c.iii Changes in the discipline

Some responses in Q18 go beyond the individual and seem to reflect on more widespread changes in the musicological community. A good starting point is the following: 36

> Many: perhaps none of them huge or transformative on their own, but in sum the changes in habit and standard operating procedure have been huge. [176]

Prompted by this observation we searched for remarks concerning the discipline in general through all responses to Q13–18 and identified over 180 relevant remarks (as always, there were borderline cases where it was unclear whether they described the respondent's personal situation or a more general observation). These responses are summarised in Table 9:

Category	Q13– Frustrating	Q14– Rewarding	Q15– Risks	Q16– Limitations	Q17– Benefits	Q18– Changes after pandemic	Total	Sentiment
access	2	3	29	12	24	6	76	0.49
interaction	0	14	11	3	16	7	51	0.76
equity and inclusion	0	3	7	9	15	3	37	0.63
learning skills	0	3	3	3	13	1	23	0.8
method	1	1	7	2	7	2	20	0.55
technology	1	1	7	7	2	0	18	0.23
money	0	1	4	2	6	1	14	0.64
values	0	0	9	1	0	1	11	0
travel, working remotely	0	2	1	0	4	0	7	0.9
environment	0	1	1	0	3	1	6	0.86
organisations	0	0	2	2	1	0	5	0.27
health and well being	0	0	1	0	1	1	3	0.6
total remarks	4	29	82	41	92	23	271	

Table 9. Remarks concerning discipline in general in Q13–18. The sentiment score is based on number of remarks in Q13–Q17. Remarks in Q14 and Q17 are considered positive; those in Q13, Q15 and Q16 negative. Remarks from Q18 are not included since they can have either sentiment.

For each category we calculated a naïve sentiment score from the responses from the “positive” (Q14, Q17) “and negative” (Q13, Q15, Q16) questions. We calculate the weighted proportion of positive responses in the total number of responses to each category. Weighting is necessary since there are three “negative” questions and two “positive” ones: hence a negative response must receive two thirds of the weight of a positive response: 37

$$sentiment = \frac{Q14 + Q17}{Q14 + Q17 + 2(Q13 + Q15 + Q16)/3} \quad 38$$

Scores above 0.5 indicate a positive sentiment on the topic, scores below 0.5 a negative one; a score of 0.5 indicates a neutral sentiment. Since just the number of responses, not their content is taken into account, these scores can only serve as a rough indication. The positive sentiment of some of the smaller categories (travel, working remotely; environment) is hardly surprising. Learning skills is also quite positively valued (see Section 4.c.iv), as is, somewhat surprisingly, interaction (see Section 4.c.vi). Mixed feelings seem to exist surrounding equity and inclusion (see Section 4.c.v). 39

Three interconnected categories that won’t be treated in detail nevertheless deserve some consideration because of both their importance and relatively low score: access, method and values. Many respondents comment on the increase in digitisation: “Many institutions moved forward in digitization, and many researchers found digital resources they perhaps were not aware of” [481]. Positive outcome is the “radically accelerated pace of obtaining and disseminating scientific information” [39]; another that “it led us to ask different questions... It prompted research areas that might not have been visited without the urgencies of limitation” [47]. Many respondents signal the danger of losing “the contact with the ‘material’ part of the discipline” [23]: “The biggest risk in my opinion is that over-reliance on technology will lead increasingly to a situation where, if it’s not online, it doesn’t exist. This will favour certain approaches and ideological bents, and harm others.” [243]. And what is digitised is not even under control of the researcher: “researchers reliant on digitized materials are at the mercy of those on the other side of the scanner. We don’t have a say in prioritizing what gets digitized and what doesn’t” [480]. This viewpoint, however, could be qualified by comments such as: “I have to give a shout-out to dozens, possibly hundreds, of extremely helpful reference librarians who have been quick and accurate in responding to research needs during the pandemic. This included, more often than not, providing scans of pages without charge — and, in some case[s], responding to a request for additional work without complaining” [393]. Digitisation has methodological consequences, and these are not always seen in a positive light. Compare for example: “Our tools shape the way we think – the increased speed of digitisation allows for more analysis of big data and more research questions based on questions related to quantifications in general” [437] with “I am concerned about how reliance on digital resources can shape research questions and trends — a topic which to my knowledge no one has looked into” [198]. There is also a middle ground: “One might look at the music they’re researching from a different perspective — they might get inspired to perform their research by using different musical softwares” [354]. 40

A digital turn in musicology will touch on disciplinary values as well, and when these are mentioned it usually with concern. One is music as a sensory phenomenon: 41

> Much research still depends upon living and moving through the world and experiencing things with our full sensory faculties. 'Online' research, if not supplemented with its corollary, is capable of representing only a small subset of the cultural and social meanings of music, and is prone to gross misrepresentations that have only begun to be discussed in our fields.[292]

The openness of the discipline may also be at risk by potentially "Establishing a new status quo that essentializes technology in musicology, creating a skill- and financial barrier to undergraduate students and global scholars" [30]. Trust and respect may be at stake: "I think that we're tending to splinter into groups that don't trust one another, and that is inherently a bad thing" [143] so that in the end "We are all getting a little less human" [111]. On a more positive note, some comments connect "accessibility and ecological[ly]" [474] benefits of digitisation and envisage the possibility of a "greener scholarship" [42]. These are important concerns, and however positive one may be about the digital turn in musicology, such issues need to be debated as part of the shaping of the future of the discipline.

4.c.iv Learning New Skills

The most fundamental consequence of the pandemic was of course that nearly everyone had to learn new skills to be able to function in the online environment. Twenty-three respondents comment on this, often describing increased digital skills as a positive outcome. For example, the pandemic "added to the acceptance of technology. It helped people, which were reluctant, to also see technology's possibilities and chances" [234] and "to become more open to digital tools, modes of operation, and modes of thinking for what constitutes 'legitimate musicology'" [108]. Critical comments come from six of the respondents, pointing out among other things the cost and availability of the necessary training. Not all training is entirely adequate: "Many of the trainings assume that you want to make said technology the centre of your research/teaching" [277]. The amount of learning should maybe not be overrated: "It's like 'we're so technologically focused now', but it's really just Zoom xD" [215]. But on the other hand, "Because everyone had to learn how to use Zoom all at once, it actually works pretty well "[427]. Mastering video conferencing tools thus appears to have become a core technical skill because of the pandemic. 42

Respondents mention a considerable number of other technical skills they acquired, including video editing, programming with music21[2], music notation programs, and online collaborative work, but one of these stands out, namely the ability to access and use digital resources. In the following sections we focus on the social aspects, reserving methodological aspects for another publication. 43

4.c.v Equity and inclusion

An important cluster of responses discusses whether technology might create a more open and inclusive disciplinary culture, because, in the words of one respondent, it "decenters the world, and allows for amazing interchange of ideas and people" [132]. Due to the pandemic, "a new, more global conversation about music" [362] has emerged. Technology could show "how it is possible to create a more equitable, global musicology" [217] as envisioned by former International Musicological Society president Daniel Chua [Chua 2022]. In addition, according to several respondents, technology "has allowed much more remote work (including presentations) that both increases collaboration and helps underrepresented scholars" [138] and "expand[s] access, particularly for underrepresented and marginalized groups" [270]. The changes are therefore not to be discarded after the pandemic: "I think we can go some ways in address[ing] equity in academia if we were to keep symposia, workshops, and conferences online" [160], or, when they are in-person, "we must retain the online versions. It should in any case be mandatory for institutions to do this as part of their open access/disability etc., policies "[114]. 44

The same technologies however carry a risk of exclusion as well. First, one must be skillful enough: "If you were not very much confident in using everything, you might need to spend to[o] much time to make things work" [229] and secondly be able to get access those technologies at all: "Access, both in terms of expense and facility of use, is a large contributing factor to who can and cannot take advantage of technology in their researc"h [156]. Unaffiliated researchers may hit upon "new gate keepers" [27] blocking access to resources; early career researchers may have difficulties getting noticed in the online environment [19]. Technology may even appear as an "exclusionary practice that leaves non-technological people behind, including those in developing countries" [58]. Strong feelings of exclusion speak from the following response from South-Africa: 45

> I have to also flag that there have been times where it has felt like the global North opened their doors through technology in the early stages of the pandemic (when it suited their interests) and now while they are moving to fewer restrictions they are simply closing those doors again. This feels like yet another instance where the global North has abused the global South when it suits them and then denied access when it would be advantageous for us (in the global South) to continue accessing these resources. [160]

It may seem a simple task to engage inclusively in global conversations through accessible online conferences or webinars, and data and publications are being made increasingly available through the rapidly growing FAIR principles [GO FAIR n.d.] and the Open Science movement [UNESCO n.d.] However, the role of publishers and other content providers in establishing and policing financial barriers still impacts widely on access.

4.c.vi Interaction

Earlier (Section 4.c.ii) we discussed how individual researchers expected their own interactions to be affected by the pandemic. Here we look into the changes they observe at the disciplinary level. We already saw many responses in Q18 that concern conferences. The discipline-level responses from the other questions suggest again that this has been perhaps the most impactful change during the pandemic. Some respondents see this change as the future of the discipline, and not just for reasons of convenience, for example: 46

> We've learned that you can hold conferences and give colloquia online. I don't think we'll ever go back to in-person colloquium — the economics are squarely against it. And as global travel becomes less common (because it has to), online conferences are sure to become increasingly important. [176]

Precisely the opposite sentiment speaks from this comment:

> I strongly believe we should go back to the "old normal" […] Particularly, I am concerned that, if we all send the message that digital conferences are as good as (or better than) face-to-face ones, and doing archival research remotely is as good as (or better than) face to face, then we will be shooting ourselves in the foot in the long run, with institutions and funding bodies cutting even further funding for conferences and research trips. [198]

The following remark nicely captures the widely felt experience that, while online conferencing has its limitations, there are important gains that should not be lost integrated into the social infrastructure of the discipline:

> Technology is not a substitute for meeting in real life; Zoom fatigue is not good. But institutions and organisations have to think through the hybrid option, and (in Philip Bohlman's phrase) recognise the "current musicological moment" for what it is. [217]

Several respondents give examples of the kind of "increased international interconnectivity" [83] that has emerged. One organised "an online conference on Zoom in the early days of the pandemic, leading to a long-lasting informal network of specialists across the world" [478]. An attendant of such a meeting describes the rewarding experience of being "in the 'room' with a number of very well respected thinkers in the field. Those whom I would probably not meet in real life" [293]. Students may also benefit: "I've also been able to start a 'remote' lecture series for my department. […] this has broadened our ability to help our students learn from scholars who are not at our own institution" [362].

47 Technology also facilitates collaboration on a more global scale, for example by enabling "to hold meetings of members of research groups based in different countries more easily, or to create new international research groups with greater ease than was possible before" [109] and "generous sharing of digitized resources among colleagues" [275]. There are however several concerns about impact of mediated communication as compared to direct interaction. Informal talk may end up not being so ephemeral when it's archived and "present a risk to researchers [sic] reputations, as they may not have chosen their words quite as carefully as they would in a written published work" [179]. Trust may become an issue:

> I think that that not meeting in person has led people to be much more suspicious of one another, convinced that some people have bad motives, and then to voice opposition in ways that are needlessly insulting. I think that we're tending to splinter into groups that don't trust one another, and that is inherently a bad thing. [143]

And, maybe because of this, people may express themselves more cautiously:

> Digital communication also results, in my experience, with a higher level of curation and filtering of information and openness [82].

Striking the right balance between the human and technology is thus very much an issue of concern, and when interacting remotely it is maybe good to remember that "colleagues, students, and librarians are live, physical, etc." [420]

4.c.vii Teaching and learning

48 Contrary to our expectations, many of the musicology researchers who participated in the survey discussed their experiences of teaching and learning practice in some depth. Even though we did not specifically ask about teaching, as our focus was on the impact of the pandemic on research, the topic arose time and time again across the answer set, demonstrating the importance of the topic to the participants. Indeed, numerous universities had required their academic staff to cease research activities at the start of the pandemic to free up time to move teaching online in response to the global lockdowns:

> There has been no time to do research, between redeveloping teaching materials repeatedly, dealing with increased caring responsibilities, and handling extra work for colleagues who are out with health issues. [264]

> Under the pandemic, I had no time for research at all, having to cope with the digital teaching situation under poor technical conditions and without no real help from my institution. [683]

Some students however did not engage, whether they did not switch on their cameras ("Teaching black tiles in Zoom isn't fun. You simply don't see, whether the students struggle for insights or for the lid of their nutella glasses" [120]) or occasions where a small number of students regularly contributed: "I hated teaching on Zoom. Students seemed to be tuned out and the same handful carried almost all of the conversation. I felt like I never got to know them and they never got to know each other" [622], and "classes on Zoom allow people to, well, Zoom out and do other things on the side while the camera is switched off" [522]. The limitations of the gaps between the physical and the digital were readily apparent: "Don't get me started with their experience with primary resources… you can't look at a digital copy of a 17th-century score on a computer screen and really get any feel for how it was put together or what it is" [622].

49 There were numerous examples of technical limitations specific to teaching. Some of these of course related to problems everybody was facing at the time, such as lack of expertise in teaching digitally: "The time I wasted – and still do waste these days for teaching recordings – on editing my own videos is ridiculous" [234]; "…redesigning courses for online and then hybrid teaching" [264] and "because of connectivity issues" [406] or poor access to software and hardware: "Because we not even had notebooks to do it and had to use our private equipment. It took half a year for the

university to provide a reliable software and hardware equipment but we had to find solutions immediately on our own to not let the students down. That was very exhausting and frustrating" [579].

More specifically for music audio, there were additional technical limitations which may in the classroom have had a simple tried-and-tested solution, but in the online space were complex: "I wish, while teaching online, that I could have been able to share both a recording and a score at the same time" [543] and teaching music performance, not a complex task in-person, suffered from connectivity issues ("…trying to teach Western rhythm and its notation to Thai classical music students via Zoom as part of ongoing research collaboration with Thai institutions. Delay due to unstable internet made the task near impossible" [68]), as well as various Zoom-related challenges: "I also teach Oboe, and the sound quality of platforms such as Zoom are terrible in reproducing instrumental performance. A disaster "[114]; "Had to give up teaching performance since it's no fun trying to teach sitar on Zoom!" [435]. The limitations of software not designed for music were very plain: "…the technology for singing/making music in the classroom along with online resources that were not equipped for music meant that I spent almost all of my Covid time fighting technology (panopticon / Camtasia / Canvas / macOS) trying to make videos of my classes to keep them going" [62]. 50

As well as the technology, the mode of teaching was also problematic, after moving entirely onto Zoom, many classes were later shifted back to in-person or hybrid, with students in-person and on-line simultaneously. The tensions surrounding the two modes of participation were frustrating and distracting: "It was like teaching online with an audience in attendance" [85], and the need for simultaneously use multiple types of software also confounded some: "Teaching music has been extremely difficult due to issues like using the blackboard while trying to Zoom or making sure my online and in class students are both engaged" [88]. One participant summed this up – "with participants both 'in the room' and 'in the Zoom'. It's horrible!" [455]. 51

However, this was not always the case and numerous participants noted the benefits of the teaching pivot. Students could often be more engaged than previously: "They were considerably involved in the course. They did oral presentations, engaged discussions, and opted for transforming their oral presentations into written papers at the end of the course. In my experience this is much more difficult with face-to-face lessons" [85], with higher level of participation ("My audience doubled because it was more convenient for the students to attend courses staying at home (attending is not compulsory) "[86]) and significantly better punctuality ("They want to continue working on-line, rather than having to travel to the faculty. Students tend to be much more punctual, and they prepare their presentations more carefully" [114]). 52

On reflection, it seems that some positive changes in practice took place, particularly of note is the reusable nature of teaching videos: "Given the success of the recorded presentations, they will become an option for students in future versions of the course, whether the course is online or on campus" [131], which reduces future workload ("I have made all those recordings available to students, so now if they miss class they can just watch the video, and there is much less work for me to do to help students catch up" [226]) and allowed the adoption of new pedagogies ("Flipped teaching. it turns out that this actually works, and now I've made all the videos already" [601]) and involve guests more readily ("Being able to present guest lectures more readily via Zoom opened up a lot of great opportunities for me, as both a presenter and host" [562]). 53

Generally, it was accepted that online work was here to stay ("Online teaching/meetings are now going to be embedded into academic culture" [70]), with some positive experiences even celebrating how teaching online was better than in-person: "Piano teaching by Zoom – that was great! When my new student, a very weak girl, whom I had never seen alive, entered the conservatory, I realized that I can do something and I'm worth something" [261]; with the complexity of numerous software being overcome ("Being able to teach an advanced class using Discord and Twitch, Skype, XSplit, YouTube, game consoles, etc, in a fashion better than I could do in person" [276]) and online tutorials with one student being more feasible than large classes ("Being able to do one-on-one tutoring/advising with a student from my home regarding his/her thesis" [441]). 54

In terms of teaching and learning, therefore, we should end on a positive note: 55

> Among the blessings of the pandemic were learning that we could do a lot of testing remotely, by have the students submit videos, saving us valuable class-time. Having to teach caused me to make a lot of changes in course design, all of them for the good. It gave me the license to try things I had thought about doing for years, and most of them worked. The year I taught online was a year of ceaseless innovation. I used it as an opportunity to do things differently and better. Yes, there will challenges, but I focused on the medium's potential and not it's limitations. In order to do ear training online, we required the students to acquire digital pianos, and we made those pianos smoke, with a corresponding (and unprecedented) spike in student learning and achievement. [543]

> Zoom and other teams surfaces allowed me to teach throughout covid and it allowed me to participate in conferences. It is impossible not be deeply thankful for those who invented these programs. Zoom is not the same as teaching or lecturing in person, especially, in the case of music. But teaching from one's home had something emotional and beautiful about it. Technology saved us from being completely isolated. Similarly, listening to music on the computer and mobile phone was a life saver. This is another experience and an interesting experience. We lose a lot but do gain something. But: like technology saved us during covid we now have to save ourselves from being forever dependent on technology. [615]

5. Discussion

In this section we discuss our main findings and place them in the context of other research into the impact of the pandemic on academia. Our central research question, "what was the impact of the pandemic on musicologists' use of technology," is answered by a quantitative and qualitative analysis of the 584 usable responses to our 2022 online survey. The demographics and disciplinary interests of the respondents are rather similar to those of our previous survey (2014–2015), and we did not widen our request for demographic information because we wanted to follow the design of the previous survey to enable comparisons between the two datasets, focusing on location, level of education, affiliation and specific musicological 56

interests. Most respondents come from the global north, the anglophone world in particular, and since the survey was online, it is biased towards participants with access to technology and digital literacy. The outcomes therefore cannot be generalised without question.

As shown earlier (see Section 4.c.i), we observed a limited preference change towards digital resources, primarily due to the general increase in availability of digitised materials, but also because of lack of access caused by the pandemic and the general increase in working from home. This "perfect storm" enacted an acceleration of the adoption of digitised resources within musicology, perhaps aligning the discipline more closely within digital humanities than previously noted by Döhl [Döhl 2020]. Many respondents reported that they expected to keep some of the change that they made during the pandemic. The spread in the responses is quite large; moreover, lack of change may indicate both a preference for traditional work practices and a long-term adoption of digital approaches. 57

Nearly everyone has been affected in some way by the pandemic, and in academia the effects have been felt by academic staff and students alike. It is therefore important to delve deeper into the experiences and insights in the textual responses. In those, we observed a number of important areas of change. Here we focus on three: individual changes, teaching and learning, and changes in the discipline. These impacts include the topics identified in this survey and have been identified across disciplines and borders. 58

With respect to individual changes, the tension between positive and negative experiences of using and adapting to new formats [Oliveira et al. 2021] can be seen vividly in the findings – again showing the need for reliable technology and adequate training and support. Many of us have experienced how the hybrid model has continued after the pandemic subsided [Azevedo et al. 2022]. The impact of the shift to online in collaborative music-making meant a change in approaches was needed to accommodate the difference affordances of the technology (playing in real time vs learning from recordings [Gibson 2021] or synchronous and asynchronous learning [Camlin and Lisboa. 2021]. The frustrations of poor connections and time lags in music performance and Skype had already been identified before the pandemic [Joseph et al. 2020], although Skype was barely mentioned in the survey responses, Zoom and Teams being the most prevalent online conferencing software, demonstrating the fluid and fast-moving nature of the technological context. Access to collections was frequently raised, supporting Onyeji and Onyeji's (2022) discussion of folk music materials in the Library of Folk Music of Nigeria project [Onyeji and Onyeji 2022]. Individual changes in musicology thus seem to follow the general pattern, with the added complication of music as a collaboratively-created, highly time-sensitive medium. 59

Another theme centred on teaching and learning, which was rather unexpected as our survey was geared towards research. As in academic global health programmes [Rose et al. 2022] the pandemic had impact on education, research and administration. The "digital turn" in music education has been documented elsewhere and the distinction between "emergency remote teaching" and online learning [Camlin and Lisboa. 2021] is highlighted by the stress the pivot caused many of the participants. The shift to online classes comes out very clearly in the survey results, along with limitations on travel and communication impacting on research outputs and practices. Analysis of this impact across academia [Arday 2022] has shown how widespread these shared impacts have been. The lived experience of the participants in our survey highlights the personal impact of these enforced changes on musicology researchers. An important finding here, in terms of equity, was that while global north participants could rely to a degree on the technologies which were being provided to facilitate the shift, those in global south struggled [Nyashanu et al. 2023] [Sahoo et al. 2021] and anticipated a reduction in access once the pandemic had subsided. 60

Interestingly, quite a few responses reveal, implicitly or explicitly, a sense that the discipline itself is changing. We focused on three dimensions of change: learning new skills, equity and inclusion, and interaction. 61

Since early 2020, a huge amount of research has been done on a wide range of aspects of Covid-19. By comparison, the number of publications that study the effect of the pandemic on disciplines and researchers themselves is rather low. Here we discuss a selection. The one we found that comes closest to our work is Sezen-Barrie et al. (2023), surveying 408 faculty, staff and students from university in the northeast of the U.S, representing a wide range of disciplines. Their study focusses on productivity and health and well-being rather than on technology, but technology plays an important role in the responses. Adaptations to the pandemic include use of virtual communication tools such as Zoom, online teaching and conferences, increased [technical] knowledge/skills, using digital collections and the pursuit of new research opportunities. As one of the lessons from the pandemic, the authors conclude that "digital technologies can help create effective and equitable virtual teaching and research opportunities" [Sezen-Barrie et al. 2023]. While our research supports that view, our findings relating to access suggest that a longer-term approach is necessary if we are to make any progress towards putting global north and south on an equal footing. 62

Equity is a recurring concern in the literature. Presenting the outcomes of a series of workshops with Indonesian researchers in social and humanities research, [Rifai et al. 2021] conclude that, while much empirical research can be done in principle using online meeting platforms and communication apps, there are various issues in the adoption of digital research methods. Some relate to lack of direct interactions with informants; others relate to the "digital divide" restricting access to infrastructure and resources in developing countries. [Livingston_2023], in an ethnographic study of academic-community partnerships in food systems research, shows how the pandemic impacted on power relations between academics and community partners, often at the expense of the latter. Further to this, [Hopkins 2022] observes that digitisation and open-access publishing have had a positive impact on equity in Digital Humanities, both for Eastern Europe and developing countries. He also connects digitisation to carbon neutrality — a minor theme in WDMDAD — and recommends (art history) journals to go fully online. He remains however a supporter of in-person conferences. [Watkinson 2022] observes — from a publisher's perspective — that infrastructure was a limiting factor in the use of eBooks worldwide. Yet online humanities conferences have caused "a flattening of the previous inequalities of participation." He also sees a change in work practices exemplified by the use of collaborative writing environments, which may lead to "more team-based humanities research." 63

We thus find rather similar themes and observations in the literature about other disciplines. Individual responses and stories indicate that there is a large variety in the ways that researchers adapted to the pandemic and how they assessed the role of technology. The pandemic made the researchers' physical world smaller but dramatically enlarged their digital world. This may explain why questions of in- and exclusions are so much in 64

evidence in these publications. Hence, equity should be an important theme in shaping the development towards “global musicology” and the role of technology therein.

6. Conclusion and recommendations

65 The storyline that emerges from our analysis of the responses is that the pandemic forced the community to attain a technical skill set that enabled online communication in many forms and provided access to a wealth of resources. Most notably this is true of students, who were exposed to several years of mainly online teaching. These experiences may have widened horizons in a variety of ways, with respect to collaboration and networking, resources, tools and research topics, and finally methodological reflections. Nearly all fundamental aspects of the discipline have been affected in some way, and it seems safe to say that, under the influence of the pandemic, the digital has become an integral part of the musicological discipline.

66 While we derive our storyline from a bottom-up analysis of the WDMDAD survey, theoretical work elsewhere in the humanities propose complementary insights. That the humanities are undergoing a paradigm shift – accelerated by the pandemic – is claimed by Lorella Viola (2023). She criticises the “evolutionary approach to the digital” of “gradual adjustments” by which “the existing model of knowledge creation is left essentially intact” [Viola 2023, 6]. Instead, she argues that the digital “affects the very practices of knowledge production” [Viola 2023, 7], so that “the digital is no longer contextual to knowledge creation but that knowledge is created in the digital” [Viola 2023, 9]. We haven’t encountered this level of methodological reflection in our data, but some of the practices our respondents describe suggest that this shift also affects musicological knowledge production.

67 Further analysis of the responses may refine or question our storyline. Speciality is an important viewpoint for further studying the comments relating to access and method. In addition, regional and national difference merit investigation. The storyline is also a prediction of future developments, potentially to be tested by means of another survey in a number of years. One particular point of concern is to what extent technology divides the community; a next survey should therefore have a much better coverage of audiences that have been underrepresented so far. A comparison of the 2022 and 2014–2015 responses would provide further insight in the pace of disciplinary change in the recent past.

68 We also believe that our work has practical implications, first for musicology, but by extension for other humanities as well. Many music (and humanities) researchers, especially the younger generation, now possess a basic common toolset and share similar experiences with these. In Viola’s words:“ As a bare minimum, for example, regardless of the discipline, a post-COVID researcher is someone able to embrace a broad set of digital tools effectively” [Viola 2023, 7]. Post-COVID researchers in musicology and elsewhere will likely shape their work practices and aims around these tools and experiences, with potential consequences at all levels of the discipline. At the same time there is a considerable group with limited access to technology or is, for whatever reason, unwilling to use it. And there is a very large disciplinary legacy that remains inaccessible digitally. There is thus a looming threat of multiple digital divides. We have seen above (see Section 4.c.v) that technology has the potential to include as well as to exclude. This may be seen as an illustration of Kranzberg’s first law of technology: technology is neither good nor bad; nor is it neutral [Kranzberg 1986], the implication of which is that shaping technology and its application is a profoundly human task. We argue here that this shaping ought to take place not only at the individual and local level, running the risk of fragmentation, but especially at the level of research communities and international organisations. Many of these support values such as equity, inclusion and openness. By using technology to support these values (and developing policies about their proper use) they can demonstrate that technologies that have regularly been described as “disruptive” can be employed constructively, enhancing human networks, connecting material and digital resources, and combining new and traditional approaches to the full range of research topics.

Acknowledgments

69 The authors would like to express their gratitude to the participants who freely gave their valuable contributions, the musicological societies who helped by promoting the survey, and the anonymous reviewers whose comments allowed us to substantially improve our text.

Appendix 1. Survey launch page and informed consent

70 Musicologists and other music researchers generally have been quick to adopt technologies that might help them with their work. Early examples include microfilm, phonograph and tape recorder. Nowadays researchers frequently make use of the possibilities that mobile phones, social media, digital libraries, search engines and computer software offer. But these technologies do not always have a good fit with the daily work practices.

71 We are looking at the research practices of musicologists and other music researchers to gather information which can be used in the development of technologies relevant to these practices. This survey will provide some insights into how you have responded to the Covid-19 pandemic.

72 Whether you do not use much technology, or if you use it a lot, we are interested in finding out your views.

73 This survey has 14 questions. Some questions are multiple choice. In other questions we would like you to write a little about what you do, what you think, and about your experiences with technology. Depending on how much detail you wish to provide, we expect it will take you between 10 and 25 minutes to complete these questions. If you feel uncomfortable writing in English, please use another language.

74 Your participation is voluntary, and you can withdraw from the survey at any time before you finish. If you take the survey we will not ask you for any identifying information. Your comments are anonymous, but please do not provide any information that could make you identifiable, or that you do not want to be quoted in publications. At the end of the survey we ask you if you wish to take part in future research – your response is stored separately from your survey comments and they cannot be linked in any way. Please do not take this survey if you are not doing music research.

We are: Dr Frans Wiering, Utrecht University (https://www.uu.nl/medewerkers/FWiering) and Dr Charles Inskip, University College London (https://www.ucl.ac.uk/information-studies/charlie-inskip-0). If you have any queries or comments about the survey or our research in general please contact us using the details on our home pages. 75

Participation in this survey indicates that you: 76

- are aged 18 or above
- have read the notes written above and understand what the study involves.
- understand that if you decide at any time that you no longer wish to take part in this project, you can withdraw immediately. After you click 'Finish' your anonymised answers are stored in a database and cannot be identified or withdrawn.
- agree that the research project named above has been explained to you to your satisfaction and you agree to take part in this study.

This research has been approved by the UCL Department of Information Studies Research Ethics Committee. 77

Data Protection Privacy Notice: Reference No Z6364106/2022/02/129 social research 78

The controller for this project will be University College London (UCL). The UCL Data Protection Officer provides oversight of UCL activities involving the processing of personal data, and can be contacted at data-protection@ucl.ac.uk. This "local" privacy notice sets out the information that applies to this particular study. Further information on how UCL uses participant information can be found in our 'general' privacy notice: For participants in research studies, click here (https://www.ucl.ac.uk/legal-services/privacy/ucl-general-research-participant-privacy-notice). The information that is required to be provided to participants under data protection legislation (GDPR and DPA 2018) is provided across both the "local" and "general" privacy notices. The lawful basis that will be used to process your personal data is: "Public task" for personal data. Your personal data will be processed so long as it is required for the research project. If we are able to anonymise or pseudonymise the personal data you provide we will undertake this, and will endeavour to minimise the processing of personal data wherever possible. If you are concerned about how your personal data is being processed, or if you would like to contact us about your rights, please contact UCL in the first instance at data-protection@ucl.ac.uk. 79

Appendix 2. Coding for Q13-14

Selective	Axial	Open	Occurrence of Code
Activities			603
	Accessing		167
		More digital available	29
		Scan and send	20
		Physical vs digital	17
		ILL	3
		Websites	2
	Attending		161
		Conference	55
		Meetings	14
		Semindar	6
		Performance	3
		Hybrid	2
		Office hours	1
		Protests	1
	Teaching		130
		Teaching online	71
		Heavy teaching load	7
		Asynchronous	6
		Hybrid	5
		Blended	4
	Learning		58
	Communicating		24
	Producing		24

	Working from home		14
	Moving research online		10
	Collaborating		9
	Doing interviews		2
	Multi-tasking		2
	Music listening		2
Barriers			23
		Lost data	8
		Finance	6
		Broken link	2
		Unhelpful library staff	2
		Virus	2
		Delays	1
		GDPR	1
		Security	1
Drivers			22
		Reliability	9
		Helpful librarians	6
		Ease of use	4
		Quality	3
Impacts			75
		Community	21
		Engagement	8
		Difficulty	7
		Effort	5
		Wellbeing	5
		Convenience	4
		Stopped research	4
		Travel	4
		Fatigue	4
		Choice	2
		Copyright	2
		Forced	2
		Philosophical	2
		Speed	2
		Time	2
		Dependence	1
		Financial	1
		Fun	0
		Health risk	0
Technologies			260
		Hardware	39
		Internet connection	34
		Limitations of software for teaching	10

		music	
		Email	3
	Software		172
		Zoom	67
		Incompatibility	16
		Sibelius	12
		Teams	7
		Updates	7
		Software expire	6
		OCR	4
		Finale	3
		Lilypond	2
		Skype	2
		Technological determinism	2
		Endnote	1
		Excel	1
		Spotify	1
None			66

Table 10.

Notes

[1] The title of the project is inspired by one of the authors' favourite children's book Scarry, R. (1968) "What do people do all day?" New York: Random House.

[2] music21 is a Python library for computer-aided musicology [music21 n.d.]

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