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Master Thesis

Laptop as a musical instrument: A case study of teachers' practices, perceptions and legitimation

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I confirm that the work is self-prepared and that references/source references to all sources used in the work are provided, cf. Regulation relating to academic studies and examinations at the Western Norway University of Applied Sciences (HVL), § 12-1.

Abstract

During the past decade, the laptop has been offered at an increasing number of Norwegian upper secondary schools. It is without a doubt the instrument with the fewest similarities to the remaining instruments, which offers fascinating challenges and opportunities. The empirical data is based on five laptop teachers who are comparatively analysed (Yin, 2018), and differences and similarities between their teaching practices form the results chapter of the thesis. The empirical data is based on one semi-structured interview (2-3 hours) per teacher and observation of one-to-one lessons in laptop, in addition to observation of a school concert and a band lesson with a laptop student. Due to the Covid-19 pandemic, two interviews and one observation were conducted via Zoom. In addition, triangulation (Stake, 1995) through external opinion bearers and a YouTube-analysis was used to discuss points in the data material. Through the discussion through Bell's (2015a) five prong affordance-theory, findings portray the laptop's central affordances in performance are related to recording, programming, processing, "playback", digital synthesis, sampling and looping. Findings express that the laptop in live performance can be used "in a hundred ways" (Øyvind), in addition to many approaches to music creation (programming, recording), also musical ideas can be achieved through multiple approaches. On the other hand, there seems to be an agreement that active live approaches of "Live Processing", "Live Looping" or "Live Sampling" are viewed as good performance goals. Data portraits multiple challenges when using laptop in bands alongside "traditional instruments". Challenges such as live setup with MIDI-controllers, role in the group, and approach to performance are central elements. An important point is who should be the "time-keeper" in the group, and data portrays different approaches and considerations with both the laptop as the time-keeper and the human as the time-keeper. Through informal structures in combination with the recent formalisation, additionally the explorative nature of sound design and audio processing, there are strong democratic elements in the teaching practices. The teachers mostly experience that the formalisation of the laptop has been well received, however, there are certain misunderstandings about how broad the laptops' affordances are and the many approaches to live performance.

Sammendrag

Denne masteroppgaven er en multiple-case studie som utforsker laptopen som et musikalsk instrument i kontekst av MDD-linjen på videregående skoler. Laptopen har i dette tiåret blitt tilbudt på et økende antall videregående skoler, og er uten tvil det instrumentet med færrest likhetstrekk til resterende instrument, som byr på fascinerende utfordringer og muligheter. Oppgaven sin empiri baserer seg på fem laptop-lærere (Øyvind Brandtsegg, Magnus Fjelde, Inge Weatherhead Breistein, Anders Paulsen, Ian Kolstad) som blir komparativt analysert (Yin, 2018) der merkverdige forskjeller og likheter i deres undervisningspraksis danner resultat kapittelet i oppgaven. Masteroppgaven sin empiri baserer seg på et semi-strukturert intervju (2-3 timer) per lærer og observasjon av en-til-en undervisning i laptop, i tillegg til observasjon av en klassekonsert og en bandtime med laptop-elever. På grunn av Covid-19 pandemien ble to intervju og en observasjon gjennomført via Zoom. I tillegg ble triangulering (Stake, 1995) gjennom eksterne meningsbærere og en YouTube-analyse benyttet for å belyse punkt i data. Gjennom belysning av teori av Bell (2015a) sine fem punkt om affordanser viser funn at laptopens sentrale affordanser i fremførelse baserer seg på innspilling, programmering, prosessering, reproduksjon, digital syntese, sampling og looping. Lærerne uttrykker at laptopen i live-situasjoner kan benyttes “på hundre måter”, i tillegg til mange tilnærminger for å skape (programmering, innspilling), i tillegg kan laptop-musikere oppnå samme musikalske mål gjennom multiple tilnærminger. Derimot virker det som ha mål om aktiv fremførelse relatert til enten “Live Prosessering”, “Live Looping” eller “Live Sampling”. Data viser flerfoldige utfordringer relatert til laptop i band med “tradisjonelle instrument”, der element som live-oppsett med MIDI-kontrollere, rolle i gruppen og tilnærming til fremførelse er sentrale. Et vesentlig punkt er hvem som skal være “pulsholder” i gruppen, og data fremmer forskjellige vinkler og hensyn med både laptop som pulsholder og mennesket som pulsholder. Via belysning gjennom Folkestad sine punkt for uformell læring fremmes det at undervisningspraksisen i laptop har sterke inspirasjoner fra uformelle strukturer, og i kombinasjon av at instrumentet er nylig formalisert i tillegg til den utforske natur av lyddesign og miksing er det sterke demokratiske element i undervisningspraksisene. Det fremtreder at selv om det eksisterer en delvis enighet om at læreplanen i hovedinstrument ikke er like tilrettelagt for laptop, er laptopen et meget aktuelt instrument for å oppfylle de overordnede målene for LK-20 (Kunnskapsdepartementet, 2017). Lærerne opplever for det meste at formaliseringen av laptop er tatt godt imot, derimot det visse misforsåelser om hvor brede affordanser og aktive tilnærminger til live fremføring som eksisterer.

Acknowledgements

This year has been a strange one. Filled with many ups and downs, loads of information and also a world of active laptop performance which opened up. I do not think I ever have done anything this massive, neither thought so much about five conversations (the interviews) in my entire life.

The interest for this thesis started with an experience of playing the iPad with an app containing digital instruments like a saw-synth lead and a theremin, with intuitive expression through touch screen. I wished to research how this instrument could be used for intuitive musicianship and music creation in education, and that was the idea for most of my first year in music pedagogy (MA). It all changed after dialogue with Øystein Kvinge (PhD, HVL), who taught laptop for the first year it was offered as an instrument at the institution. The iPad is an interesting instrument in itself, but the laptop is actually in the process of being formalised into music education in Norway, additionally being the instrument almost all music is recorded onto, mixed in, and even released through. I thereby would like to thank Øystein for helping this idea take form, as well as taking time for the pilot interview for this thesis.

As we all wish we didn't know, the year of 2020/2021 has been the most challenging periods on a global scale since WWII. To write a Master thesis this year has raised many challenges, as almost all guidance and teaching has been done online through zoom. Despite this, I feel lucky to have a year related to working in solitude in this period. It is probably the young who have suffered the most from the pandemic in Norway at least, and it would be notably worse being a new student in a new town than a fifth year-student writing this thesis.

The biggest thanks of course I hand to my supervisor professor David Gabriel Hebert, which has been the biggest motivational factor for me to produce this thesis. You have been a huge impact on the theoretical perspective, as well as giving the opportunity and motivation to present this research project for the Nordic Network for Music Education as well as the Grieg Research Group. If you're not a Norwegian, David is the reason you are able to read this as all, as I translated the thesis to English after a motivational speech by him.

I, of course wish to thank my mother, which retired from her job as associate professor at Western Norway University of Applied Sciences (HVL) three years ago. Without your academic expertise and faith in me, I am not sure I would even have been writing any thesis at all. Though not direct for my venture, I would like to show gratitude to all the researchers who have created the content this thesis rests upon and all the musicians changing our idea of what music can be through the use of technology in all its forms. We all merely stand upon the shoulders of giants.

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Introduction

1.1 A world of technology

The world we live in is complex, nuanced and in constant evolution. Through development and implementation of new technologies mankind has made tasks less time consuming, providing humans more time for activities which the technology can't do at the given time. Mankind today is highly dependent on technological inventions to extend their range of agency:

Yet, the success of human beings in this world plainly does not depend on bare brains any more than it depends on bare hands. It is the dramatic flexibility of the brain and the hand to fashion tools and use them in so many varied and powerful ways that is perhaps the most distinguishing mark of the human condition. The average human being does not function as a person solo but overwhelmingly as a "person-plus" (Salomon & Perkins, 2005, p.75-76)".

Through the history of music there has always been invention of new instruments and applicable technologies, leading to the creation of new genres and cultural expressions. With notable inventions like recording tape and the electric microphone, as well as the possibility to record onto the medium of phonograph and vinyl, the culture of the world has been shaped by many musical inventions in the 1900's (Bell, 2018). Music technology created the opportunity to record instruments and experiment with manipulation of sound, and producers like The Beatles' George Martin started to use the recording studio as an instrument to create textures which was impossible earlier (Lester, 2016). In the world of synthesizers, Robert Moog popularised the first keyboard-controlled analog synthesizer, the Moog Module, and later Yamaha produced the first widespread digital synthesizer which dominated 80's music, used by e.g. A-ha, New Order, Phil Collins and Depeche Mode (Lavengood, 2019, s.74). In 1982 the communication protocol of MIDI was invented, a system containing information on pitch, duration and velocity or parameters from 1-127. Until now, that system has remained mostly untouched, but in 2020 Roland released the first keyboard capable of MIDI 2.0, which will be implemented in the near future. MIDI 2.0 is described as the biggest game changer in music since its creation, comparable to the difference from a black-white TV to a full color-TV (Deahl, 2020).

In the 1980s the digital revolution started, and home computers like Commodore 64 and Atari ST were capable of music production through MIDI. In 1985 Steinberg released their first sequencer, continuing to release the first digital audio workstation for the Atari ST, Pro-16, which developed

into Cubase in 1989 (Levine, 2019). Through the 90's, the computers became faster and smaller as the laptop became capable of processing playing and performing of live music in real-time, and the use of laptops to perform music has had a massive impact on popular-, club- and experimental music scenes. Instead of dragging huge computers or loads of physical LPs in order to DJ, the performers now could have their entire set stored in a small and light device, where just searching for a word gave instant access to the next tune to play (Saddler, 2016). Outside of DJs, the portability of the laptop allowed artists like Björk and Herbie Hancock to explore the use of DAWs in tours at the start of the millennium (Wolek, 2012). This situation also shares similarities with the invention of the bass-guitar in the 20th century. The upright bass is dependent on a big resonant hollow body to amplify, as well as thick and heavy strings with a large distance from string to neck, so the instrument will be both heavy to play and hard to transport. The electric bass, which removed the need for acoustic amplification, reduced the body size, thickness of strings and height, allowing musicians to play faster with less force as well as making transport much easier (Bell, 2015a, p.48).

In the world of music there sometimes erupts a “WOW-moment” with the release of new music with inherently different traits, which leads to a paradigm shift. Consider, for instance, when guitarists like Ray Davies discovered how to distort their amps, leading to a grittier sound in many genres (Giles, 2014). The oeuvre of Jimi Hendrix remains one of the biggest Wow-moments in distorted guitar, playing effects like an instrument in addition to complex musicianship (Hinton, 2020). One can see the “WOW-moment” in many genres, and in 2010 the EDM-producer wave kicked into the mainstream with a bang with the explosion of modern dubstep, a mostly computer-based genre with extreme drops and sharp sounds changing the game. Skrillex was a notable figure of the modern dubstep in pop culture, and although many now find dubstep obsolete, one can't deny that the sound somewhat changed the spectrum of modern EDM in popular culture (Aaron, 2014). Since 2010 the popular charts have been dominated by computer-based music, as genres like trap as well as lo-fi hip hop have been popularised in the 2010's. In this digital age the laptop has become an artifact capable of performing a vast amount of musical actions, and that is what I explore in this thesis. Enter the laptop.

1.1.1 Definition of “laptop”

Since this thesis will focus on the laptop computer as a musical instrument, it is a necessity to define exactly what the “laptop” actually is. According to standard dictionary definitions, the laptop can be defined in the following ways:

A portable microcomputer having its main components (such as processor, keyboard, and display screen) integrated into a single unit capable of battery-powered operation
(Merriam-Webster Online Dictionary, laptop)

A computer that is portable and suitable for use while travelling
(Oxford online dictionary, laptop)

A computer that is small enough to be carried around easily and is flat when closed
(Cambridge online dictionary, laptop)

Synthesizing the main points from these definitions, we find that the laptop is a small and portable computer with a battery, and it also typically contains a keyboard, screen and touchpad. One side often carries the screen, and the other side contains components, including the keyboard and touch pad.

1.2 Formalisation of the laptop into schools

Since even before the laptop was formalised in music schools, Norwegian schools have had an increased focus on popular music since the late 90's. The practice of band rotation is common in primary and secondary school, with students trying out a different "rock band" instruments (e.g. drums, guitars, bass, keyboards/synthesizers) for every song they play and perform in band (Hanken & Johansen, 2013). Later on, upper secondary school pupils wishing to focus on music apply through auditions on a specific instrument, which will be their designated "immersion-instrument" to serve as the main focus throughout the three years.

In Norway there has been an increasing number of music courses at upper secondary schools which have implemented the laptop as a possible instrument to immerse in during the 2010's. The students learn to use the laptop containing music software as an instrument, much like a student learning piano (Øgrim, 2016). The laptop musicians learn from a teacher one-to-one, perform with laptop in band class alongside traditional instruments, and perform both alone and with other musicians in concerts. In this way the laptop has moved from the informal arena where it first was capable of processing a live performance since the early 2000's, and is now slowly taking form into formally structured education in institutions. Having slightly more than 20 years of use in the music scene, the laptop is by far the instrument which has the least amount of history directly linked to the instrument itself. An important point to mention is that the

implementation of the laptop would likely not have taken place in such a widespread fashion if there was not a focus on popular music in schools beforehand.

Laptop lessons abide by the national curriculum, which has “competence goals” by which to evaluate students. Namely, performing rehearsed and improvised repertoire, exploring expressions and means of interpretation and improvisation, rehearsing and performing music through hearing and notation are some curricular goals for “immersion-instrument” lessons (Kunnskapsdepartementet, 2019). The laptop is somewhat different from other instruments which are mostly acoustic/electric (except digital pianos/synths), so how does laptop fit into the curriculum made for real time performance-based instruments?

In this thesis I will only focus on the laptop as an instrument, since stationary computers are not portable for use in performance, and tablets/phones (simply small computers) do not have the nuanced affordances provided by the laptop, although increasingly sharing some important capabilities in both creation and performance of music (like the App Garageband and Cubasis).

1.3 Personal motivation

My motivation for writing this thesis is multifaceted:

- 1. To show musicians and teachers to approaches to live musicianship based on empirical data, helping non-laptop musicians figure out the "how and what" of laptop.*
- 2. To show teachers and leaders of schools and how the laptop can be included into an existing curriculum or educational institution*
- 3. To demonstrate that laptop and traditional instruments not only can exist together, but complete each other in both the academic and non-academic world of music*
- 4. To learn and applying the performative perspective of music technology into personal artistry*

These motivations hint at some biases which I will discuss later, but the research itself is designed in order to deeply explore relevant questions. There is hopefully some sort of importance in the findings of this thesis, as within music pedagogy I have yet to find a single thesis about the laptop as a musical instrument. Still there are books regarding teaching of music technology in both performance and production (e.g. *Routledge Companion to Music, Technology, and Education*. Also, in Norway: Eiksund, Angelo, Knigge, 2020). My hope is that

this thesis will provide “real world” insights, by researching what, how and why the laptop provides some opportunities for music technology in education at all age levels.

1.4 Previous theses

In Norway there have been a small number of master theses that have directly researched the laptop and DAW as a musical instrument:

Nupen (2017) at University of Oslo who researched challenges and possibilities related to live-performance with the laptop, collecting data from professional musicians about their live setup, challenges and perspectives about challenges and possibilities with live electronic music. The research of Nupen provides reflections about the vast possibilities of live-setup and how different groups and musicians have experienced and perform with different degree of “tracks” (music playing with little interaction) and how communication between musician and audience is affected by varying degrees of live interaction.

Wallumrød (2019) from Norwegian University of Science and Technology explored the perspectives on laptop as an instrument with reflections through historic analysis and data consisting of interviews with expert informants. This thesis explores different perspectives: sound history, informants’ perspectives (one in the culture school council, one teaching instrumental didactics at NTNU, and a teacher at upper secondary school), as well as a course Wallumrød arranged on laptop for youth. This thesis shows great reflection about the development of sound and the different perspectives on the instrument as a cultural artefact, where Bell’s affordance theory is used as tool for analysis as well.

There has also been research related to the agency of the DAW, digital processing, and in many fields of music technology. The laptop as an instrument can be viewed as an instrument with much research on processing etc. is very applicable, but in-depth research about the idea of laptop as a musical instrument is not yet a large field in 2021. Additionally, both of the aforementioned theses are written by musicians with music technology/laptop as their “immersion-instrument”, and I mostly come from a rock/pop/jazz/electronic background as a bassist/guitarist. Through these “glasses” I will look at how the laptop compares to and can add value to the collection of acoustic/electric instrumentalists.

1.5 Problem statement

"If it either has been the saxophone, electric guitar or Hammond organ there has always been some resistance when new technologies have emerged" (Øgrim, 2016, translated by author).

The usefulness and applicability of traditional instruments has historically been limited by their physical form, which directly impacts vibrations when played to produce sound. As the more traditional instruments have been limited, music software on the other side is not relying on form and thereby potentially limitless. Therefore I want to explore the different approaches and perspectives towards how the laptop can be used as an instrument. This through an exploration of laptop teachers' perspectives regarding challenges and possibilities related to the teaching practice of the newest instrument in upper secondary schools in Norway. Additionally, it can be useful for other teachers to be familiar with the process of formalisation of the instrument, in addition to the process towards legitimation in the non-scholarly world of music. In other words: what is the laptop, why the laptop, how are laptop lessons shaped and how did we even get to the point of acceptance of the laptop as a musical instrument?

1.6 Research questions

This thesis focuses on four separate research questions which will give a "bigger picture" view of the laptop's affordances, live uses, teaching practices, and the laptop's transition from the informal field into being formalised into upper secondary schools in Norway:

RQ1: About affordance of the laptop as a musical instrument

What do laptop teachers identify as the laptop's affordances as a musical instrument, and which forms of live musicianship appear in the lessons?

RQ2: About teaching content/repertoire

What are the instructional strategies and "repertoire" in laptop lessons?

RQ3: About legitimation of the laptop as a musical instrument

How have the teachers experienced the laptop's process towards academization and legitimation?

RQ4: About legitimation in relation to the curriculum

How do laptop teachers view the curriculum's applicability, and which arguments do they use to legitimate the laptop as an instrument?

For the first half year of writing this thesis, there were only three research questions (see p.111, agreement form). The last two research questions were later developed from a single one, which seemed a more efficient way to include a wider aspect of legitimation of the laptop. Also there have been some minor changes to RQ 1 and RQ 2 to better fit the data material from the interviews and observations, directing them to a larger extent towards the teachers' perceptions and observable points within the data material.

1.7 Delimitations

This thesis has a somewhat large scope as its field of interest, and the concept of its case studies is to perform a holistic analysis of the different teacher perspectives on the laptop as instrument. This study dives into affordances, the teaching practice, perceptions of the process of legitimation and implementation in music schools, and laptop's applicability to the national curriculum. In the interviews there were many more interesting points of data, such as motivation of students, gender imbalance, and issues associated with specific performance situations. Diving deeper into simply one of the mentioned points in depth would give a deeper understanding of a narrower problem field, which in themselves can become ideas for future research. For this reason, this thesis consists of information and conceptual frameworks from different fields within pedagogy, music technology as well as social sciences. Thereby the strength of this thesis is that it portrays what the new instrument can be and how schools that already have implemented the laptop have experienced the process. This thesis is also formed somewhat to "bridge the gap", analysing similarities between the laptop and more traditional instruments, which hinders going deeply into specific technical aspects of the instrument.

1.8 Assumptions

Before the data collection, I had mostly perceived the laptop as a music production tool, later expanding to the performance aspects while writing this thesis. Therefore, I had few assumptions regarding what I would find. Though this, I have been a formally trained bassist for several years. I have had several teachers and thereby some familiarity with the how learning situations can be on instruments from the pop/rock/jazz scene. This gives me familiarity with the situation of one-to-one lessons, which provides some background experience for comparing the teaching practices. Additionally, I have ventured from listening only to rock and guitar based music, to later learning the analog synthesizer and finding synth-based music highly interesting. In my

early 20's I noticed my inability to hear the difference between a tube amp and some digital modelling amplifiers, due to major advancements in digital sound. The same can also be said about the quality output from software synthesizers. Now I embrace digital technologies, realising how streamlined they make music creation and performance. Having undergone this transformative musical journey as a musician, now as a researcher I also understand both the side of the technology resistant and the technology enthusiasts. This thesis will then try to bridge that gap: connecting the laptop in 2021 to similar earlier inventions, in terms of both use and implementation.

1.9 Structure of thesis

This chapter has focused on background, problem field, research questions and assumption/delimitations that serve as a basis for this Master thesis. The second chapter will offer a literature review, followed by the conceptual framework for the study, with attention to such themes as Digital Audio Workstations, upper secondary schools, affordance theory, curricular theory and legitimation theory. Chapter four contains information about the research participants (laptop teachers), the multiple-case study approach and methodology of data collection and analysis, in addition to ethical considerations. In the fifth chapter I will portray the results and analysis of the data material, and in chapter six the results will be further discussed in relation to the conceptual framework. The last chapter of this thesis contains the conclusions of the study and ideas regarding possible future research. At the end, one can find the appendix section with interview guide, project information, agreement form, approval and correspondence with NSD (the Norwegian centre for research data).

2. Literature review

To be able to grasp the field of interest for this thesis, one needs information on the history, perspectives and approaches to the laptop as a musical instrument. In Norway like many other places in the world, there has been an academisation of music technology and computer-based music production since the early 2000's (Kultorp, 2017). In recent years, bachelor studies in music performance have started to offer live electronics/laptop as an instrument available to students wanting to develop their skills in live performance of digital music (Øgrim, 2016). Since 2014 more and more upper secondary schools have started to offer lessons in laptop as instrument, as we now gradually witness the formalisation of the laptop as a performance-related instrument. The movement has received notable media attention. Over half the teachers in this thesis' have been represented in Norwegian newspapers about laptop being offered at the school they teach (Breivik, 2019, Stølan, 2018, Haugland, 2018). There has been a debate with different opinions on whether or not the laptop qualifies as a musical instrument, and now we somewhat see the idea of digital information technologies as a instrument. What is worthy of teaching in a performative laptop lesson, and what could be the learning content worthy of teaching in laptop, which has had a short time of existence in the world of both education and music?

This section reviews publications which debate the utilisation of laptop as a musical instrument in a performative setting, whether or not it can be seen as authentic musical instrument, approaches to performance with studio technologies, the idea of "liveness" and the different "laptop orchestras" in universities. Moreover, this review also dives into the world of live coding, an approach with music programmed live through coding software.

2.1 The "ideation" of laptop is an instrument

With every new instrument it takes at least a handful of years for them to become fully acknowledged as legitimate in both the music scene and academic institutions. In D. A Williams' article (2014) about the iPad as a real musical instrument he compares the iPad tablet to the oboe, and discusses the definition of a musical instrument through six shared points:

1. In the right hands, both instruments can be played beautifully.
2. In the wrong hands, both instruments can be played very badly.
3. A person most likely needs to practice to use both instruments well.

4. It is necessary to build technique to play both instruments well.
5. There are audial and physical limitations to both instruments.
6. Neither will do nothing unless touched, and neither will produce sound unless touched
(Williams, 2014, p.94).

As an iPad is simply a small touch-screen computer, all points are applicable to a laptop with a DAW: it takes time to develop skills in both manipulation of audio, digital synthesis and other aspects in laptop.

E. Marlow (2009) discusses how laptop can or cannot be defined as a musical instrument. The writer observes a jazz concert in New York with a band using a laptop performer/DJ called DJ Olive, who fills the soundscape with sound effects while also soloing on top of the band (p.341). Marlow mentions the laptop can be disliked by jazz purists, but mentions that non-standard instruments have been used since the toy symphony by Mozart and probably even before that (p.342). Marlow also mentions the jazz idiom, in which Don Ellis and his band used electric key instruments, while Ellis amplified his trumpet and played it through an echoplex (tape delay) in 1967. Additionally, Marlow describes how Douglas' band Keystone mixes older genres like funk and Middle Eastern scales, combined with the new electronic sounds. He describes this potentially can be viewed as something new and possibly the equivalent of a "Toy Symphony" of the 21st century (p.343). The concert was digitally recorded and placed for digital sales just hours after the show, debating the potentials offered by digital recording and distribution (p.344)

An analysis of media representations of the laptop as a musical instrument found that in 2001 and 2002, descriptions of laptops in a musical performance increased (p.31, Wolek, 2012). Descriptions of laptop composing in digital studios and musicians like Herbie Hancock adding laptops to their touring crew started. Articles debating how much the laptop musician is actually doing, how the audience can't see the actions used to create sounds from the laptop, and different articles about laptop orchestras (though not in popular media) are part of media representations identified. Brian Winston describes the term "ideation", which is the imagination that a new technology can serve a specific purpose. The medium is described to not develop until "supervening social necessity" is perceived and musicians invest time into the instrument (Austlender, 2012, p.3). One can see the gradual ideation of the laptop as an instrument in both research and media articles.

Prior (2008) explores the relationship between music and the mobile computer, and the concept of mobility. The laptop is described to be distinct from earlier portable music devices in the case of having a studio in a small 13-inch computer, also musicians spends time on laptop for both leisure and work. Thereby obtaining a special relationship with the device and an introspective portal (p.915-917). The music software is what divides the laptop from a document writing machine, and the evolution from the 1957 program *Music I* with a single modifiable waveform into modern programs like Ableton is massive (p.921-923).

2.2 Studio technologies in performance and “Liveness”

Philip Auslander (2012) dives into the concept of liveness and the history of live performances. He describes liveness as a bi-effect of technological mediatization of sound, as recording technologies made it necessary to define when a performance is done in real-time or is a playback of a recorded performance. The first recordings made on cylinders and phonographs were created to preserve and reinforce the mode of live performance. When the radio was implemented some radio stations started playing recorded music, thereby deriving the need to separate recorded and live music. The concept of “live” was first noted in dictionaries in 1934, and recorded music and live performances started being binary oppositions (p.4). The default definition of live is that an audience and performer is present to each other, but also mediated performances (live broadcast, recorded live concerts) in which the partakers are not present, but witness the performance through technological mediation (p.5).

A central point of critique against live laptop performers is to which degree the musicians are actually performing the show live. Parkinson and Bell (2015) analyses two counterpoints in digital musicians: Derek Bailey and Deadmau5. Bailey has a higher degree of “liveness” utilising live coding, and Deadmau5 performs live in a more labor-free and coordinated live show where most of the sounds are prerecorded (p.170). There are similarities in the performers as in both a stadium prerecorded-show and in an algorithmic live-coding rave (*algorave*) the performers want to make the audience dance (p.172). Deadmau5 posted the way he approaches live shows on Tumblr: he runs Ableton live, playing stems of premixed files, as well as a signal to the video/light engineers signaling where they are in the show. He uses synths on stage to tweak the audio from Ableton, claiming this is the most live he will be comfortable playing shows (p.173). He mentions the pride in the production/songwriting rather than doing virtuosic live-performances, and that the focus is the audience and light show, not in the live performance. Bailey is inspired by the free improvisation of jazz music like Coleman where the music is non-

idiomatic, without a form, affordances and genre. Live coding emphasizes improvisation in coding and performance where it is a way around the fixed interfaces and more of commercial digital audio workstations (p.178). Live coding is portrayed as a contrast to the more traditional perspective of Deadmau5, with performers live-compositional skills are the key point of performance (p.178)

Knowles & Hewitt (2012) explores the relationship between performative, gestural and technological practices of the live performances utilising studio technologies in the 21st century. There are many conceptual precedents for digital music technologies, like the genre of Dub, which used the mixing console to create heavily-processed alternate mixes of reggae music. The technology of MIDI allowed performers to store and recall sonic parameters, and the affordability of digital technologies in the 80's allowed consumer music production to emerge. Also digital mix-consoles allowed sound engineers to store, recall and automate setups. The authors note the term "performativity" has been widely used in literature about performance to indicate elements of the qualities of performance. Knowles & Hewitt coined the term "recorditivity" to define qualities of live performances within recording practices.

In the article, Knowles & Hewitt categorises five main sections of studio production techniques in live performance: *Analog mixing as performance*, the first use of studio technology. Exemplified by the Dub genre, with Mad Professor and Adrian Sheerwood using mixing on stage. Additionally electro-acoustic music, which explores the use of technology to process acoustic instruments through tape and multiple speakers resonating in the acoustics of the room. *Digital sampling*, live performances triggering samples from pads or triggers mounted to instruments (often drums). This approach allows for e.g. activating drum-samples from the studio recording in a live setting. *Live processing and click tracks* is an approach given by low-latency computers using software plugins to process music using controllers mapped to optimise the live performance. Click tracks are often used to synchronize groups of musicians together, and allows for combination of quantized pre-made music with live musicians in performance. *Live recording (Loopers)* is deriving from the digital loop-pedals marketed towards guitarists, but used by vocalist and other instrumentalists alike. The authors mentions Ed Sheehan as an example, where the audience can visually see the process of recording and looping on stage. *Live Recording and Arranging* is the closest to the term "recorditivity", as the performer integrates recording with elements of composition and arrangement. The audience can visually see the studio process, building and arranging a track, similarity to in a studio, but in the frame of performance.

Knowles & Hewitt brings up the term of an authentic performance, and how an authentic performance is connected to showing skill that can be understood by the audience. The visual live show legitimates the performance, and live performance is a common “test” in e.g. rock music, showing the musicians “true” capabilities. Thereby the authors imply the importance that the performance is understood by the audience through visual evidence of the musician’s agency and skill. Many electronic musicians have strived to perform music with more “played” elements, like drum patterns and synthesizers. The notion has gone so far that some musicians avoid sequencers live, coining terms like “lifestep” derailing from Dubstep. This has again affected studio situations, as some musicians record their music live unquantized and without sequencers.

Cascone (2003) analysed the issues of audiences’ expectations of laptop music and electronic music in three levels through “reception theory”:

1. *Grain: laptop performance*: Electronic music is described as best appreciated through engaged “active reception” by the audience (p.101). The unfamiliar codes have prevented audiences to attribute authenticity to the performer. The laptop musician performs music in a virtual non-space, and the laptop musician pretends “presence” and “authenticity” when none really exist. The cultural artifact is misinterpreted as counterfeit, making audiences unable to value the performance (p.102). Electronic music has been commercialised since the late 70’s, where the purpose to maximise profits is described to be eroding the ability to construct art (p.102).
2. *Sequence*: Laptop music has links to the acousmatic music where the composer sits with the audience playing back the compositions, where the work is piloted by the composer. The electronic dance music culture has reduced signifiers from the 20th century, and electronic music is described as somewhat bracketed. The music has used a conventionalised set of performance-codes for to satisfy audiences’ expectations and sustain demand for the music.
3. *Satellites of super culture*: When the audience pays for a ticket they want to see skills performed which they can’t do themselves. The system has assimilated electronics artefacts, making the music easy to consume and thereby creating a demand for the music (p.103).

Cascone concludes that absence of visual elements makes for a more attentive listening. If computers are only repositories of intellectual property, the music and performance reside in this virtual space, and the audience need to “reprogram” their apparatus to active reception for better enjoying the works.

2.3 Laptop orchestras in higher education

Laptop orchestras have been a point of interest related to questions about the legitimacy of “laptop as musical instrument” in educational settings for nearly two decades. In 2005 the Princeton Laptop Orchestra started out as the first Laptop orchestra in higher education (p.171, Trueman, 2007). Trueman describes the interest of the counterpoints between the two: the orchestra enables rejuvenation of earlier music, while the laptop on the other hand is a new technologic unit. The laptop’s usual sound projection is through mono-directional speakers, while the sound of an orchestra is a mix of instruments placed in groups resonating in a concert hall. To create an acoustic instrument-like projection of sound, each laptop in the laptop orchestra is connected to a hemispherical speaker projecting omnidirectionally from the stance of the laptop musician (p.172). The performers are seated on a pillow with the laptop, speaker and multichannel rack-interface along with MIDI devices facing the conductor, while the sounds are created through live-coding programs like ChucK (p.173). Trueman describes reasons for pushing the laptop orchestras to turn the “lonesome laptop producer trend”, making laptop music into a collaborative community of performers (p.177).

As a notion of liveness, live coding can be perceived as a very close element to “totally live” as the performer relies little on pre-made music or presets on digital instruments. Ge Wang (2008) did his PhD research on the development and use of ChucK, explaining the commands, codes and possible uses for the program. Among the topics covered in the PhD dissertation, Wang mentions case studies of pedagogical approaches and teaching of ChucK, digital routing, side programs (sequencers and game boards), as well as different compositions for the program and how they are made (p.49-130). The time-based program for audio synthesis is what is used by both the Stanford and Princeton laptop orchestras, and the development of a mobile phone edition was planned as well (p.162).

Smallwood et. al. describe the compositional process for creating music for the Princeton laptop orchestra (PLOrk) in relation to sound design, conducting among others (Smallwood, Trueman, Cook, Wang, 2008). As mentioned earlier, the orchestra is not usually placed in instrument groups, but they have five subwoofers connected to five laptop performers who play a bigger role in the bass register (p.11). Composers Wang and Smallwood use different scenarios and sampled acoustic instruments as inspiration, whereas the piece “ChucK ChucK Rocket” is based on performers passing around sounds to achieve a surround experience not possible in a conventional orchestra (p.12). The performers move their hands in gestures controlling sensors,

accelerometers and more where hand movement control pitch and volume (p.14). There is a debate as to whether the conductor should be the wireless network or a human, whether synchronising to a “click track” and sequencer, or using a conductor as possible ways of keeping the laptop musicians in time. The PLOrk has shared all of its compositions and set up online for the free use of anyone wishing to start a laptop ensemble (p.23).

Taking a new step away from human-made laptop music the LOLbot software was created to learn the way human musicians improvise, giving a computational approach to a machine musician, and to provide a practice tool for human musicians (p.1, Subramanian, Freeman, 2012). The LoLc encourages people to share their codes, giving ensembles new ways to perform and loop to improvise, where activation of audio files, queuing patterns and transformation of audio is possible. The LOLbot can be used in a coherent way or to add contrast to a human-laptop performance, creating new aspects or reinforce the performance (p.3-4). All patterns are stored in binary code, and the potential of the LOLbot is seen as a precursor to multiple musician-machines performing in an orchestra (p.4). Kapur and others (2011) write about taking the laptop orchestra to an another level involving controlled automated robots playing musical instruments, whereby the mechanical, electronic and acoustic engineering, as well as computer design are done by students (p.50). The students as well collaborate in creating the ideas for the instruments:

Tammy is a spine-like robot with a marimba, stringed instrument and bells.

Raina is a motor-driven rainstick (a tube with pellets), and they developed three different percussive robots: *Mahadevibot*, as well as *GanaPantibot* and *Breakbot* (p.51-55). The project is a notable example of collaboration in an educational institution within multiple fields. Students compose music and additionally incorporate both the mechanical, digital and acoustic elements to create a special type of performance (p.61).

3. Conceptual framework

In this section I will describe the conceptual framework used for discussion of the data within this thesis. I will describe theory and framework about DAW/laptop, the upper secondary schools in Norway, affordance-theory, informal learning, curriculum theory and legitimation theory in music education. This serves the theoretical basis for this thesis, and will be functioning as a tool to both understand, triangulate and connect the data together.

3.1 Digital Audio Workstation

The digital audio workstation (DAW) is a term describing a range of software programs digitally replicating the analog recording studio environment. MacBooks have the DAW GarageBand preinstalled, and on PC it is simple to buy and download a DAW, making the PC capable of music creation. Although less actions are possible in GarageBand in comparison to Logic Pro X, Apple's leading DAW, GarageBand has been used by some major artists as well (Wolfgram, 2020). The DAWs commonly share the capability of sequencing, recording, editing and mixing music (Bell, 2015a).

3.1.1 Different DAWS, different use

Although the ever-new array of composition software is frequently marketed as though for musical dimwits, results are limited primarily by the musical skill and knowledge of the user—abilities that can be advanced by school-based composition studies (Regelski, 2007, referred in Bell, 2015a).

The DAW provides the musician with tools to organise and edit sounds, as well as the ability to play digital replications of real-world instruments through MIDI. Without the need for hours of practice of repetitive muscular technique, a newly started musician can achieve surprisingly good-sounding results with little amount of technical practice. Additionally through online sample-libraries like Splice one can download professional royalty free sounds, and a professional sounding song can be created without any form of physical performance (Røshol, Sørbo, 2021, p.155). As all DAWs contain mostly similar traits there are slight differences as some actions are easier in specific DAWs. Many laptop musicians also use a combination of programs to suit different situations. The laptop musician is directing the DAW and deciding what actions are taken, and the musical creations will be shaped by the DAW as well. The laptop musician resides in constant tension between these poles of like-sided influence (Bell, 2015a, p.54).

Each DAW is geared towards a somewhat specific musical situation, still one can explore all kinds of musical situations within most DAWs. Contrary, DAWs make some specific actions the path of least resistance. Compare this to the guitar where the chords of least resistance would be stacking fourths on top of each other, as this would not require the guitarist to spread the left hand. Though this, the possibility to play extended chords is there through practice and exploration of the instrument (Bell, 2015a, p.48).

I will now give a short description of the DAWs used by the teachers in this thesis:

1. Fruity Loops (FL)
2. Reaper
3. Ableton Live (3 out of 5 teachers)

Fruity loops (FL)

FL is closely linked to electronic music, and the DAW is based on a mixer screen and a browser/playlist view, like most DAWs.

The software is available in four editions with a price ranging from 89€-489€. The different editions include varying amounts of plugins and digital instruments. FL stock plugins are fully capable to create industry standard music.



Fig 3.1: "Fruity Loops Studio"



Fig.3.2: "Reaper"

Reaper

Reaper is amongst the different DAWs the least expensive one for full edition, also the program has a free trial. The program is not expensive, and costs a one-time payment of only \$60. This by itself would make Reaper a good choice for institutions wanting to teach music technology where economy is a factor. Especially if the school will offer obligatory courses in music technology for all students.

Ableton Live

As 3/5 teachers use Ableton, this requires more attention than the other DAWs. Ableton is based on two main screens. The program contains the session-view, with tracks laid out in a horizontal array, stacked from top to bottom. Ableton also offers the arrangement view, which some teachers in this thesis describe as the screen used for finalising music and arranging the song. The “session view” will more often be used for live performance, as the clips created will repeat until the musician stops them. Also, Ableton has the affordance of automatic warping, so the musician can change tempo without changing pitch of the clip. The price of the program ranges from Live Intro for \$99 to Live Suite costing \$749.



Fig 3.3. “Ableton Live”

3.2. “MDD”-music upper secondary/“Immersion-instrument”

In Norway there are 58 upper secondary schools (ages 15/16-18/19) around the country which have a program in Music, Dance and Drama (Studievalg.no, 2021). The student chooses which of the artistic fields to immerse in, and all the courses give “studiekompetanse” (the possibility to apply for higher education) after completion of the course. Just like other courses which give “studiekompetanse” the students learn general subjects like Norwegian, English and mathematics in addition to course-specific subjects in music.

The schools follow the national curriculum, and the subjects mostly (e.g. Skien VGS which has music technology as a subject) are the same and follow the same national curriculum. In August 2020 the new national curriculum was implemented for first year students, while second and third year students follow LK-06, the national curriculum since 2006 (Kunnskapsdepartementet, 2006).

A notable change in the new curriculum is naming the instrument to specialize in for “immersion-instrument”, translated from “fordypningsinstrument” (Kunnskapsdepartementet, 2019). The

Main instrument curriculum 1st year, translated to English by author:

- Master basic technique
- Perform a repertoire of music from different genres/epochs
- Connect means of expressions to genres and epochs
- Use different methods for learning
- Create and explain week-plans for practice
- Participate actively in choice of repertoire
- Connect practical musicianship to relevant theory
- Improvise on main instrument
- Play/sing by ear
- Evaluate different aspects of concerts and preparation for performance

Fig.3.4: "Main instrument curriculum (MUS5-01)"

instrument is the student's instrument of choice for the course, typically the instrument which the student is most profound at, as they receive a grade, which will later be used to apply for higher education. The subject is based on one 45-minute lesson each week, and students receive tuition one-to-one from a skilled teacher with relevant education at minimum Bachelor level.

The one-to-one classes are arranged in one of the oldest forms for transition of knowledge, learning through apprenticeship, or "master learning". The term "master learning" can be traced back to the 14th century when work became more specialized, and students started training under a master who provided housing, food and teaching as payment for their labour (Spetalen, 2010). This form of learning has been critiqued for not allowing the student to make their own critical reflections, but end up reproducing the teachers' approaches to the profession (Nielsen & Kvale, 1999). Lave & Wenger (1991) has been inspired of learning through apprenticeship, and created the term of *situated learning* which is the phenomenon of learning situated in a social context in a specific geographic location.

In Norway there has been some noticeable changes since the national curriculum of 1997. One of the competence goals of music in primary and secondary schools described listening to composers like "Edvard Grieg, J.S Bach, Wolfgang A. Mozart and Ludwig v. Beethoven" (Hanken & Johansen, 2013. p.74). The repertoire focused towards classical composers received critique for not including modern art forms like the music video or modern genres within music education. In 2006 the new national curriculum did not mention which

Curriculum 2020 1st year, translated to English by author

- Rehearse, perform and convey music through hearing and notation
- Demonstrate instrumental technical skills in the practice of immersion and utility instrument
- Develop practice-plans and reflect on the connection between exercises and performative development
- Apply relevant work-physiological principles and mental strategies in rehearsal, performance and dissemination
- Explore musical expressions and means in interpretation and improvisation, and reflect on one's own musical choices in performing and creative processes
- Collaborate and take active responsibility in ensembles by giving and receiving input and by shaping common expressions in executive and creative processes
- Perform rehearsed repertoire and improvised material at concerts, individually and in ensembles
- Use music theoretical understanding in rehearsal, interpretation and improvisation on immersion-instrument and chordal-instrument
- Use relevant software and other digital resources when working with rehearsal, rehearsal and communication

Fig.3.5 "Music curriculum MDD05-02 (immersion-instrument)"

repertoire to teach, but rather invited the teacher to decide which content to use as a means to reach the curricular goals (ibid.).

3.3 Affordance

3.3.1 From Gibson to today

The theory of affordance has its roots in perceptual psychology. Gibson created the theory of affordances in relation to how the environment gives physiological resources and needs for safety to both humans and animals (1977, 2014). The affordances of the same environment would be the same even as different animals and humans would have different approaches of using the environment. Gibson suggested that this approach of thinking of environments would potentially provide design and architecture with a theoretical basis (Withagen & Costall, 2021). There have also been critiques of Gibson's notion of affordances in relation to artifacts:

On one hand, the concept affords enumerating all the possible meanings of a certain object. On the other hand, this endless list of all possibilities for action does not capture how the object actually reveals itself to us. Artifacts and buildings always have a certain feel: they are beautiful (or ugly), suggest a certain action to a certain degree, have expressive qualities, invite the user to do something with it, and so on (Withagen, Costall, 2021, p.2).

Gibson's theory of affordances explains that affordances exist objectively in the artifact, Tia DeNora (2007) explains how the relationship between the artefact and user is a like-sided interaction: "We are afforded help (or hindrance) from the objects around us, but simultaneously, we constitute those object's affordances just as they constitute us and what we may afford – our capacities (and incapacities)" (p.256). For the laptop, the user is provided with the affordances which we use and perceive, and in light of the DAW-environment one realises what we human musician have of affordances within ourselves.

Gibson's theory implies that the affordance is within the artefact no matter what the beholder perceives, but researcher Don Norman does not agree. He created the term of perceived affordance. The affordance given by the designer of the artifact who knows what the creation can do is unimportant, rather it is the affordances the user of the artefact perceives which are the "true" affordances (quoted in Bell, 2015a, p. 47). If the user can't figure out how to learn and

utilise the DAW intuitively, what affordances are even there? This view shares a resemblance to the metaphysical debate of “if a tree falls in the forest, and no one is around to hear it, does it make sound?”.

The DAW also creates some directions for the musician. Bell (2015a, p.57) describes how Garageband already in an empty project-file creates directions for the music:

4. A tempo of 120 beats per minute in 4/4, a classic disco tempo.
5. The key of C major

Though aspects like these are easily changed or ignored, they still give direction as the road of least resistance is to create music within these boundaries. Bell describes the DAW environment a double-edged sword, and what he means is this: There is a negotiation for developers between making the DAW user friendly through directions and limitations for the musician, or being so open that the user can feel disoriented in an unfamiliar program (p.44). Limitations and design of a DAW can shape the music created, which will be a point of interest in the discussion.

3.3.2 The affordance of the DAW

Where Gibson looks at an environment and relates design and architecture to affordances, Bell has related the term to how the DAW environment enables possibilities for action (2015a, p. 47). As all types of DAW environments are capable of a vast number of musical actions, Bell explains that in some cases its of best interest to decrease the possibilities of action for the user to create a better experience for the musician (p.53). This relates to the term of “conventions”, defined as “a constraint in that prohibits some activities and encourage others”. Norman mentions that the conventions are in a dynamic evolution and needs a community of practice (1999, p.41). For every DAW, there exists an online community exchanging experiences and answering questions within forums, as well the community within YouTube which can be seen as detrimental to the exploration of the DAW, especially for new laptop musicians. Additionally, one must take into account the community of online music streaming, where laptop musicians can instantly upload music, receive feedback and get noticed on services like Soundcloud and Bandcamp. Additionally, the term of anti-affordances can be used to analyse what a DAW environment cannot do. This would need comparison to the rest of the DAWs to notice what a specific product does *not* afford when comparing to the rest.

Bell (2015a, p.55-61) explains the affordances of the DAW through the five P’s: presumptions, privilege, prevision, protection and prevention.

Presumptions: The conditions that exist for the instrument to be played. Computing skills and familiarity to the laptop, where clicking and dragging, cutting and copying are all actions shared with non-music software.

Privilege: Actions that are simpler to perform becomes privileged actions, which can steer the music creation towards the path of least resistance, using the easily found privileged actions.

Prevision: The provided actions which are available in the software, not necessarily found easily. These are found in menus, submenus and through right clicking.

Protection: Actions that are “hidden” in the software. Without the guidance of peers, teachers or through online searching, or randomly finding them in the software, they are hard to find.

Prevention: The anti-affordance, what the DAW does not permit. This would be logic to compare to the other DAW environments and will not be as applicable as the rest, but still prevention serve as a good tool to compare with traditional instruments.

3.4 Formal and informal learning

As the field of interest in this thesis is the exploration and formalisation of laptop in upper secondary schools, the theories of formal and informal learning situations and strategies are of importance. I will in this section explain the history of informal learning and what informal learning can be.

3.4.1 The rise of informal learning strategies

There has been a change of paradigm in music education since the start of the 2000's, as interest in popular music education and teaching practices with inspiration from informal learning has gained traction (Røshol & Sørbo, 2021, p.152). Through researching practices of how musicians within genres of pop/rock created, performed and learned music in the band, Lucy Green influenced the paradigm of modern music education. Changing the spectrum from traditional education in classical music and works deemed important for national culture. The pedagogic philosophy and didactic practices from Green (2002) popularized the pedagogic approaches of learning music by ear, peer-to-peer learning and choosing repertoire in popular music along with students, which has influenced many teaching practices. Ruud (1979, p.58) also points out that learning skills in creativity is best learned within a non-authoritarian learning environment. Christopher Small invented the term

musicking, a verb containing all actions supporting and surrounding live performance of music (1997, p.113). The term of musicking has opened up the perception that music is something one do through a multitude of actions, as listening and conversation about music are examples of actions within musicking. This also has opened up for more open attitudes within music education, as well as higher levels of informal approaches in teaching (Odendaal et. al, 2014).

In the world of music there is a huge portion of self-trained musicians who never have received lessons from a teacher in direct engagement, as the laptop is within the process of legitimation many laptop musicians now learn through online resources. Also YouTube democratizes learning internationally, as Ian Shoeman from South Africa explains:

“Being able to learn through the Internet is essential as Bluegrass and Old Time in South Africa is nonexistent. [It is] impossible to find a teacher. The Internet is the only teacher I have” (Waldron, 2013)

YouTube alone can serve as a musician’s only source of musical knowledge, though there is no interaction or feedback from teacher to student. This and other factors will still define the YouTube-trained musician as an autodidact, though transmission of knowledge is similar to a formal situation, from a knowledgeable teacher to a learning student.

3.4.2 Categorising the learning situation

Göran Folkestad is a researcher/pedagogue who has done vast amounts of research related to informal learning and how musicians within the non-academic scene learns and creates music. In his article (2006) he describes four points to categorise whether the learning situation is closest to formal or informal learning:

1. *The situation*: Where is the learning taking place? In an educational institution or outside? In for example a band with peers or in a classroom with a teacher?
1. *Learning style*: How is the music learned? By notation or by looking at the neck of the guitar, listening and copying?
2. *Ownership*: Who has the largest extent of ownership and decision power within the situation? Is the power spread equally or has one partaker the sole power of decision?
3. *Intentionality*: What is the purpose of the activity? To learn how to play or is playing the sole goal of the activity? Is the activity rooted within a musical or pedagogical framework?

(p.141-142)

There is not a simple yes or no answer to whether or not the situation is informal or formal. One can the other hand can envision a scale from formal to informal, and the situation resides at some point within the scale. In informal learning situations learning is also described as incidental learning. The learning can almost be thought of as a bi-effect of the activity itself (Marsick & Watkins, p.296). In this thesis I will use this model to analyse the teaching situation of the teachers' practices, to explore whether the lessons are more informally inspired than lessons in "traditional instruments".

3.5 The "Curricular spider web"

There have been many theories and models made to analyse the teaching situation, components of both the curriculum as well as the teaching practice (Bjørndal & Lieberg, 1978; Hiim & Hippe, 1997). "The question of what schools should address has confronted society since the dawn of schooling", implies McKenny, Nieveen and Van Den Akker (2006, p.68). A teacher with autonomy must ask themselves many questions relating to didactics, structure, and content as well as philosophical perspectives for their teaching practices.

Van den Akker (2007) created the spider web model for analysing the different components of the curriculum. The model is formulated in a spider web structure. The centre of the model is the rationale and the remaining points in the model spring out from the rationale as equivalents. The model is portrayed as a spider web to explain that one dramatic shift in the curriculum can pull the remaining sections out of balance, similarly to what happens when a tread of a spider web is taken away (p. 41).

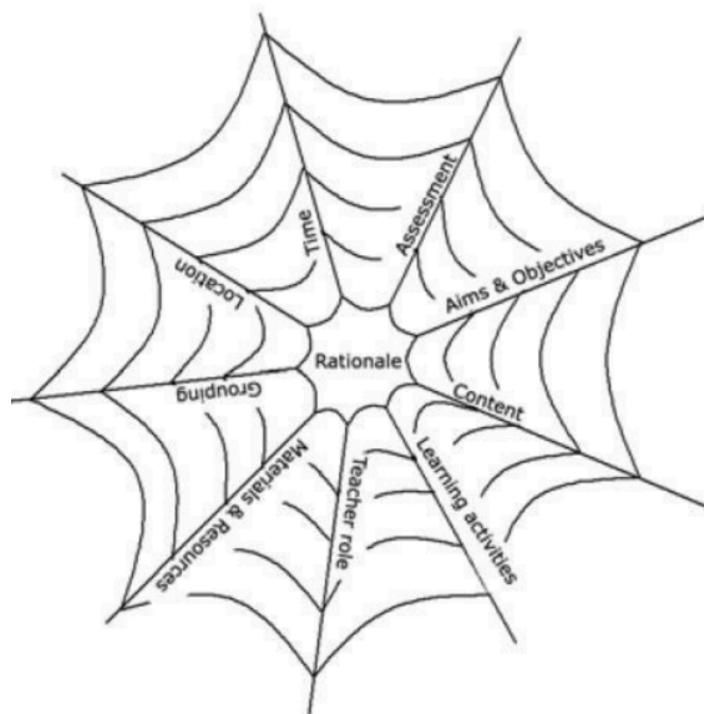
Components of the Curricular Spider Web (Ibid, p.39):

Rationale - Why are the students learning? This can be found in e.g. the core curriculum.

Aims & Objectives - Towards which goals are the students learning?

Content - What should the content be for students to learn.

Fig 3.6: "Curricular Spider Web (Van Den akker, 2007)"



Learning activities - How are they learning the content?

Teacher role - How is the teacher facilitating the lesson?

Materials and resources - With what tools do the student learn? Is it just a laptop or a whole other setup?

Grouping - With who are the students learning? One-to-one or a larger group?

Location - Where is the teaching taking place? A recording studio at the school or elsewhere?

Time - Which time will the lesson take place?

Assessment - How can one fairly measure the extent of which the student has learned? Through exams or is the student graded through formative evaluation?

3.6 Legitimation in music pedagogy and technology

Legitimation has long been a debate in music, as music has been legitimated both as a means for increasing intelligence and skill in other fields (*instrumental perspective*), as well as *art pour l'art*, whereby to become skillful at music is a goal by itself (Varkøy, 2003). Legitimation can be described as the process of “a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions” (Suchman, 1995, p.574. Referred in Schmutz, 2009). The term will in this thesis be describing the process towards implementation of the laptop as well as the perception and ideation of the laptop being a real musical instrument.

3.6.1 The debate on legitimation of music, and which music?

Hanken & Johansen (2013) have categorised arguments for musical legitimation in three separate types, mostly related to compulsory education, but is applicable to upper secondary school as well:

1. Cultural heritage
2. The individual
3. Society

Through arguments for preservation of cultural heritage, one argues that the purpose of music education is to make both national and international culture accessible for the next generation, thereby transferring culture through generations. Then again the question arises of what cultural heritage is worthy of spending time to pass on, which would differ from teacher from teacher. A canon serves as a collection of cultural heritage deemed to be important within a genre or epoch. I will in the results chapter compare similarities between the teachers in this thesis towards who they

perceive as important musicians in laptop. As the laptop is a very modern instrument, preservation of cultural heritage can be an argument against laptop, which does not have a long history of culture similar to e.g. the violin. When we see so many young musicians who download music software and start making music, isn't it the heritage of acoustic and electric instruments what we rather should be protect?

When legitimating with arguments in the individual perspective, one can argue that laptop provides the individual affordances to perform a wide spectre of actions, expanding the musician's agency. The laptop is both capable of being a production tool and an instrument, so the agency of the musician will undoubtedly increase through learning a DAW for both creation and performative musicianship. When legitimising through arguments for teaching laptop for the individual, Ruud (2013) explains how the music is affecting and rooting an individuals identity. Music gives an individual room for self-regulation, identification, increasing intra-personal intelligence and self-awareness of emotions. Within music education there has been constant debate of which genres who should be taught, and Even Ruud (197) criticised teaching modern art music to students instead of the kind of music the students have familiarity with.

Arguments from the individual-perspective focus the positives for the student themselves. When arguing for the society, the effect of learning a DAW can be a lot more noticeable. Technologies in education have seen a rapid increase since the start of the millennium, and use of web-based learning resources have especially increased. Many municipalities in Norway lend all students in compulsory education a Chromebook, having special deals with Google regarding storage of students' personal data (Bergen Kommune, 2021). In a modern society under constant dynamic development there has been a wish to make students adaptable and creative, as the modern society requires citizens to be flexible and creative, so they can be active and productive within the democracy (Nielsen, 1998, p. 306).

3.6.2 Legitimation in the history of modern music

In Norway the first jazz course in higher education was first created in 1979, but jazz had already existed for over 50 years in the music scene (Mosnes, 2019). Rock and pop which has existed for a long time has as well has been formalised into both institutions of higher education and compulsory music education. Additionally, popular music studies are still expanding within higher education. As jazz, pop and rock have dominated popular culture in the 20th century, there has been a trend on "Billboard Hot 100" that much guitar-based music has disappeared from the list, as electropop,

EDM and hip-hop has dominated the 2010's. The use of digitally-generated and synthesized instrumentation has also affected other genres, as the 808-drum machine has been used in Hot 100 tracks within other genres with songs like "Thunder" by Imagine Dragons (Blume, 2018). When looking at the history of formalisation of both jazz and popular music, it is fair to say it is only a matter of time before digital music technology becomes formalised at a similar level. One can't argue the effect of Lucy Green (2002) and similar concepts in popular music pedagogy have been changing the scope of music education in Norway, as pop/rock music has been a central part of much compulsory music education. As mentioned earlier, the government in 2006 removed specific classical repertoire from the national curriculum, and without the legitimization of popular music in education, the idea of formalising the laptop would probably not be as welcome as today.

3.6.3 Pedagogical fundamentalism and radical pedagogy

There are both teachers on the conservative side and progressive side together at music schools, and the resistance of social-cultural change and implementation of new digital technology is described by Partti (2017) as pedagogical fundamentalism. Though the perspective is understandable as the teaching population mostly are not trained in digital technology, buying devices without the teachers learning them will be of little effect. One can look at the jazz guitarist just 40 years ago which suddenly had to teach electric guitar to students in a similar way to the teacher who has to learn a new technology to teach. According to Dewey the teaching and education needs to engage directly with modern society for making a student understand that school is applicable (Williams, 2017, p.92). This is cited in the Norwegian national curriculum, and there is a focus that the school is applied to modern life (Kunnskapsdepartementet, 2017). Kardos describes that the older generation of teachers feel that technology is simplifying music, making hard-learned skills redundant, and engagement with important concepts shallow (2017, p.318). The generation of students enrolling in education today is born into a world of technology, using tablets and computers since young age, and coding languages are even being taught in primary schools (p.319). When the digital literacy might be better within younger generations, why should older generations learn and teach skills the youth already can possess?

4. Method

In this chapter I will explain the methodology for data collection, analysis of the data as well as research design for this thesis. I will present which epistemological approach to case study this thesis is rooted in, and how the interview guide was made, and observations were conducted, in addition to ethical matters pertaining to this thesis. This study explores the case of the formalization of the laptop as a musical instrument taking place in upper secondary schools in Norway. The data is based on five different teachers who serve as separate cases for comparing and analyzing different pedagogical approaches. The focus is on one-to-one lessons in laptop in addition to observation of a school concert and one band lesson. This chapter also contains information regarding how the teachers were contacted, and their background, in addition to the challenge of gender imbalance among laptop teachers. There have been many considerations while writing this thesis, including a determination of what serves as a case within this research: Are each of the teachers a case by themselves, or is it the “movement” of legitimation and formalisation of the laptop that serves as the case?

4.1 Epistemological orientation

Critical realism is an epistemological paradigm which is closely related to case studies and research relating to social studies (Wynn, Williams, 2012, p.787). It serves as an alternative to both positivism and the interpretivist paradigms, in addition to developing new approaches to generate knowledge. The epistemological orientation constitutes that there is an objective reality which exists independent of human knowledge or perception, but the world is not necessarily reducible to our range of perception. Within this direction, our thoughts, beliefs, concepts and theories which constitute reality is real in an ontological perspective, although inevitably separated from the entities themselves (p.790). As a researcher within qualitative fields, I retrieve data material from different individuals, each with their own perspectives, thoughts and experiences. It is the task of the researcher to analyse, consolidate and represent the data with equal considerations to all participants perceptions.

The research of individuals perceptions and experiences is central to the case study, whereby one recognizes that the perception of reality experienced by the participants being researched with equal validity (Stake, 1995). Stake explains three levels of perception and interpretation of the world:

- a) *the external reality that we recognise through the interpretation of stimuli*
- b) *the reality that is shaped by our interpretation*

c) *the reality of integrated interpretations that is our rational reality*
(p.100)

4.2 Selection of informants

The data in this thesis is from five teachers who teach laptop as an instrument in upper secondary schools within various locations across Norway. To find these teachers I used a combination of searching the schools' websites for information, reading newspaper articles about laptop being offered as an instrument, in addition to a Facebook group with laptop teachers as well as teaching staff and administration interested in the instrument. I was informed about this Facebook group by one of the teachers even before the data collection started. To reach out to the teachers, I either called or emailed the school administration, receiving contact information or leaving my own. In some cases, I directly messaged the teachers who were easiest to find.

The informants have been chosen through the approach of purposeful sampling, where the informants are chosen to represent a degree of diversity within the social group (Etikan, Musa & Alkassim, 2016, s. 2). This provides with a representative selection of the larger unit of the case, which is the laptop as a musical instrument in upper secondary schools in Norway. The informants all have a somewhat different background, age and reside in geographic locations from the lower west coast up to the northern part of mid Norway. In other words, the geographic are spread over a somewhat large section of the country, and as well the age groups are somewhat represented from the youngest of 22 to other teachers being in the end of their 40's.

To show a somewhat representative selection of informants the teachers all have different educational background, work experience, as well as informal competence in music. In this thesis some of the teachers wanted their full name being used, and others have decided to remain anonymous, whereas aliases have been created:

1. **Ian Kolstad** is a teacher in both culture school and upper secondary, where he teaches laptop and music production. He has formal education as a music therapist, and in addition to being a teacher he also works in a production-team in a studio in Gothenburg. As a musician he plays in the band Goldlog and has been involved in various session work.
2. **Inge Weatherhead Breistein** is a jazz saxophonist, electronic musician and composer who teaches laptop at two upper secondary schools in Bergen, having a masters in jazz improvisation as well as education in music production. He has been active as a musician with

his own solo projects, and he has just released the album “High Flying Collage” based on sampling and processing acoustic piano in addition to saxophone. Additionally, he has been working with other musicians in various projects, e.g. Tortusa.

3. **Øyvind Brandtsegg** is the teacher with highest level of education in the group, with a bachelor’s in jazz melodic percussion, and MA plus a PhD in music technology. As well he has done a vast amount of both artistic and technological work, winning the Norwegian Grammy (Spelemannsprisen) with the band Krøyt. In addition, he has worked with Motorpsycho, created plugins like the Hardron particle synthesizer and has created generative music for installations like Nils Aas “Flyndren”. As a researcher he has e.g. immersed in cross adaptive processing.
4. **Magnus Fjelde** is one of the first laptop teachers at upper secondary schools in the country, and has had a role in the the legitimation of the instrument in media and in schools nationwide. He is an educated jazz pianist, having worked in both culture schools and upper secondary. He has recently produced the album “Fortsatt Våken” by Audun Skanke, and has as well been active as both a solo artist and a session musician working amongst others with Stavangerkameratene and Hilde Seviksvåg.
5. **Anders Paulsen** is the youngest of the teachers, and is a second year student at a music technology BA. This is the first time Anders is working as a teacher, which gives interesting perspectives as teaching laptop is his first pedagogical job. He is both an active producer, mix engineer, live-sound engineer as well as a keys/synth-player in bands like Nebula Horizon.

4.2.1 Female teachers

As mentioned, all informants are male by gender. I tried to reach out in the Facebook group, asking for any female laptop teacher, but got an answer that there at the time were none, but there was a woman who was teaching laptop up until 2020. After sending a direct message to her I did not receive an answer, and nor contact through email. Her telephone number was not online.

There appears to be an absence of female laptop teachers in upper secondary schools in Norway. This means the informants in this thesis are a good representation of the demographic of the teaching practices in Norway for the immersion-instrument lessons in laptop. A case study does not seek to generalize, and the purpose



Fig.4.1: “Post in Facebook Group”

of having multiple cases is to compare a representative selection of informants to gain larger insight. The absence of female musicians in the world of laptop will be a point of interest later in the thesis, but fits more general patterns of gender in music technology education (Armstrong, 2011; Bell, 2015b).

4.2.2 Background of teachers

To understand the differences and similarities of the different teachers which this thesis data derives from I have created a table over the different pedagogues formal and informal background, as well as which DAW the teachers are using as their main DAW. All teachers wished to have their full names used in the thesis. In the table shown below the categories shared between more than one teacher are highlighted in the same color, while points only mentioned by one teacher are left with different colors (Fig.4.2).

	Ian Kolstad	Inge Weatherhead Breistein	Øyvind Brandtsegg	Magnus Fjelde	Anders Paulsen
Formal education	Music therapist (MA)	Jazz (MA), music production one-year study	Music technology (PhD), jazz (BA)	Jazz (BA)	Under education in music technology (BA)
Instrument(s)	Guitar, laptop/electronics	Saxophone, laptop/electronics	Percussion-Vibraphone and drums. Laptop/electronics	Piano, synth, laptop/electronics	Piano, synth, laptop/electronics
Main genres	Alternative, rock/pop, electronic music	Jazz, hip-hop, electronic music	Electroacoustic music, rock, jazz, generative music	Alternative pop/rock, electronic music, jazz	EDM, house
DAW	Ableton Live (Pro tools)	Ableton Live	Reaper	Ableton Live (Logic)	Fruity Loops
Musikerliv	Producer, band musician and session musician	Composer, musician and session musician	Composer, performer, Band musician, programmer	Producer, band musician	Producer, live-sound engineer, band musician
Teaching background at schools	Upper secondary, culture school	Upper secondary, culture school	Upper secondary, culture school, university	Upper secondary, culture school	Upper secondary

Fig 4.2: “Background of Teachers”

The table above shows that three of the teachers come from a jazz background, as well as a music therapist (masters) and a student in a music technology BA program. Two of the teachers with a background from jazz mentioned learning some skills in DAW in their education, but a lot of their skill came from through learning outside of their education.

Keyboard-based controllers are probably the most widespread hardware controller to use to along with a DAW, and not so surprisingly the most common first instrument for the teachers was the piano. The remaining three all have different backgrounds as instrumentalists. We can also see similarities between the work experience of the pedagogues, where four have taught at both culture schools and upper secondary schools in Norway.

4.3 The multiple-case study

A case study is a research design that examines some form of unit with the purpose of achieving a deep and nuanced insight into the unit in itself. A case study can research individuals, organizations, state programs and institutions (Yin, 2018, p.14).

There is no exact definition for what a case study is, although there exist many explanations for the case study as a research design. Schramm explains:

The central tendency of all case research is that it tries to illuminate a choice or a set of choices: why these were decided on, how they were implemented and with which result (quoted in Yin, 2018, p.14)

Stake describes a case as not only a of method, but a choice of what should be studied (2005, p.443). A case study often builds on data which contains a lot of nuanced information with many of different points of interest in addition to the ones in the research questions, and is most often used along with qualitative data collection methodology. Merriam (2009) explains the importance of delimitation in a case study, and mentions that it is the unit which defines the case study as research design (p.41). Through empirical data of cases in this thesis', discussion of the data through literature and theory I will explore the teachers perspectives in relation to the research questions.

Yin defines a case study by four points which I will be using as a definition for the research design of this thesis:

1. *The case study copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result*

2. *Benefits from the prior development of theoretical propositions to guide design, data collection, and analysis and as another result*
3. *Relies on multiple sources of evidence, with data needing to converge in a triangulating fashion* (Yin, 2018, p.15)

The differences between a single case and a multiple case can be small in practice, but the multiple case study often has a different definition of “the case” and approach to analyse the data material. This thesis offers the first comparative insights into the laptop teaching practices in upper secondary schools in Norway, which could serve as an inspiration for both present and future laptop teachers, teaching staff and others interested in the movement. Stake mentions that the case(s) exist and “live their own life” (1995). This multiple-case study will attempt to collect different practices, uses and perspectives of the laptop and then compare differences and similarities between the different cases. Also, this case study’s research questions are formulated as questions starting with “what” and “how”, which drive for the wish to explore a phenomenon. It follows that this multiple-case study is an *explorative* case study, diving into teacher perceptions and experiences of the laptop as a musical instrument and in their teaching practices (Yin, 2018).

This multiple-case study has a partly instrumental purpose, as the findings will be able to provide a certain degree of generalizations that can portray the teaching practice and the introduction of laptop in upper secondary schools (Yin, 2018). In a case study, one concern is for a researcher not to influence the activity or thought processes of the informants. The researcher seeks to understand how participants in the research project think and how they experience their field (Stake, 1995, p.12). As a researcher I do not wish to provide a clear “recipe” for how to teach laptop based on the teachers, but rather share experiences of how and what they teach, and what can be learned from their ideas. This way, one receives insight into the teaching practices and finds similar ground and differences, so other laptop teachers can have inspiration for their own teaching practices.

4.3.1 Data triangulation

Each teacher in this study has their own valid perception of the problem area as mentioned in the epistemological orientation, and having data based on multiple individuals' perceptions is of importance in a case study. Having perspectives from multiple angles within data material is referred to as triangulation within case studies. Stake (1995) explains how the most common use of triangulation is data triangulation, achieved through performing different methods of data collection. Data triangulation implies performing multiple techniques for data collection so that data material has several angles from different perspectives for confirming facts (p.126. Yin, 2018). As an example in this study, an interview will only provide the teachers own perception of their practice, and there is the possibility that an outsider observing a lesson can perceive contradicting information. Through using both, the data is validated through two separate perceptions and thereby containing a larger extent of validity.

As interpretation of data in case study is a large part of the research, triangulation through both methods of data collection and individuals analysing information is mentioned to be of importance. As this master's thesis is an individual project, it is the case that I have been without another perspective for most of the time, which Stake (1995) mentions as a good way to triangulate the analysis. Member-checking is an additional method used for triangulation. I have performed member-checks with the teachers, and they have had a chance to check the transcribed material in addition to the citations and analysis of the data. Especially when the teachers have requested use of their full names and work professionally in the music field, it is important that the data is not misrepresented and that the process is as transparent as possible from start to end (p.115). In addition to the material from the interviews and observations, I made a small analysis of a YouTube search regarding a mode of performance named live looping (fig. 6.1) in addition to a small trip to Bergen's "Walk of Fame" for perspectives from the city council about local music producers (fig. 6.4). This to portray how a DAW can somewhat direct the music created, and provide external perspectives towards the discussion of formalisation and legitimation of the laptop as a musical instrument.

4.3.2 Observation

Observation as a method was developed by the end of the 19th century by social anthropologists who wished to see in reality how different cultural groups lived, and is among the most widespread methods in ethnographic research. The researcher can through observation research how a social group, a phenomenon or an organization functions in reality to answer research questions about what people actually *do*, rather than only what they are able to *say* about what they think or do (Angrosino, Flick, 2007, p.1.). Under observation, the researcher will him/herself witness how the research subject is in real life, and the researcher gets an audiovisual understanding of how the physical reality plays out in the world through direct experience. Through the observations, I accessed data applied to answer RQ1 and RQ2, about the affordances and instructional practices of the lessons. I got permission from NSD to film the observations on condition that they preserved anonymity (avoiding filming faces, distorting voice), but after filming lessons while taking field notes I realized it provided more value to only perform running field notes of both dialogue and action. I deleted the films on the handheld video camera with password protected memory card and used the field notes to create descriptions for the observations.

The observation will in this thesis be used to provide a description of the institution, space, context and conditions surrounding the teaching situation, offering context for the reader. Developed as an anthropological method for describing the totality of the situation, this will, in accordance with case study as research design, give a good insight into the action that is observed (Angrosino, Flick, 2007). The role I undertake in the observation is observer-as-participant, which will indicate that the researcher is present and recognized by the participants in the research project as a participating group member, but again with relation to participants as a researcher (Desai, 2002). The participants are aware of the purpose and use of data in the research project, and the researcher mainly takes ongoing notes but can to a certain extent have a dialogue with the participants during observation (pp. 54-55. Angrosino, Flick, 2007). The observations are described subsequently in the results chapter, and the observations are selected based on portraying three very different situations of sound design, live looping and preparing for band class. Because of the evolving situation of Covid-19 pandemic, only two lessons were observed in person, and one (Anders) online.

4.3.3 Semi-structured interview

For this thesis the most beneficial method for data collection of nuance was semi-structured interviews, as this provides both opportunity to follow a somewhat descriptive guide in addition to the opportunity of exploring useful data that may emerge (Kvale & Brinkmann, 2015, p.156). I created an interview guide divided into several different sections with an opening phase, background of teachers, musicianship, content of lessons, legitimation of the instrument and legitimation and applicability to the national curriculum. The guide was created on basis of Kvale & Brinkmann (2015). Stake describes the interview as good method of data collection in case studies: a “road to multiple realities”, giving insight into personal thoughts, reflections and experiences (1995, p.64). Conducting a semi-structured interview is requires creation of an interview guide that contains topics and possible questions and follow up questions to ask. The interviewer needs to be open and flexible, being able to notice when the conversation turns into interesting places, improvise and follow up with questions to receive insight into unplanned territories (Thomas, 2016, p.190). Yin also describes interviews as an essential data source of a case study, as “most case studies are about human affairs and actions” and thereby information in interviews are a portal to these human experiences (2018, p.121). Yin also mentions the importance of asking open questions without overly complex nature for achieving broad and open answers, as the participants do not feel compelled to excel, but rather openly share their experiences and opinions in an open and relaxed environment.

The interviews were planned to last an hour, and I performed a pilot interview with an earlier laptop teacher at HVL. This length would be described as a shorter interview by Yin (2014, p.119). It turned out that the interviews with the teachers lasted a lot longer, and all interviews actually ranged from 2-3 hours. The last time I did semi-structured interviews was for my BA, and I noticed an improvement in my ability for follow up-questioning in every interview made. Since all the interviews contained much information, the transcribed interview data for this thesis is slightly more than 126 pages from five interviews. As the corona situation had not improved in Norway since August, it was hard to meet two of the teachers in person. Therefore, two interviews were done through the online video meeting service Zoom using end-to-end encryption. The interviews were recorded on a handheld audio recorder, stored on HVL’s password protected cloud storage, and deleted from the unit after transcription. The rest of the interviews were completed at the teachers' schools, and one was performed in a suitable public location agreed upon by the teacher and researcher.

4.4 Analysis of data

When data collection is done, the process of analysing the data starts. Yin (2018, p.165) explains that the analysis in a qualitative case study is one of the least developed aspects of the whole process, as there is no specific approach as in quantitative method but rather several methodologies for coding, identifying topics and answering research questions. For this thesis I read through the interviews as soon they were transcribed, then coded them using Nvivo for organizing the material into logical topics and sections. This process was repeated for every interview, and through organizing the material I created codes and later reworked the material into new codes which served the thesis better.

After the coding process I started to write the Results chapter, copying related citations from the codes into headings and then consolidating and creating coherent text. When writing the results chapter, it was of importance to interpret the data in a way that was cohesive within the context the data was taken from. These quotations were then explained and connected to each other through analysis. After writing the results chapter in Norwegian, the chapter was translated to English.

In this thesis I have taken an inductive approach which, similar to grounded theory analysis, is based on collecting and analysing data without relying vastly on theoretical prepositions before data collection. The conceptual framework was later developed based on the findings in the data material, with the goal of creating connections and relating the data together. In the analysis, I created categories for each of the research questions based on noticeable findings in the data material. Then I created subcategories for each of the given questions based on which data points appear as meaningful. After the creation of the categories I cross-analysed the data material from the teachers up against each other to find notable similarities and differences between them.

4.4.1 Use of Nvivo software

In order to be able to code and organise the data material, I used a popular software for qualitative analysis called Nvivo (fig.4.2) to code and organise the data material for further developing the results chapter. In Nvivo, it is possible to store, code and analyse everything from text documents to video and audio files

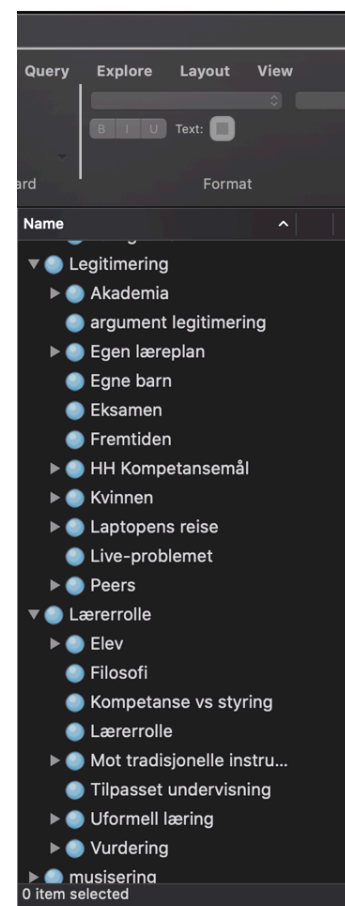


Fig 4.2: "Nvivo"

and works as a good instrument for coding nuanced data in large quantities (Thomas, 2016, p.206).

In Nvivo I created nodes and sub-nodes based on a combination of themes from questions asked and points of interest from the data material, which are put in categories based on the four research questions. I used the “comparative method” to analyse, while I simultaneously analysed and coded the data material to be able to develop concepts and access how these work in comparison with each other (Thomas, 2016, p.204).

4.5 Ethical considerations

As the project has to be carried out in the most ethical way possible, there are certain factors that are important. As mentioned in the background of teachers their full names are used. I started out with having anonymous informants and I created pseudonyms for the teachers. One of the teachers expressed a wish to have his full name used, and after asking the remaining teachers with an open choice of anonymity or the use of full name they all preferred and consented for their full names to be used in this thesis. In the appendix one can find screenshots confirming the use of full names (p.x-x). The teachers described positive effects of this approach: Magnus mentioned it as positive so the teachers get to know each other, and others did not care about anonymity, or felt that they have made contributions which they wished to have their names connected to. As the teachers all included their full names, this now comprised the biggest ethical factor for this thesis: to be sure that the data deriving from the teachers was correctly interpreted, analyzed and presented in the results chapter. The teachers are musicians who have done much artistic work, and in addition to sometimes working at multiple schools. Thereby it is of importance to not present data in a way that could be harmful to their work relations, relations in music and additionally the music they have created.

As mentioned earlier, I have performed member checks of the interview material, and later member checks with translated citations and analysis of these. The last member check was with the entire results section so that the teachers can see how the data has been analyzed and used in the thesis. The project was approved in August 2020 when abiding to the decided regulations, and the permission to use full names was confirmed in January 2021. I asked NSD if I needed to create a new agreement form for the teachers, and was informed that it would be sufficient with a written confirmation from the teachers that their full names were approved for use (appendix x). This removed the need to delete the recorded identifiable material to preserve anonymity, but nevertheless this was deleted to ensure compliance with the guidelines given by NSD. Another

aspect of ethical considerations is the students who are not involved as direct participants, but as "accidental participants". This entails that they are involved as participants in observation but who are not informants or who are the focus of the research project, and the majority of these students are under 18 years of age. These students had all been asked by their teacher about participation and informed about what their participation in the project will entail, and only those students who have approved are observed in a teaching lesson. The study is not about the students, but they are partakers in the lessons observed and are mentioned anonymously by teachers in the interviews. The students are in no way identifiable through descriptions in this thesis, and the only description used in observations is the material they were working on, which again could be linked to students by a couple members of the local school, if not already forgotten by this time.

4.6 Credibility and transferability

Being able to portray validity in a thesis is a concept that originates from quantitative research and the concept will in most cases not match to the purpose behind a qualitative study (Kvale & Brinkmann, 2015). The concept has its roots in the epistemological direction of positivism, building on the idea that the world is objective and measurable, and it is stated in the positivist philosophy that also social conditions have an objective reality and can be measured (Golafshani, 2003). Qualitative research on the other side deals with subjective experiences and perceptions, and has a very different focus: individuals' experiences, description of a phenomenon and development of theories (Cope, 2014, p.90). Therefore, the *credibility* is of importance, which refers to how data is interpreted and represented in a truthful way. To portray credibility, the researcher should perform observations, audit trails and verify findings with participants (ibid). Additionally, *transferability* is the notion of how findings can be applied to groups outside of the participants. If findings provide meaning to readers which also teach laptop or music technology, this will portray some degree of transferability. The researcher should provide background information of participants and the context for the study so readers can assess the findings capability of being transferable (ibid). As a single case study does not strive to make generalizations, the reason of having a multiple-case is to provide a bigger scope of the possible teaching practices. Therefore, if other laptop teachers would recognize elements and agree with the data, the findings would be supported by others with similar competence, thereby achieving transferability.

5. Results

In this section I will describe, compare, summarize and analyse the data material from the interviews in addition to observations. This section starts with findings related to the affordances and performances of the laptop, following with instructional strategies and repertoire, then following with teachers' experiences of legitimation of the laptop and the curriculum. Observations are used to portray different stories of teaching situations in addition to performance situations utilising the laptop as a musical instrument. In addition to observations and interviews, the table of important musicians/bands/producers by teachers is also based somewhat on email correspondence between teachers and researcher for creation of the table. There have been many interesting points of data, and the data has been selected to provide insight into challenges and possibilities of the laptop, sharing insights of how the teaching practice can be shaped.

In this chapter, there are four headings created for each research question:

RQ1: 5.1 *From the analog recording studio to the digital audio workstation*

RQ2: 5.5 *Repertoire or pioneer work?*

RQ3: 5.9 *Integration and understanding of technologic affordances*

RQ4: 5.11 *The national curriculum and legitimation*

Also, each sections contains data which can also be related to the remaining research questions, and data from earlier in this chapter is sometimes brought up to provide perspectives related to the new .

5.1. From the analog recording studio to the digital audio workstation

A lot of DJs today actually just stand there on a stage and press some few buttons... What I try to clarify a bit is that the electronic world is very big, and I try to get them to play their instrument live and playing their instrument along with other musicians. Playing on these laptops, these MIDI-devices and these gizmos in front of an audience that happens only there and then.

(Inge)

The laptop has mostly been closely linked to the role of producer, and the teachers describe it is from this point of view that the students mostly derive from. Electronic music in popular culture is described to traditionally been largely based on pre-recorded material that is activated via pressing “some few buttons”, and to a large extent it is visual effects and show elements which “gets the audience off” (Inge). Some of the teachers mention that part of the goal of their teaching practice is to turn the performance of electronic music into a performance with interaction happening on stage. Additionally, teachers express the goal of broadening the perspective towards the laptop, explaining the vast fields of use outside the mainstream: Ian describes how he has the entire light show programmed in Ableton controlled by his MIDI-footswitch, Anders explains how he mixed a jazz-tune automating with his Minilouge synth. In this way one can look at the formalisation of education in laptop as the process towards making electronic musicians perform with more live elements and interaction happening on the stage. The DAW is described by teachers to contain so many elements from the analog studio world (Anders), that creating limitations for oneself within the software can be wise when creating music (Inge).

In order to be able to discuss the most noticeable modes of performance in the data when performing on a laptop, we must be able to ask which instrument-specific affordances the laptop has in a live setting. Firstly, it is described that the laptop musician is the only type of instrumentalist which can hold a complete concert with all the musical elements of percussion, chords and melody without the help of fellow musicians. Ian went so far to say he perceives the laptop as “organised playback”, describing the affordances of the instrument rooted in recording, editing, processing and playback of music. He compares the laptop to the first sampler, the Mellotron, saying many technologies have become “streamlined” into the laptop. The instrument will thus be able to fill many functions, e.g. a “band in a box” giving the ability to edit, process and activate music as the laptop musician wishes. This is also mentioned in interviews as a challenge for some students, because of affordances given by the DAW to do every role yourself (composing, recording, mixing, releasing), students sometimes end up working mostly by themselves, missing out on the experience of working together with other humans in music outside obligatory band classes and concerts. On the other hand, a singer-songwriter performing alone is mentioned have a much bigger agency to create a “big sound” (Ian) when using the DAW live in compare to a traditional harmony instrument. Also, the instrument is mentioned by Øyvind to be the only one capable of recording itself as an affordance of the instrument, mentioning that traditional instrumentalist need “a unit external of the instrument” to record their performance. Also, creating “tracks” for playing with other musicians playing on top is an

affordance, and Anders describes how they have created tracks containing the rhythm section for a concert with an instrumentalist and vocalist to be performing over the laptop in concert. He then poses a question of whether playing the music live or use “pre-processed tracks”, then saying “If you activate something (samples, loops etc.) and process the sound live you are doing a live performance”.

5.1.1 The affordance of designing a live setup

Using MIDI controllers and teaching the student to program the device to be able to be used to activate existing projects in performance and control parameters is described by all teachers almost as a prerequisite for performance at the same time as a challenge in laptop. When the music is created one must then map the loops, samples or processing effects to the device, which is described by Ian and Magnus as learning process just by itself.

So what is the affordance of a MIDI controller as opposed to a synthesizer when the device cannot create sound by itself? The teachers describe when connecting a MIDI controller to a laptop, the musician can decide how the laptop shall respond when buttons, faders, pads and keys are activated as almost all parameters in a DAW can be programmed to respond to MIDI messages. Thus, the teachers mention a live electronic performer can, for example, use a MIDI surface to eg. control parameters for processing, activate loops and samples in addition to acting as a surface for making music through virtual instruments. This in combination with the constant development of new digital software provides limitless possibilities for assigning functions to a controller (with it’s limited physical capabilities). Ian mentions that once the students has obtained an overview of the program, he “insist that they buy MIDI-pads”, and he mentions at in Ableton one can simply “press command+M” (on Mac) to quickly route parameters to the MIDI-device. Ian compares preparation of a live setup to how a bass player would before performance decide to use “a four-, five-, or six string bass” and if one “should have an EQ-pedal between the amp and the bass”. He mentions that a musician makes “a few decisions” before performance, and that laptop is no different.

5.1.2 Mix or compose? Play or write a track?

In order to be able to utilise the laptop’s instrument-specific affordances, each of the teachers suggest that it requires knowledge and skills in several fields of musicianship and music technology. It is also important to mention that transitions between actions can be blurred: Inge mentions an example of him processing a sound in order to compose with the right

context to the sound, merging the mixing process with the composition process. The teachers mention specific techniques for utilising the instrument, in the same way that a guitarist plays guitar with finger picking or with a plectrum to bring out different sounds on the guitar. However, rather than “techniques to play as fast as possible,” Anders notes that laptop musician uses more cognitive skills that are “developed over a span of time”.

Instead of playing the notes directly into MIDI device (via keyboard, for instance), one can also type in the notes using the mouse or computer keyboard. Some producers use the term “to write a track”, which is a trend online whereby a whole EDM song can be created by just writing MIDI notes (and “dropping” audio files) into the program without any live playing. Also, Magnus describes him noticing a trend amongst students to “not be that interested in gear”, working within the DAW for music creation and performance. Ian describes programming instruments as a skill requiring much knowledge about how the instruments are played, and Inge describes to program realistic digital instruments, programming velocity of MIDI is key to natural sounding instruments when imitating. Although Inge also explain that in some genres static note velocity is a common approach, e.g. on drums in the Grime genre.

Inge especially noted that “writing a track” is common in many electronic genres, in which they drop audio files into the project-file and draw midi notes into software synthesizers. Magnus noted that “For some students writing in the piano roll is almost like a technique, they are extremely quick at it. It is almost like they can write the piano live in concert.”. This can be a quick way for producers to make a track, requiring only the laptop with a DAW to create a full composition. Inge as well mentions this in email correspondence as a technique just as much as other techniques. In addition to the many approaches to program MIDI, there can be multiple approaches to create somewhat same result with slight differences in sound. Inge describes how one can make a clip/sample loop through two separate approaches: one can simply loop the clip, which would make the clip repeat with no change in sound, or one can for example run the clip through a long delay with high levels of feedback. In the first edition, the clip will be untouched by processing, but when using a delay the clip will undergo a process of saturation via being routed via the plugin. Inge explains how the DAW is so open that it can be overwhelming in the composition process, and he has found creating limitations for himself within the DAW leads to success in his music creation. Additionally, Ian explains showing examples of the big difference between analog side-chain compressing and a software compressor, pointing students for potential work outside of the DAW. Øyvind also

pointed out in a lesson that a certain software side-chain compressor used by a student was really not side-chaining, but only bumped the volume down.

5.1.3 Laptop generated music

Another field of music that is unique for the laptop is that it can be programmed to create music somewhat on its own. Laptop generative music can be described as music created by a computer with a program in which one can enter the frames for key, rhythm and sounds based on partially randomly generated parameters. With this, the laptop can almost be compared to a musician with skill in improvisation, who in the same way as the laptop will know the key and have a “toolbox” of possible phrasings that are drawn into the improvisation. Generative music is mentioned in interviews by Magnus to have played a role in the world of art as it has been especially used in art installations. The music you at a given moment will potentially never be repeated in the same way ever again.

Øyvind Brandsegg describes constructing a generative sound installation for Nils Aas' sculpture "Flyndren" (Standing on Inderøy, near Trondheim, in the period 2006-2026). The music is generated via an external composition machine which is further streamed to the sculpture (via the website flyndresang.no, where one can live stream music).

5.2 The modes of laptop performance

It is important to point out that a live performance can be both concretely rooted one of the following performance techniques or a combination of several, and it is also important to point out that the first two can be carried out with only a laptop, however, connection with MIDI-devices is described in interviews to provide greater room for action for the laptop musician. These categories are found as the main modes based on the content in the interviews, in addition to perspectives from observations of the one-to-one lessons. Also, there was found multiple ways perform in addition to these, but it seems like an agreement that these modes are good approaches for a laptop musician to perform live in upper secondary schools, utilising the affordances of the laptop to record, sample, process and launch clips/samples/sections.

5.2.1 Live Processing

"If you use the laptop to get a sound on a song, it's just a tool, but when you start working with the processing of the sound and manipulation live, we start talking"

-Anders

The teachers describe live processing into two different branches based on the same approach to performance: live processing of live musicians and live processing of pre-recorded material on laptop. Using live processing of pre-recorded material is a direction many of the teachers aim for as performance in upper secondary, as the music can go from start to finish when triggered.

When the music is activated, the musicians job is to process with effects, like phasers and delays and EQ. Through live processing of musicians, one takes an approach somewhat similar to the live-sound engineer, but on the other hand, the laptop musician is to a greater extent involved in shaping the sounds in real time beyond what the performer will be able to manage himself. When using pre recorded material, the laptop musician has a project-file containing loops and samples, as well as effects processing within the program. The pre-recorded music can either be launched by triggering, and Ian mentions through Ableton's affordance of "follow actions" the laptop musician can decide how many times the loop shall repeat before automatically launching the next.

5.2.2 Live looping

We started from scratch, made a project where we programmed the music together. Played things live and built it on top of each other with vocalist in front who improvised.

-Ian

Live looping as a method is based on recording and processing yourself and further loop the recorded material on top of each other until the unity and development of the loops becomes the song. This is described a method that can have a great degree of both flexibility to create and improvise, simultaneously it is observed as a mode with more room to make mistakes that can even require starting the song over from scratch. Live looping can require a good sense of time and the ability to perform and launch the material at first attempt for the musician.

Live looping can also be done on a laptop with a base of pre-programmed tracks activated along with what is currently being played and recorded at the concert. It is also possible to do live looping without having composed material in advance, or that one can compose a piece to practice playing through part by part. In this way, one can look at live looping as a step further

from live processing of existing material, as live looping will have a greater degree of challenges related to time, rhythm and motor technique. Øyvind mentions that “building an instrumentarium” to do live loop-based performances with “manipulating, launching and mixing” as a situation the student must go through many learning processes to do, additionally Anders has not incorporated this approach in lessons. Ian has live looped with multiple laptop students connected to a WLAN-network where multiple laptops "sync to the same metronome" where they “started from scratch” and the laptop musicians programmed the music live while a “vocalist improvised”. This allows for multiple laptops to sync to the same metronome, and allows for a "laptop only” group to play together seamlessly. Inge mentions Ableton’s session view to “add samples and loops” which are repeated for a fast and inspirational composition process.

5.2.3 Live sampling

Live sampling as a performance technique is explained as recording of musicians or vocalists in a live situation. As an example, Ian mentions that one can set up and “open microphones in the Ableton sampler” when “the drummer plays a beat”, “cut it” and then later “play something the drummer has played before”. He mentions the need to be “quick on your fingers”, but that “it starts to get fun” when the musician is capable of this performance technique.

To start out teaching live sampling at a comfortable level Magnus has in lessons played piano, while the student records, samples and processes what he played to later launch the samples or play the chopped up samples through midi devices. This could be a nice pedagogical level to start out before exploring live sampling in bigger ensembles, and he mentions this can add interesting and unexpected elements to ensembles like a string quartet.

When the laptop musician has recorded a sound the musician can similarly to a DJ manipulate the sound through changing tempo, key, texture and more on a headset before later launching the processed audio to the output. When the musicians are performing they have a somewhat similar tempo as the recorded samples from earlier in the performance, and this will derive the need of connecting other musicians to headphones with a metronome. Anders as the youngest with strong roots in the EDM genre mention that live sampling has not yet been prioritised as it can be somewhat demanding for the laptop musician. Magnus mentions Jan Bang as a great example of experimental live sampling in jazz.

5.3 Technology in human and technologic relations

Each of the teachers described in interviews that using the laptop in live situations requires much preparation and practice, and that students skills in these modes of performance can first be trained after large amount of learning the possibilities within the DAW. At the same time, there are several considerations that must be reflected on for performance in comparison to a musician playing acoustic or electric instruments. For instance, Øyvind explained that the laptop musician must “create our instrumental part in an interaction ourselves, and we must find out on what prerequisite one can fill a role that can contribute something in interaction.” This situation also creates challenges when it comes to the educational objective of performing with others, and as Ian explains, there are varying approaches: ‘Some students will connect the pad to the machine, put the machine away and just play. Some will compose, bounce, have someone sing and press play and then leave the stage. On the other hand, the subject requires you to play with others. So how do you do that?’”

The software on the laptop is based on synchronization to a static metronome in the program, while the human musician is described to naturally have a somewhat flexible pulse, which implies the laptop musician must make a decision: *Who should be the time keeper?*

5.3.1 Laptop as time-keeper:

If there is a constant pulse from percussion instruments, the teachers mentions musicians will adapt to the laptop’s tempo just as they would to a live drummer. Also, it is mentioned that if the band has a live drummer the drummer could perform a percussive role that does not conflict with the laptops pulse. If not, there could potentially be a need for some or all musicians to be connected to headphones with a metronome. To avoid using headphones, which is described as an external and unnatural musical situation by Øyvind (though he mentions it sometimes can be a good approach), he explains the laptop musician can implement “cue-sounds” which signal when the next section of the music is soon to start.

Magnus also describes that the cue sound can be sent on a monitor/headphone channel so only the performers on stage will hear the sound when playing a concert. I observed a concert with the laptop as the time keeper of the group:

5.3.1.1 Concert with laptop as time-keeper

On observation of a school concert there was a laptop student who performed “Running to the Sea” (Røyksopp) with large parts of the music on pre programmed “tracks” playing from start to end in band with a vocalist and a couple of other musicians playing key-based instruments (Moog Subsequent 37, Nord stage) and a bass guitarist. The concert hall was dark, the lights were directed towards stage and the school had a hired sound-engineer for the concert. There is a lively atmosphere in the audience, which sit with one meter distance from each other, according to measures of the Covid-19 pandemic. In the concert there was many performances ranging from acoustic music with a vocalist singing on top to rock bands playing Foo Fighters. The song was introduced by the hosts of the concert, who mentions that the next song is doing something very special, having something so special as drums on the laptop instead of a “real” drummer. The song was driven by a “four on the floor” kick and floating pads with a big atmosphere, the differences between the sections like chorus and verse were mostly noticeably related to changes in the vocals. In the performance, which audience unfamiliar with the song probably didn’t notice, the vocalist started to sing the verse at the wrong place. A band with more traditional instruments can simply repeat the chord sequence so the song becomes correct (if the vocalist started a “round” too early), if all music is preprogrammed and launched in it’s full there is little room for the laptop musician to fix the situation. The performance ended, and the musicians remained observably untouched by the mistake. The audience sitting in the half-full concert hall applauds loudly, and the performers walk off stage.

This observation show a possible limitation to the laptop as a musical instrument, as there can be more risk to live performance and not being able to change in this case. When using pre programmed music which can’t be launched in sections, a way to solve problem can be to add cues right before the next part of the song starts as Øyvind and Magnus mentioned. Although this, for other musicians to learn how to perform together with music technology is as well described by Ian and Magnus as something which provide an important learning experience for the other musician as well.

5.3.2 Human as time-keeper:

Øyvind explains that for band he often advises laptop students to use sounds which will not interfere or go out of synchronisation with the drummer. This can be in the form of a non-rhythmic floating pad sound, or sound with short duration (one-shots) that don’t last long enough

to go out of time. As well to this, Øyvind mentions the laptop musician can launch samples, clips and loops with longer duration within sections which do not contain any profound rhythmic elements to get out of synchronisation with.

Magnus mentions that since there are several considerations for laptop performance many of his students end up playing synthesizer in band class, or use the laptop to provide sound for a MIDI-controller, leading to the student e.g. plays synth bass in the same way one would on synth. This turns out to be similar to other teachers experiences, and a element that is mentioned is that some teachers of band class (none of the laptop teachers teach band class) do not have large knowledge of the affordances of the laptop and how it can be used in interaction with human musicians. This is described in observation of Anders' lesson to give greater responsibility to the student, who must take the initiative and solve challenges somewhat by themselves.

5.4 Utilising the affordances

When we now have looked at the specific affordances and modes of performance on the laptop, what is the boundary from when a musician is playing “through the laptop” or using the instrument-specific affordances given by the instrument?

The teachers have different philosophies when to define when a musician is using the laptop as an instrument or as a tool providing sound for midi-keyboard. Magnus compares this situation to the church organ, as the pipes themselves are producing the sound and the rest is simply a control surface for the pipes. In his perspective when playing a sound which exists in the DAW, the musician is using the laptop as an instrument in as well when it is the producer of sound. On the other hand, Ian says that this is to “only play a keyboard” and that when the performer uses the the laptop to “record a loop and then use the laptop to manipulate the loop” it is an approach utilising the laptops affordances.

Øyvind explains the smooth transition through three levels, which could be ways to use the laptop as together with midi-devices with programmable parameters (knobs, faders etc.): “..There is a smooth transition from pure keyboard playing to working expressively with shaping sound on a synthesizer to switch to a laptop that is more angled towards sound recordings that were not available on an analog synth but being able to record, sample and edit.”. Also Anders exemplifies how he uses the laptop along with the mix console as a

live-sound engineer, explaining that the process of live mixing also is a use of the laptop as an instrument with live interaction.

5.5 Repertoire or pioneer work?

Regarding questions about repertoire, all teachers mention that their use of repertoire is different from their own experience teaching other instruments. This is by some explained through the fact that the laptop is so new. This in contrast to, for example, the piano which has a clear expectation of progression, techniques and repertoire which are considered important for optimal development of the instrumentalist. Additionally, it seems like many assignments are not geared towards repertoire and covering songs, but are formed as learning activities to create music within given boundaries. A following example is Inge's assignment, which gives directions in composition (using five band instruments, edit, chop, sample) similarly to Madlib's project Yesterdays new Quintet, instead of covering a song by him. Also Anders mentions using repertoire to create learning in genre aesthetics, for mixing and sound design.

"In laptop we compose as a completely integral part of finding the repertoire. Since the repertoire does not exist, we must constantly create something, we must create our instrumental part by ourselves, and we must find out on what prerequisite one can fill a role that can contribute something in the band."

Øyvind

Song repertoire is mentioned to sometimes be linked to band class. The observed lesson by Øyvind was mainly regarding how to use the laptop in band playing the song "A Day In the Life" by the Beatles. Magnus also described working with the material from the observed concert in laptop lessons. Ian went to say that he does not use much repertoire as assignments for lessons, saying the laptop is "kind of pioneer-work", thereby implying there are mainly other forms of learning activities outside traditional use of repertoire of music lessons.

5.5.1 The "agreement of repertoire in laptop"

I created a table (fig.5.1) based on a combination of questions in interviews, email correspondence as well as some musicians mentioned in interviews outside of the question regarding important musicians for the laptop. This list contains producers/musicians/bands mentioned by two (in blue) or more teachers (colored). It is important to note that many

musicians on this list are not utilising the laptop, but are musicians who are used as inspiration for genre aesthetics, the use of synths, production style or similar elements. Moreover, some musicians are mentioned by the teachers as important for the students, and are not musicians that they use for lessons. These are marked as “modern” in the table.

Ian Kolstad	Magnus Fjelde	Anders Paulsen	Inge W. Breistein	Øyvind Brandtsegg
Eivind Aarset	Eivind Aarset		Eivind Aarset	
Jan Bang	Jan Bang		Jan Bang	
	Brian Eno		Brian Eno	Brian Eno
Radiohead/Tom Yorke	Radiohead		Radiohead	
	Jon Hopkins		Jon Hopkins	
Erik Honoré	Erik Honoré			
Portishead	Portishead			
Massive Attack	Massive Attack			
		Cashmere cat	Cashmere cat (modern)	
	Nils Fram		Nils Fram	
Skrillex (modern)			Skrillex (modern)	
Alan Walker (modern)			Alan Walker (modern)	
		Corey Henry	Corey Henry	
	Imogen Heap	Imogen Heaå		
			KYGO (modern)	KYGO (modern)
George Martin		George Martin		

Fig.5.1: “Musicians/bands/producers important for laptop”

So in other words, there is somewhat an agreement between the teachers that musicians like Eivind Aarset and Jan Bang (Prof. University of Agder) from the Norwegian jazz scene exploring electronics. The creator of ambient music and generative composer Brian Eno was also mentioned

by three teachers. Additionally, the alternative rock band Radiohead was mentioned, which has created multiple albums exploring the use of electronics, e.g. the album "Kid A".

5.6 A typical lesson: some observations

It is useful to briefly consider what a laptop instrument lesson actually looks like. During the period of this research, much teaching was disrupted by the Covid-19 pandemic, and for much of 2020/21 lessons needed to be offered online. Still, two days of face-to-face lessons were observed (both Magnus and Øyvind), and one online lesson (Anders). The lessons by Magnus and Øyvind were 45 minutes in length, while the one by Anders was a double lesson of 90 minutes.

Following a fixed schedule for lessons is something that very few teachers mention in interviews that they do. They describe choice of content for lessons is somewhat directed by the student, or is based on music providing motivation and learning of important skills for the student. Magnus mentions that he “previously tried some kind of structure in the lessons” but that in recent times he takes account of how the student likes to work, like “jamming or performance-related activities” for the first 15 minutes, or “work on projects” (song file within the DAW) for the majority of the lesson. I will now analyse three observations that show teaching situations of three distinct fields of the laptop and music technology:

5.6.1 The synthesis/sound design lesson

I observed one double lesson of the duration of 90 minutes with Anders on Zoom. The lesson was in a classroom next to the studio, as the studio was unknowingly booked through the day. The student (1st year) was using a PC-laptop with FL-studio connected to a 6-channel mixer and speakers with no external gear added to the laptop. Anders and the student sit shoulder-to-shoulder facing the laptop, and the conversation in the start is friendly, almost “peer-like”. The student was given an assignment of creating a bass sound from scratch “in-the-box” using a software synthesizer, and the goal of the lesson was to further develop and learn how to combine elements like different oscillators at different pitches, white noise, and tonal shaping with ADSR envelopes and LFOs (Low Frequency Oscillators). In the lesson, Anders explains different forms and knowledge of synthesis like FM (frequency modulation) as well as programming (coding) of synths in Csound as well as how sawtooth and square waves consists of sine waves stacked on top of each other. They develop the synth sound, and venture into another software synth named

Sytrus for other sounds and parameters. An hour into the lesson the student asks Anders how to create a lead-synth sound from an EDM-song. Anders instructs the student for five minutes, then asks the student if they can change seats so he can explore how the sound was created through his own hands. He explores how to create a similar texture, thinking out loud and discussing the process of first creating the synth sound to then processing it through effects. He ends up with a similar sound, then saying “we are not that far away now if we add a couple of envelopes and some distortion”. The lesson ended, and I remarked a good teacher-student relationship, which e.g. can be explained by Anders being 23 years old and thereby in the same generation classification as his student.

5.6.2 The live-looping performance lesson

In a lesson observed with Magnus in person, the lesson took place in the school-recording studio, which had an “industry standard”. There was a large mixing console, monitors, analogue compressors as well as a recording room fully equipped with a range of band instruments, capable of housing a large band. The student (1st year) enters the room, which Magnus in a friendly way greets to then have a small chat regarding how the assignment for that lesson has gone. The student plugs his MacBook Pro to the mixer and connects his Push 2 device (Ableton’s DAW-integrated controller) to the MacBook. The student and teacher sit with some distance shoulder-to-shoulder facing the mixer console. The student starts to play an arpeggiated loop, trying to record new elements without the aid of a click track on top, but struggles to find the downbeat and is unable to record the loop. Magnus implies that the student could “turn on the click-track”, but the student wishes to try again without, then Magnus friendly says “go ahead”. After a couple of attempts the student adds the click track, and is able to record the new loops of vocal samples, then synth-chords and processed drums. From the speakers one can now hear a full-sounding dirty hip-hop inspired beat, and the student launches a pre-recorded distorted and “robotic” vocal loop on top, making the part the A-section. Now the student disables the loops one by one, to then record a new chord progression, marking the entrance to the B-section, which is developed with melodic synth-layers on top, to later launch the A section again, repeating until the student stops the song. All of these actions are performed on the Push 2 MIDI-controller, with some interaction on the touch pad as well. “Good, that mid-part became somewhat too big, can you filter in the low-end?” says Magnus, and the student adds a low-pass filter. Next, Magnus starts a conversation about how the student envisions the mid-section to sound like. “Do you want that to be naive and dry or do you want more reverb?” he says, implying that both can work, mentioning the band Bon Iver as an example of interesting dry synth sound. The student says he wishes the section to be dry, but wishes a change in sound, implying “maybe some Vinyl” (Modulation plugin, making recordings sound vintage), then

adds an RC-20 (modulation plugin) to the mix. They agree the new sound was interesting, and I perceived the section now sound somewhat close to the production of the band MGMT. The student packs down and converses about the upcoming band class, which he brought a TalkBox to school for experimenting within band.

5.6.3 The lesson preparing for band class

In a lesson by Øyvind which I observed in person the lesson started off with a student entering the school-studio, which is a small room (10m² approximately). The room contains one multiple-input audio interface, monitors, a MIDI-keyboard, computer screen and a window to the next-door classroom which serves as the “recording room”. The student sits facing the screen, and Øyvind sits by the same table. In band class the laptop student is going to perform “A Day in the Life” (The Beatles) in a band consisting of piano, saxophone and two vocalists. The student questions the teacher if the band should play to a click track, additionally he describes wishing to work with programming drums for the track. “Can I hear what you have done?” Øyvind asks with a friendly tone, and the student loads his project-file with pop-jazz inspired sections of music. They start talking about how to make a tempo track, but implying it is not a necessity through enough practice. They work on the string section: “can you add some tremolo? If you listen to the original it is more like a chamber orchestra”, Øyvind says. The student opens his orchestra plug-in, showing how he can move the different instrumental sections inside a digital representation of a concert hall. Øyvind starts to talk about how to avoid using a click track, implying “it is a bit boring” if the others have to follow the “static metronome” of the DAW as this is a somewhat unnatural situation for live musicians. In the end of the lesson a new dialogue arises, the laptop student mentions he experiences uncertainty in the social aspect of the band. Øyvind asks “have you shown them what you are going to do?”, and the student answers “no”. Øyvind continues to say “you shall not be the dictator of the band, but you have to show them what you will do”, going on to converse about group dynamics in band. He says that the longer it takes before the group knows what the laptop musician will do, the easier it can become for them to derive from the idea the laptop student created. He then implies “if you’ve got something to show them next band class it will be alright”. The student packs up, and the lesson is at it’s end.

In other lessons that have been observed, there is also some dialogue between teacher and student related to fields that surrounds the performance aspect. Magnus describes how parents have bought audio interfaces for their children, which only have two outputs instead of four which he describes as important for sending click-tracks. He describes that students should converse with him about

potential new musical investments before buying less desired equipment, using the instrument itself searching online for options for potential investments. Additionally, multiple teachers imply the importance of the internet as a learning resource. Ian went so far to say that if you want to learn the DAW to create a “russelåt” (tracks made for students’ “buses” celebrating the end of upper secondary school) you can find YouTube videos to learn everything within the DAW, and if you wish to “learn music” you go to him as a teacher. Ian and Magnus mention the use of “Mix with the Masters” (channel with mix/master and sound engineers of famous music talking about how they mix music), and Magnus mentions using e.g. YouTube channel “Andrew Huang” for learning about music and technology. Additionally, he mentions using live performance videos on YouTube for inspiration in live performance techniques and solutions for live-setup.

5.7 Examples of laptop assignments

In this section, I will present examples of possible assignments for teaching laptop. These are all mentioned by the teachers as a formal assignment they have given to students, which I’ve shortened down to core elements. It is important to remember that the teachers describe music creation as an integrated practice of laptop musicianship, and all students without noticed exception creates music themselves. Thereby working on the students’ own music is “also a type of assignment” as Øyvind explains. The teachers all imply that working with relevant music is of importance, and Magnus implies that “it is stated in the curriculum” that “the music should be relevant”, saying that when the student does not perceive the importance of a given song, “it becomes really boring for them”. He says it then turns into “little practice”, which makes it the teachers’ interest to give assignments which the student feels are relevant, or that learning derived from the assignment is clear and desired for the student.

Øyvind: Record a certain number of real-world sounds, which can be anything from dialogue to sounds from a forest. The student will capture nuances in the sounds, and the laptop musician will extract motifs and details to later edit and process the sound, creating a sound-sequence with appropriate length for the music. He mentions the music can develop into anything from two-minute piece into an ambient and floating 12-minute piece, depending on the sounds created by the student.

Inge: Make a piece of music inspired by Madlib's solo project Yesterdays New Quintet. Make a track which sounds like there are five musicians playing the piece. Record instruments that are edited, chopped and sampled. If necessary, use VSTs for some instruments you do not have

available (e.g. Fender Rhodes type electric piano) and record it into audio afterwards for sampling and editing.

Ian: Make a remix of an artist/band that releases their original audio files online for the purpose of making others remix the song. Learn about remixes and copyrights through the process. Ian describes how the Norwegian metal band Shining released their "stems" (original tracks on the recording) online and asking saying anyone who wish can remix, which Ian and students started to do as an assignment. He implies remixing as an assignment which can be relevant and exiting for the student, as modern artist the student might also have familiarity with can place their "stems" online.

Anders: The student had created a song, and Anders noticed too much compressing, EQ and effects were used. He then created an assignment to turn off the plugins, using only the volume faders to mix the song. This to demonstrate how one should "adjust the volume on the tracks correctly" before adding any processing, and to provide perspective and develop a critical ear for the student. Anders also explains of how "over-processing is gold" in the genre of EDM at the other end of the spectrum.

5.8 Challenges in teaching laptop

All teachers except Øyvind imply a challenge in motivating students to perform music with live interaction in the laptop, simultaneously he mentions there are "solid challenges" to the live performance aspect. Inge explains there are "many (students) who do not have that background", being autodidacts which makes working in the producer role "very logical". This is also a challenge mentioned by Magnus, and he mentions students with a background from house music most often are harder to encourage towards live musicianship. Additionally, Inge describes the challenge of motivating students to use the Ableton Session view, making them perceive how much value it brings to the DAW.

Another challenging aspect is teaching mixing, learning the uses of plugins and being able to understand and hear how they function. As well Ian mentions the perspective of "kill your darlings", as the student's favorite part of the song can be what the teacher feels must be removed. He as well mentions a challenge teaching "how to know when there are enough instruments and frequencies filled out". Anders additionally mentions the challenge of teaching students how to even be able to hear what is "needed" for a mix at all, which is a skill that will take time to develop.

Moreover, Inge mentions breaking habits of students as a challenge, as their approaches can have been used for years and become somewhat integrated actions. As Ian mentions, much of the skills for the laptop musician is knowledge of technologies and how to use them, making the laptop musician rely more on cognitive skills than motor and physical technical skills. As an example, the theory of aural training in more traditional music and within music technology is so different that Øyvind created a new university-subject called “aural training for music production”, training students to hear and recognize effects and processing.

Øyvind additionally mentions the world of laptop is large. It is used in such a variety of genres, having important links to 20th century composers who experimented with tape, microphones and analogue synths. Inge mentions he wishes to teach the loop-based creations of Steve Reich, but mentions a teacher has to take motivational factors into account when choosing repertoire. "You can touch a little of one and a little of the other" says Øyvind, implying that decision of content is challenging, as one does not have time in the three years of upper secondary school to dive deep into all aspects. Moreover, he mentions the multitude of skillsets and knowledge of music theory the laptop musician needs training in, saying that “everything is a bit challenging while at the same time being simple”. Many of the teachers imply a challenge in the aspect of motivating students, Ian explains how his motivational speeches are about “finding your flame” and the deeper reason why one wishes to learn the laptop. Øyvind mentions his strongest motivational factor is “how extremely interested” he is in the field of music technology, which in turn positively affects student motivation.

5.8.1 Progression of teaching

Starting out with the first-year students Inge explains he spends the first lesson trying to understand the background, skillset and the skills the student wishes to develop, which will be taken into account for upcoming lessons. Ian additionally describes in interviews that many first-year students start without experience in Ableton, and the first period of teaching is related to learning the possibilities of the DAW “just like learning the alphabet”. He moves step by step, like “how you set up a drum rack” and how to “program two measures” of drums with the drum rack. When learning more elements, he gives the student “side-assignments” to be check if they understand and can apply the newly learned element or technique in practice. “There are individual progressions for every student” he mentions, and implies the importance of expressing what is the expected progression for the student, saying “it is quick that the world takes over” regarding social life in the upper secondary age (15/16-18/19).

The timespan and approach to how the progression of teaching is planned is varied, and Magnus explains he made his “translated” curriculum goals to structure his teaching plan over the three years of lessons. Now he makes the progression plan along with the student, who writes a document with “goals they have for the year”, and what they “lack of knowledge they wish to learn and understand. Then we make a plan afterwards, which of course is linked to the curriculum goals”. He also describes that students are different, some which are very motivated whom one can plan “lesson-to-lesson” with, whereas other students are sometimes best suited with a plan spanning over longer periods of time.

Øyvind values the idea of a year-plan, which he still develops, mentioning that in upper secondary school there can be content that the teacher usually ends up teaching. Øyvind describes he usually starts with sound awareness, then possibly moving towards working with rhythmic elements in spring, and possibly in second year learning synthesis techniques. All this while at the same time teaching processing and mixing through all years. Two of the teachers mention the challenge of knowing what can be expected progression and what in the enormous sea of content is important to teach. Anders mentions the challenge to select content that “needs to be known”, especially without some guidance from some sort of laptop curriculum. Thereby, Anders plans lessons for a shorter time span, taking students’ wishes for fields they wish to develop into account. Inge as well mentions that selection of learning content as well is somewhat of a challenge because the idea of the laptop as an instrument is so new, saying “on saxophone you have so much history around the instrument and teacher material for all ages all the way down to first grade in primary school”. Additionally, Inge exemplifies sometimes reflecting about what content or learning activity which would be the “laptops similar” activity in a lesson when planning.

5.8.2 The teacher role compared to traditional instruments

All of the teachers except Anders have taught acoustic/electric instruments in addition to teaching laptop, and the teachers mention that they have a partially different approach to teaching the new instrument. Ian describes similarities from own practice, as the theory and methodology of the lessons are “quite similar” in the form of “presenting a task that needs to be done”. Øyvind compares to himself as a drum teacher, saying when he is a laptop teacher he has a more open approach to “what they (student) bring, what they know from before and what they want to develop”, being more flexible in his role as a teacher. Inge explains himself as more flexible in the teacher role as well, mentioning there are “natural reasons as the subject is so

new”. Anders regards how if he was teaching piano he would be more geared towards physical technique and making sections “sit”, and his teacher role of laptop is of a more explorative nature, deriving from the explorative approach within sound design and mixing. Magnus also explains that he allows the student to “steer the direction” of lessons to a larger extent than when he teaches piano.

Most teachers also described that students often have a different musical background than the teacher, leading to an exchange of music between teacher and student. The teacher becomes more informed about newer genres that otherwise would not have appeared in their information channels. Inge mentions the genre of “Future Bass” which he perceives as a trend online as many students wishes to learn how to create the music, additionally the genre was observed mentioned in the “synthesis/sound design lesson” with Anders. The world of electronic music is described by the teachers as being very vast, and new electronic genres and sub-genres are immersing frequently. Inge mentions that he through his interest in hip-hop/rap can provide roots to the genres and sub-genres of hip hop which many of his students enjoy, while Inge at the same time becomes updated on new trends in music. This provides some degree of like-sided learning.

5.8.3 Expensive instrument to teach?

One might imagine that offering lessons in laptop as a musical instrument would require a recording studio with a separate recording room, also providing DAW-licenses for the students at the school’s expense. This is not the case. Only one of the schools observed had what would be defined by the researcher as a full “industry standard” recording studio. Ian describes teaching his upper secondary school students at the culture school he also teaches at, and Anders mentions sometimes teaching at a studio at NTNU, the university where he studies music technology. The recording studio at the school Øyvind teaches is also a solution which would not be massively expensive when creating a new studio from one classroom and a smaller room, becoming a studio and the recording room.

There is only one school in this thesis which provide the DAW for free to students, and the rest of the teachers who require the use of a specific DAW in lessons require the students to buy it themselves. Inge compares this to how a school does not buy the students other instruments, e.g. a trumpet. At the same time, Magnus mentions the “free-principal” in Norwegian public schools as the reason for letting the students borrow a license for Ableton Live Suite (the edition with the most plugins/instruments) while they are in upper secondary school. At the end of upper secondary school the students have to uninstall the DAW.

As the laptop then does not “require” any extra expenses, it can even be argued that it can be even less expensive to offer lessons in laptop for the school. To teach the different forms of synthesis, Øyvind mentions that he programs a software synth from scratch through coding. The software synth contains only parameters he wishes them to learn as “a carrier, a modulator and a modulation index”, so the student has to automate the modulation themselves instead of an envelope who performs the movement automatically. This way one can avoid buying expensive analog gear, and Øyvind also mentions that Reaper trial is free for testing for a limited time. Moreover, in Anders’ and Øyvind’s lessons, the students worked solely in the DAW with only speakers and an audio interface. Although this, the teachers mostly agree the student should at some point buy a MIDI-controller, microphone, audio interface and headphones/monitors to make music outside school.

5.9 Integration and understanding of technologic affordances

Øyvind has used music technology in performance since the late 90’s. In the band Krøyt (which won Spellemannsprisen, the Norwegian grammy) he used motion sensors mounted on the body linked to computer being “a rack with 8 units in a big box”. He describes the audience thinking his movements to trigger clips, samples and loops was “just standing there and dancing”, which was “incredibly well-choreographed” as it was hard to time the movements so exactly at the beat. He describes the audience thinking his movements to trigger clips, samples and loops was “just standing there and dancing with perfect timing”, probably because it was so uncommon to think that a performer could trigger events in a computer just by twitching a muscle or waving a hand. He then describes how people have become more used to technology in general, and now it is more understood that technology can be used in innovative and ways.

5.9.1 The Norwegian producer wave

Inge who resides in the same hometown as KYGO and Alan Walker mentions that after the producers’ rise to fame has “opened the world of the idea” of the “performative electronic musician”. When the mainstream audience watches the television performances they see “the new thing”, which he implies has been positive on student numbers in both culture schools and upper secondary schools. Moreover, he mentions the change of focus from the “shadow producer” towards the “DJ being the star” has affected the interest and laptop musicianship in itself. Øyvind also mentions that producers like KYGO is easy to notice for the young to notice

the rockstar-like status and wish to start their journey as laptop musicians. He and Ian also implies a problem with the marketing perspective of female producers who sing on their tracks, which are marketed as artists instead. Øyvind describes it can be harder to identify with the opposite gender in some cases, making young girls less aware of music production as a field. Magnus and Øyvind goes on to talk about how when there are so few female students, the environment in class can be somewhat alienating for female laptop musicians.

5.9.2 Decreasing cost of technology

A legitimising factor mentioned by a couple of the teachers is how technology has become cheaper. Inge mentions “one can buy a Korg MS-20 for 5000kr” (semi-modular analog synth), approximately 600 dollars on the used market today. Magnus talks about when he in 2001 bought his first Mac with Logic Gold (early edition of logic pro x): “the Mac was 20 000kr and the software more than 10 000kr”, and the DAW did not have the same number of plugins or instruments as today. He mentions that an organ plugin costed “3000kr”, and the same one is included in Logic Pro X in 2021. Ian played in synth-rock band in the 90’s and bought a Roland MC-505 (rhythm machine) for “around 20 000kr”. Today the same functionality is included any DAW-software. Two of the teachers also mention the digitalization of society and availability of technology has made laptop the “folk instrument of the 21 century” (Inge), describing how no other instrument at any time has been so easily accessible for so many. Ian also mentions how younger people “are already familiar with the instrument”, and it does not take long time before the students can create music within the DAW, which can be a legitimising factor for the instrument.

5.9.3 Opposition to laptop

Øyvind mentions how “one does not see what the performer is actually doing”, and the performer just as well could be on stage “checking their email”. He mentions how the actions performed on laptop are “detached” from the sound you hear, just as the unplugged sound from the electric guitar is very distant from the amplified sound. This is one of the elements which can be a root of prejudice towards laptop performance. Inge mentioned how in electronic music it is often the light show and visual elements which grabs the audiences’ attention. Ian also mentioned that he has encountered perceptions that performing on a laptop resembles “cheating”, since it “is all playback”. He later explains that most people nowadays will not be able to notice

if an instrument is “real” or not as sound quality of digital instruments have become very close to indistinguishable from analog instruments. Unless they actually see playing on the laptop they cannot know if the sound comes from a DAW. He also mentions he has received compliments for recording “a real Hammond organ” in a track, but in reality “it was a Nord c-1 processed through tape”, describing how good the sound quality of digital instruments has become. Inge mentions how online sample libraries like “Splice” have become very common, and he says the idea of creating a sound from scratch “can be unfamiliar” for many students. Although this he mentions that a student without skill in sound design can create impressive-sounding tracks, having skill and knowledge of composition and mixing. Not requiring years of repeated technical practice to create good sound can be a prejudice making musicians perceive the laptop as an “easy way out” (Jon). However, practicing physical technique is described to be compensated by the vast amount of knowledge in various fields of music by Anders.

5.10 The process of legitimation into upper secondary schools

“Is that some kind of KYGO-stuff?” both Magnus and Anders mentions many have asked them, and Magnus describes that some teachers show scepticism towards the musical instrument. Magnus also implies that if one is “unfamiliar with rhythmic music” (pop, rock, jazz etc.), the performance and affordances of the laptop might be more “unfamiliar”. In my observation of the school-concert, the laptop musician performed “Running to the Sea” by Røyksopp. The song was introduced by a student (described in interviews being a classical musician) stating “the performance has no drummer”, but uses something “so special as the laptop”. Magnus mentions that musicians mostly are open-minded people and “most who want to are able to understand it”, once they start learning that the laptop is not “an easy way out”. As the teachers link the laptop to synthesizer history in addition to experimentation with tape loops and recording, Magnus explains how he argues through examples as “in Abbey Road they used a Moog” (The Beatles’ album) in seminars with different teachers and employees at upper secondary schools. He mentions other teachers have been sceptical to how a student can turn in a composition and how one “can’t be sure” that the student has created the music. Still, he implies that through frequent teaching in addition to live performances, the teacher will understand if somebody else made the music. Although the teachers describe the feedback about implementation as mostly positive, some mention they have encountered teachers carrying opinions that laptop is “cheating”. The teachers describe laptop being offered at their school after students have applied (sometimes for multiple years), or the wish to be relevant to the music in modern society.

5.10.1 Fascinated and unfamiliar coworkers

Øyvind explains that when his students have composed music they sometimes perform live to receive feedback from the teaching staff. Other teachers are “positively curious”, and Øyvind implies the feedback section often ends up with the student explaining what he/she just did to the teachers with less knowledge of music technology. Although this, he implies that this will change over “the next ten years”, when teachers have “seen it more” and understands “what it can be”. Ian also mentions similar events from a time his student had a pre-exam concert, and the teachers were like “question marks” after the performance, not understanding what the student did when pushing on his MIDI-pad. He ended up bringing the teachers over to the laptop screen, explaining the processing, instrumentation and how the music was composed. “If you watch a piano concerto it is impressive” he says, but if you have a “laptop student who has produced for five months” and perform through “twisting of knobs” they do not fully understand the amount of preparation and skills needed for the performance to take place. Additionally, the laptop is mentioned to contain linguistics from both “music technology and live-sound engineer” (Inge) world, mixed with terminologies and gear from the different electronic genres, and Inge describes an MPC (sample pad) can be more familiar to a hip hop-musician than musicians in other genres. This would derive a bigger gap between the terminologies used by instrumentalist playing more traditional instruments and laptop musicians.

Ian also implies the challenge of being the only teacher with knowledge of the laptop as an instrument at the school, saying “the rest of the teachers know almost nothing” of music technology. Øyvind also states this, also implying “it is not even rude to say that” and explains the laptop “is so different as an instrument that it is almost like a riddle”. Ian mentions a few teachers also have a negative attitude towards the instrument, perceiving it as “just a buzz”, a trend soon to disappear. Additionally, Anders has experienced that when he has “made a banger” (hit-song), others acknowledged the music being good, still were not as directly impressed as when he performs a piece on piano. Inge also mentions that for teachers who feel unfamiliar to electronic music, the attitude itself is hindering for understanding, as “they are a bit harsh on themselves”, making electronic music “scarier than it needs to be”. Although this, Inge and the rest feels that the other teachers have been mostly positive to the new instrument, at least once they have grasped some of its potential. Øyvind mentions he was mentoring Wallumrød who did a master thesis about the laptop as a musical instrument. Wallumrød found that in some culture schools the instrument was sometimes used to replace missing instruments. “It is great, if we miss a cello voice one can play it on the laptop”, is one of the most dubious statements

Wallumrød collected from his subjects in his study, and Øyvind notes that many “misunderstandings of the laptop” also have a bit of truth in them, as they are “one of hundred ways” to use the laptop as an instrument. Ian mentions the lack of technologic knowledge can be an issue for schools to provide lessons in laptop, and to offer the instrument "either the existing teachers need to learn it”, which would most likely not providing similar quality of teaching as if schools “hire people who have music technology as a field of interest and work”.

5.11 The national curriculum and legitimation

In order to gather the relatively newly started environment of teachers who teach laptop in upper secondary schools, a Facebook group was established by Magnus in 2018 with the name "Laptop as main instrument in MDD-subject teacher group". In this group, the teachers share inputs from their teaching practices and experiences. In addition topics like framework factors at different schools, and perspectives regarding how the teaching of the instrument could take form. Inge describes the importance of Magnus somewhat pioneering the implementation of the laptop through the group and the translated curriculum as an important factor for making teaching staff “see that it is time” to implement the laptop as an instrument. Magnus created the competence goals from LK-06 transferred to laptop made by in 2017 (fig.5.2). Here, curriculum goals are explained and what, for example, perform basic technique could be in laptop: "computers and synths in themselves are a technology and technique, you have additive and subtractive synthesis and to learn to sample and edit and there are extremely many different techniques to learn. It is in a way technical exercises as it is named in the curriculum“

First year

vise grunnleggende teknikk	Tilkobling av kontrollere og oppsett av programmet, forstår hvordan en miksepult fungerer (inkl. Sends/return, in/out) stabil datamaskin, legge ned andre programmer og slå av nettverk og autoupdates etc, programmere sekvenser og sette disse sammen. Jobbe både horisontalt og vertikalt i Live. Kan jobbe med opptak i mididel og audiodel.
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Second year

knytte praktisk musisering til relevant teori	Forstå synthese og kunne bruke forståelsen til å påvirke og generere lyd live, synce eksterne synther og trommemaskiner via midi, kunne innlere "studioteknikker" som automatiseres slik at de blir en improvisatorisk del av liveutøvelsen.
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Magnus' "translated" curriculum for laptop. Translated into English for this thesis.

Perform basic technique (first year)	Connect practical musicianship to relevant theory (second year)
Connection of controllers and setup of the software, understand how a mixer works (incl.sends/return, in/out) stabile computer, turn off internet and autoupdates etc. Program sequences and arrange them into one. Working both horizontally and vertically in Live. Can work with recording in midi and audio.	Understand synthesis and use the understanding to inflict and generate sound live, synchronise external synths and drum machines via midi, be able to learn "studio techniques" which is automated so they become an improvisatory part of the live performance.

Fig.5.2. "translated" curriculum, translated into English from Norwegian"

When interviewed for this thesis in 2020, Magnus was not too eager about the translated curriculum, as he has walked away from a big part of the plan after experiences deriving from teaching. Although this has had an effect on both the spreading of the laptop, helping other laptop teachers, in addition to “bridge the gap” between the world of traditional instruments and the laptop.

Magnus describes how some teachers at the seminars were sceptical towards the laptop’s applicability to the national curriculum, and were critical to how one can play “different epochs” on laptop. Magnus explained that one must broaden the perception of what an epoch can be. He mentions an example from the 60’s as an epoch: “One can choose a song from Beatles with synth” following up with “one does not have to play Ob-La-Di Ob-La-Da”.

5.11.1 Perspectives about the national curriculum

The teachers have different perspectives about the national curriculum’s applicability for the laptop. Inge also mentions having used Magnus’ “translated” curriculum for connecting his teaching practice to comply with the national curriculum. Øyvind describe the curriculum goals as open and achievable through all instruments, and the goal of “connecting modes of expression to genres and epochs” would not be the same genres and a classical guitarist would learn. He mentions knowing “how an 808 sounds” (drum machine), “side-chain compressors” and “auto-tune” and their use in genres as an example. Anders feels that though the curriculum goals are achievable, he would value a more instrument-specific plan, especially for more specific points to evaluate his students’ works. Ian on the other hand feels that many curriculum goals can be challenging and not as applicable for the laptop as the traditional instruments. Moreover, he mentions that some students come without much knowledge of the DAW or music technology, and related skills need to be learned before being able to comply with some curriculum goals. As Anders said, “on the laptop you have everything, and it takes a lot to master everything”. As the curriculum goals can be relatively open and content within lessons are largely influenced by the background of the teachers within this thesis, the teaching practices end up having clear differences from each other.

5.11.2 Instrument specific curriculum for laptop?

The teachers carry different perspectives on the national curriculum's applicability to the laptop. Some teachers believe that the competence goals are reached through the content in lessons, others consider some goals to be of little value to the instrument, also Magnus made his own translated curriculum which Inge has used as inspiration. With this, what do the teachers think about developing a new laptop-specific curriculum?

Three out of five teachers imply a wish for an instrument-specific curriculum to be developed over various timespans, and they believe the status and legitimation of the instrument will be served with more structure, plans and research on the instrument. The person who has the strongest opinions against a separate curriculum is Øyvind, who feels that concretizing the content and goals of teaching will prevent the development of new approaches using the instrument, saying "over the next 10 years we will find out what it can be, but I really hope that in 10 years also the instrument is still undefined". He argues that a classical violinist has "clear expectations" of what they should know (e.g. compositions, techniques), and a student who could excel on the violin in untraditional ways would in a formal music education have to "excuse themselves" for not having skills within more established aspects. This could be of some hinder for untraditional exploration of traditional instruments in the 21st century, as the progression and canons are somewhat decided upon after decades or centuries the instruments have existed.

On the other hand, other teachers have opinions that a separate curriculum would be positive in several perspectives. Anders, who has his first teaching job as a laptop teacher, feels that carrying out a fair assessment of the students' work can be difficult when there are few clear goals, still feeling that the curriculum would need to be open so the teacher can decide how to fill the lessons. Both Ian and Inge share the opinion that the status of the laptop will increase with more structured plans and research done about the instrument, as Ian mentions "I think laptop both deserves and needs it". Inge also describes how he wants more plans to create more approaches for how a teacher wishes to teach, comparing to the structured and planned way he has the option to teach saxophone.

5.11.3 Music technology as separate subject?

As instrument lessons in laptop are leaning towards the goal of performance, some teachers also mention that classes in music technology/production could be of value in upper secondary schools as an addition to laptop instrument-lessons. Inge describes that many students will likely continue in the music producer-role after upper secondary as well, and a separate subject of music technology/production could open for other approaches to the DAW. A point of interest is that all of the teachers in this thesis started with other instruments before they learned music technology. The teachers all imply having skills in both a traditional instrument in addition to the laptop is a great combination, and teachers mention the example of Norwegian musicians like Eivind Aarset who uses Ableton to loop and process sound of his electric guitar. Anders mentions that piano lessons gave him “a database to take from” and the skill to record his own performances in his own music. This way, having music technology or production as a separate subject could open the world of the laptop as a supplementary instrument for other students. On the other hand, Ian explains how starting with laptop can lead towards motivation to play instruments in real life, saying “the laptop that has led him (Ian’s son) to learn acoustic drums”. Øyvind also explains the affordance of laptop as a tool for production/composing and analysis of personal performance, as it is easier to find mistakes when listening to recordings of personal playing, and if you wish, fix the mistake within the DAW.

5.12 Arguments for legitimization

Both Inge and Anders argue for the laptop as an instrument through how almost all modern music have been through the recording and editing process within a DAW, directly stating “listen to a song on p3” (popular Norwegian radio channel). Though this, Inge mentions that he understands if someone perceive more value to teaching music production instead of the laptop as a performance instrument. Ian says that next time one is audience at a concert “look if you see a laptop” and where it is placed, describing how involved the laptop is in many situations of a live show.

Anders additionally argues for laptop through the fact that laptop, like traditional instruments, require huge amounts of practice, and a mix-engineer has for example “acquired techniques and knowledge to be able to make those songs as good as they can in the same way that a musician has acquired skills to play.” Øyvind goes on to say that it is the laptop’s many affordances that make it an exciting instrument, and that the laptop as a fascinating field which has developed

over the last 20 years. He implies, “there are very good opportunities to explore music and musical communication” through the laptop as a musical instrument.

5.13 The future of the laptop as an instrument

The various teachers share a perspective that laptop has a future with growing student numbers, but in most cases not at the expense of applicant numbers for acoustic and electric instruments. All teachers share the perception that the laptop in 2020/21 is now within a period of exploration, and during the coming decade it can develop into a more concrete subject than the time this was written. In addition to the potential as an instrument, teaching of music technology/production is also mentioned as a possible division of the subject in the future. An issue described for the future is the low numbers of female laptop musicians. There was only observed one female laptop student through this entire thesis, and Magnus mentions having just a few female students earlier, a trend the teachers wish to change. Also, Ian implies there is a huge amount of laptop musicians out there who “do not believe they fit in music schools”, and offering laptop taps into students who are not playing acoustic/electric instruments.

5.14 Summary of results

The categories and headlines in this chapter reflect both notable similarities and agreements between the teachers, in addition to notable differences in how they approach the performance aspect and experiences in legitimisation. I will now summarise the results of each section within this chapter:

RQ1: 5.1 From the analog recording studio to the digital audio workstation

- The teachers describe the laptop’s specific affordances in performance are related to recording, editing, processing, looping and sampling. The DAW is described as having vast possibilities, and gives the affordance of being controlled by MIDI-devices and the ability to use extend gear, which can greatly extend the agency of the performer. The lines between music creation, mixing, studio and performance are blurred, and non-performance skills are viewed as “scale practice” in laptop lessons leading to the goal of performance. The most notable modes of performance the teachers agree are utilising the affordances of the laptop are: “live processing”, based on processing pre-recorded material or processing other musicians, “live looping”, based on recording music and looping while in performance, and

“live-sampling” which is based on sampling, editing and processing other musicians through the laptop. Moreover, the laptop is described to have the instrument-specific affordance of generating music within guidelines programmed by the musician. The teachers describe that for a laptop musician to play in band, there are several decisions and considerations for performance: the musician needs to create their own part, they need to decide which approach to performance they will take, which setup they will use to perform, and also who should be the time-keeper: the laptop or the drummer.

RQ2: 5.5 Repertoire or pioneer work?

- The approach towards repertoire is different from lessons in traditional instruments, which is largely based on learning and mastering a piece of music for learning of skills or similar. The repertoire is mentioned to sometimes come from band-class, concerts or vocalists wishing to perform digital music. All teachers express a great importance of using repertoire and content which feels relevant for the student, which can exclude teaching older synth- and loop/sample-based composers like e.g. Steve Reich. Repertoire is described by Anders as a reference for learning genre-aesthetics, sound design and mixing. It seems like the focus is rather geared towards learning important and applicable skills/techniques than learning specific repertoire. The formal assignments are learning activities with the goal of music production/mixing/remixing, instead of learning and perfecting music, which is a central activity for lessons in traditional instruments. In laptop the musicians/artist most frequent mentioned by the teachers are Eivind Aarset, Jan Bang, Brian Eno and Radiohead which are important musicians for inspiration for performance and aesthetics. The assignments carry elements like composing, recording, processing and sometimes performing the music live. The observed lessons contained activities of sound design, performance and aspects of musicianship in band. The teacher role is described in interviews and observed by researcher as somewhat democratic, as the teachers describe themselves in most cases being more open and flexible. This can be explained by the explorative nature of sound design and mixing, in addition to how newly formalised the instrument is.

RQ3: 5.9 Integration and understanding of technologic affordances

- Along with the integration of information technology into society, the familiarity of music technology has also increased. The Norwegian producer-wave is described as a factor for the implementation of the laptop into upper secondary schools, and at the same time creating scepticism towards the laptop. The remaining teaching staff is mostly unfamiliar to music

technology and electronic music, which affects the feedback when students perform at concerts. The students are described in interviews almost having to “teach“ the other teachers how they performed their music. The performance situations of the laptop are more culturally unfamiliar than a guitarist performing, and the sound one hears is detached from the sound source when comparing to acoustic instruments (e.g. strings resonating to create sound). This can in turn make laptop performances less understandable, and the effort and skill needed to create the music is not easily perceived by individuals with less familiarity to electronic music. Although, the remaining teaching staff is mostly described as positive towards the implementation of the laptop, still some teaching staff feel the laptop is “just a buzz”, simply a trend soon to disappear.

RQ4: 5.11 *The national curriculum and legitimation*

- The teachers have different opinions regarding the national curriculum’s applicability towards the laptop, and Magnus created a “translated curriculum” (fig.5.2) which assisted both himself and Inge towards shaping their teaching practice and plan content for lessons. The teachers all agree that the laptop in 2020/21 is in a period of exploration, and that we will see a more concretized approach towards teaching the laptop as a musical instrument in the years to come. Three of five teachers think the laptop will achieve higher status with more structured plans and a specific curriculum, and Anders explains it could assist his evaluation of students with more related goals than the existing curriculum. Øyvind on the other hand has the strongest opinion against a laptop-specific curriculum, describing it can hinder the development and exploration of the instrument. As the laptop as an instrument is fairly new when comparing to traditional instruments, he describes canons and plans possibly will hinder the development and affect the approach towards the instrument. The teachers argue for legitimation of laptop because of its wide array of affordances and situations it can be used, the widespread use in popular culture and additionally the amount of practice and knowledge the laptop musician needs to perform. The teachers describe that student numbers will increase in the future at varying levels, mostly not affecting applicant numbers for other instruments.

6. Discussion

In this chapter, I will discuss the data from the interviews as well as observations reported in the Results chapter, considered in relation to relevant theory and the findings from previous studies. Specifically, I will discuss and analyse data in relation to (1) Bell's "5-prong approach" to explore perspectives on laptop as an instrument in addition to possibilities and challenges with the instrument, (2) Van den Akker's "spiderweb model" of curriculum components for discussion of laptop teaching practices, (3) Folkestad's model for informal music learning structures, and (4) the legitimation theory by Hanken & Johansen to discuss the arguments for and against the laptop's legitimation in both music education and professional music scenes.

6.1 Modes of performance on laptop

The data portrays three different modes of performance for the laptop as major components in the teaching practices. Live looping, live processing and live sampling are all approaches which are mentioned by the teachers as approaches which utilise the affordances of the laptop to a high degree. In online searches via databases Oria and Google Scholar, one finds little research on live looping, and the research points to the DAW Ableton as the one most commonly used (Øien, 2021). There are various performers exploring and doing demanding performances in both DAW-based live looping and loop-pedal based looping (e.g. Jarle Bernhoft, Rachel K. Collier, Ed Sheeran). Nevertheless, the history of live looping is described as connected to the experimentation of creating music through tape played at different speeds and sequences. Composers like Riley, Stockhausen and Reich were mentioned in interviews as a link to the past before digital technology. Studies additionally described the "Time Lag Accumulator" system which Riley used, perceived as a prototype and origin of the looping stations and DAW-based loopers of today (Øien, 2021, p.134). This would support the words Ian used about the laptop, describing it as "organized playback" and comparing the laptop to a streamlined Mellotron. The affordance of being able to organise and control playback can be viewed as a partnership between technology and humanness, freeing the performer from lower-level cognitive functions, and allowing the musician to work with the affordances provided instead (Salomon, Perkins. 2005. p.74). As the technology can take over for some actions (sequencing), the risk is that the audience perceives the laptop musician as less involved in live performance than e.g. a

pianist, also an aspect of Nupen (2017). As Bell describes, the audience applauds the pianist for the performance, not the piano (2015a, p.52). The view of the laptop as an instrument should be no different, and most of the teachers feel that we are moving towards the recognition of the laptop musician as a fully valued instrumentalist.

In the perspective of DAW as a cultural artifact, the laptop carries information of cultural expression and ways of use. The laptop is an artifact often bound to popular producers within the mainstream media, and thereby the path of least resistance for the young can prove to be creation of popular electronic music and hip-hop. Data seems to support this view, as the teachers explain it as mostly from a producer-perspective that students are coming from. The live performance of laptop is described as somewhat “culturally unfamiliar” by Øyvind, and Inge describes the trend by major producers of using little live interaction in concerts. The media representation of these producers may have steered many producers away from performing their music through recording/looping or activating clips, sounds and sections, while processing them live. One can almost perceive the performance modes as a somewhat hidden affordance of the laptop, as these performances are not as easily found in media representation and popular culture.

Bell describes how music created on DAWs can be driven towards “privileged” affordances (2015a). Some teachers mention the loop-based session-view in Ableton as their main screen when live looping performance. The session view is the first screen to be visible on opening the DAW, and Ableton is then making the affordance of looping the path of least resistance. Although other DAWs contain the possibility of looping through more protected affordances, the ability of looping is in a larger degree hidden and requires a larger extent of exploration or processes to make a section loop.

Additionally, having only one command (Command+M on Mac) to “MIDI-map” actions in the DAW makes for quick setup of live performance gear. One can argue that, in Bell’s terms, the “privileged” affordance of Ableton has shaped music performances to become more loop-based. This became especially evident when the author conducted a YouTube-search for “live looping performance” on April 13. 2021. On the first page of

search results, over 50% of loop performances used Ableton Live as the primary device or DAW (fig.7.1)

Video name	Device/DAW
Boss RC-505 Loop Station - Multi-Instrumental Live Looping - Reinhardt Buhr	RC-505 pedal loop station
ONE MAN BAND by Alfie Rev LIVE Looping Performance (Eps. 1) MEMORIES REMAIN	Maschine studio
TOP 10 Incredible LIVE LOOPING ARTISTS in The Voice	Physical devices, only one clear in sight boss rc-505.
Foo Fighters Meets 70's Bobby Caldwell - Live Looping Mashup by Elise Trouw	Ableton
Vinh (Germany) — BOSS Loop Station World Championship 3 International Finals 2013	Boss pedal loop station
Virtual Insanity Jamiroquai Live Looping Cover	Ableton
Boss RC-505 Live Looping - 4K GH5s Night Shoot in Berlin - Reinhardt Buhr	Boss RC-505
Portal (ableton live looping performance)	Ableton
Ableton Live Looping Performance - Faith Over Fear #Ableton	Ableton
Akai MPK MINI MK3 Ableton Live Looping Performance	Ableton
Live Looping Using Ableton Live by The Clouds Below	Ableton
"Gangster's Paradise" - Coolio (live looping cover by Taylor Reed)	Boss RC-505

Figure 7.1: Youtube videos on “Live Looping Performance”

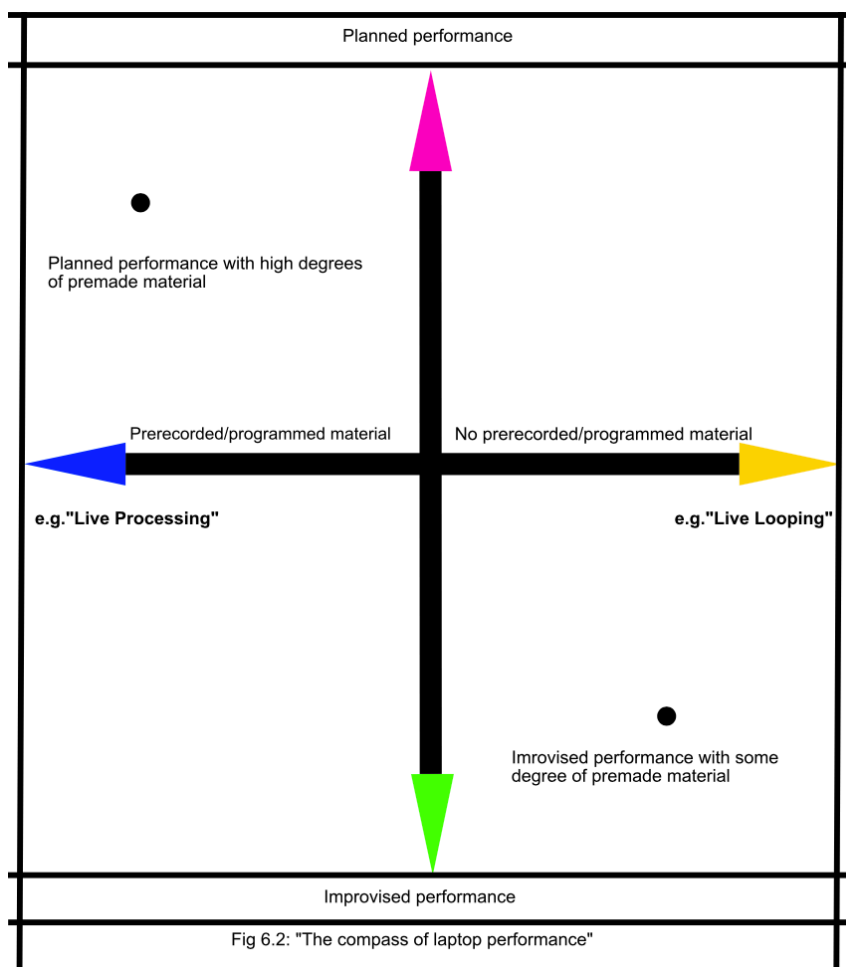
Additionally, in DAW-based performances, Ableton was the only one used in the videos, clearly showing how the program directs the musician into loop-based music creation and performance. Also, the teachers in the thesis using Ableton were also the ones who mentioned teaching looping the most frequently in interviews. This also applies to the loop-based musicians in Nupen’s thesis (2017), who all are performing with instruments within Ableton or through looping acoustic/electric/electronic instruments. In the performance situations of live sampling and live processing, the teachers explained the laptop’s affordance to process the sound of other musicians (or sounds within the DAW) in addition to recording and sampling musicians. It is important to note that both the live-sound engineer who has had the role to process acoustic instruments in electroacoustic music (Knowles, Hewitt, 2012), as well as stand-alone samplers can process, but samplers and the mix console are not implemented as instruments in upper secondary schools.

A point of interest is how there exist notable similarities between the main modes of performance in laptop and situations of performance on traditional instruments. Live processing can be linked to the situations when an electric guitarist uses a pedal board to process the sound by twisting knobs, creating change in timbre to the sound source of the guitar. Radiohead, which was mentioned by the teachers, has many songs with this

approach of experimental guitar playing. Live looping can share similarities to groove-based jamming in band, if one perceives the different instrumentalists as a separate loops entering and zoning out. Musicians listen to the other instruments playing, and then decide what to play to compliment the rest. Live sampling shares interesting similar elements to the tradition in jazz music of “quoting” parts within solos earlier played in the performance. Additionally, it is common to quote a section from earlier music like “The lick”, used somewhat similarly to how the break of “Amen Brother” by The Winstons has been sampled into N.W.A’s “Straight Outta Compton” and Squarepusher’s “Big Acid” amongst many others (Collins, 2007). Moreover, when looking at the comparison of legitimized instruments by Williams (2014), the laptop without doubt fills all the points of a musical instrument listed, just like the oboe. The statement “It is primarily through their use that technologies become musical instruments, not their form” applies somewhat to the laptop, but arguably the form, or portability, of laptop allows the distance between studio and stage to become blurred (Théberge 1997. Referred in Bell, 2015a, p.46). Overall, the sound produced by the laptop is “detached” (Øyvind) from the form, opposing acoustic instruments which rely on physical elements/form to produce sound.

6.1.2 “The compass of laptop performance”

When a laptop musician performs solo or with other laptop musicians, one can perceive the two main modes of *live processing* and *live looping* as entailing the opposite ends of an axis. This led me to develop a figure, derived from the teachers’ descriptions, that illustrates what I call the “Compass of Laptop Performance” (fig.6.2). A laptop musician may perform with pre-recorded material and loop the rest, or can mainly process prerecorded material to later record and add more, as seen in the “live looping performance lesson”. Also, there is the opportunity to improvise as Ian described, or to follow a planned composition as in an observed lesson offered by Magnus. Live sampling is not placed in the figure as it is described mostly in the interviews as a live performance with laptop musicians sampling other instruments or vocalists. As shown in the model (fig.6.2), when performing solo or with other laptop musicians, the performance can be placed at some point in the “axis of live approach” (horizontal, from “Live Processing” to “Live Looping”), and at some point in “the axis of pre-planned performance” (vertical, from “Planned Performance” to “Improvvised Performance”).



The example indicated to the bottom right of the figure relates to the live-improvised session with Ian, and the upper left to a performance approach described by many teachers; processing pre-recorded material with some plan of how material will be processed. Also, when performing music on premade “tracks” which go from start to end of song interrupted and the laptop musician performs e.g. live synth on top through the laptop, this would also be placed on the upper left corner. It should be mentioned that even though the horizontal axis describe processing, it does not imply that the performer processes at that end of the axis, but that it would be perceived an approach residing at that end of the spectrum. This figure would also incorporate other performance situations, as live coding described in the literature review, or performances using live electronics without laptop. A post in the Facebook group “Laptop som hovedinstrument MDD-Faglærergruppe” (laptop teachers, teaching staff and administration of upper secondary schools) described how at least one school has named the instrument “sound” (Fagerlia VGS), while one school in Oslo uses the term “live electronics” (Edvard Munch VGS). As Inge mentioned, “this opens to different approaches”. The name itself directs the content and affordances opened by more

external gear in performance, to even going “DAW-less” by syncing together samplers, sequencers and synths in performance situations without a computer involved. This option opens to even more approaches, yet the “Compass of Laptop Performance” (fig.6.2) arguably applies to this situation as well regarding levels of pre-sequenced material. Additionally, there are more variables of performance which could be applied to this model, still these seems to be the most applicable towards the data.

6.2 The affordance of creating and limiting a live setup

Ian explains the laptop musician is empowered with the “affordance” to create their own instrument, and seemingly endless possibilities exist for combinations of external gear. This then requires many decisions and limitations to be made before performance. Inge compared this situation to how Adolphe Sax “limited” the saxophone to its physical shape and possible pitches, but now the laptop musician “limits” their own instrument. Naphtali (2017) has written about live processing and as well addresses the live-setup as creation of an instrument, noting that making the DAW more “physical” through MIDI-devices enables electronic musicians to be more active in the live situation. The issue of deciding how to perform and with what equipment is described as a central prerequisite for performance. Even with a minimalistic setup, e.g. a MIDI-keyboard with few pots/faders, the laptop becomes more physical and lay out interesting possibilities for combinations of macros and parameters on the MIDI-keyboard. The challenge of deciding how to perform and what to perform with is described as a learning process for the students, which coheres with findings from Nupen (2017). Making the laptop a more physical instrument through MIDI-devices is mentioned as an important factor in the laptop lessons, as physical controllers make the performance more inviting for live-interaction and allow for the change of multiple parameters at the same time. Also, on the touchpad the musician can only click and edit at one parameter at the time, while on a MIDI-device the limit is how many knobs your hands can grab, allowing for change of multiple parameters and faster speeds.

Still, it is fully possible to perform only with the laptop, and this is described to be the preferred workflow musicians with a high cultural familiarity to the laptop. Magnus describes some students are not that fascinated by external gear, as they have tactile technique to program music within the “Piano Roll” without relying on external elements. Øyvind mentioned a goal of making the students able to realise the music they

have within their mind, learning the steps needed to create and process sound into what they wish. This would probably in most cases be doable within the “limitless” DAW. When the student finds the fastest way through the touchpad and DAW-only, Ian implies it is not of the biggest importance how the sound was created: “as long as there has been active work for creating it”.

Different gear brings different sound and approaches to music making and performance. The laptop with extended gear shares similarities to the guitarist who chooses a different guitar which can use different pedals and gear to alter the sound source. When perceiving MIDI-devices as cultural artefacts, as Inge mentioned the MPC is an important instrument in the development of hip-hop, this would imply cultural information within the artefact can prove the path of least resistance to be the creation of beat-like music (Withagen & Costall, 2021). This can in the same way as playing a vintage Stratocaster or a modern Strandberg guitar drive the musician into different genres and expressions, but possibly to an even larger extent through the amount of external elements one can use to control the laptop. Experimenting with samplers and sequencers can drive the music in another direction in the same way as the guitarist can be driven to play blues-inspired music when trying out a Stratocaster. Relating to the guitar, one can find the “prevented” affordances of the laptop: *to acoustically create sound*. This is also described by Øyvind who mentions the specific feeling of acoustic sound, and Inge who faces the challenge of making electronics “grab the audience” similarity to saxophone. Another prevented affordance is to simply pick up the instrument and play without preparation or decisions taken beforehand, as one can when improvising on acoustic instruments.

6.3 The teaching of a wide skillset

As the laptop musician is described to reside in a role with links to both the producer/mix-engineer from the analog studio, the live instrumentalist and the DJ, the instrument is containing aspects, skills and inspiration from all these. The teachers describe the laptop musician to need a diverse set of skills and knowledge in many aspects of music technology to be able to use the laptop in performance at all. Thereby the teachers have to teach the DAW and which affordances reside within the software. To start, the student needs to learn the presumptions of the DAW, and as well some actions are transferrable from other computing skills (Bell, 2015a; Prior, 2008). Like Ian mentioned, the students are familiar to the laptop from before, and one can notice many aspects in DAW like “click

and drag”, cutting and copying are similar in other programs like Microsoft Word. Thereby the students being raised in a world of digital technology are mentioned to transfer knowledge and quickly learn to navigate the DAW at a level able to create and process music.

In addition to learning the affordances to create and perform provided in the DAW, the students are trained in mixing and processing of sound. Plugins are mostly “previsions” of affordance, as they are hidden in menus in specific locations of the DAW (Bell, 2015a). Magnus mentions learning new effects as learning a distinct new technique on a traditional instrument, described as a “technological technique”. In some observations, the interaction of which parameters to change in the mix is often described through linking to emotions like “naive”, as well as known parameters of dry/wet as well as ADSR (Attack, decay sustain, release) and frequencies. Learning effects and being able to hear how the different parameters are affecting the audio is described as a “knowledge-skill”. It is described as an important skill which is developed over time, and studies show over-compressing for example can be linked to lesser enjoyment of the music (Mussoi & Bentler, 2015). A point of interest is Jon’s role of directing the mix, as he opens an idea for change in timbre in a bridge by asking for the student’s idea, leading to the student proposing their own solution in the mix. In this way the student can “own” the decision in a larger extent, and the opposite can potentially risk the student not feeling similar “ownership” of the music creation.

As the guitarist produces sound from scratch by the affordances given by the guitar: strings which vibrate at a set frequency when played, the comparative element on laptop would be synthesis. Sound design and synthesis is described in interviews and observation as a central aspect to the laptop as an instrument and is giving the musician the affordance to create any kind of sound through oscillators, envelopes, LFOs, and modulation. Sound design is mostly a prevision affordance in DAWs, as the instruments are not placed in plain sight, but in menus needing exploration within the DAW to discover. The methodology for learning sound design is varied between the teachers, where both the observed “synthesis/sound design lesson” in addition to some of the listed assignments are related to creation of synth sounds from scratch. Also, the digitalised stand-alone gear of sequencers, loops, samplers etc. are all collected in the laptop. As skills in these digitalised analog units can be a slightly “hidden” affordance, it can add to the “toolbox” of music creation and performance for the laptop musician. Having a conscious and reflective relationship to

technologies within the DAW (also externally from the DAW) is described to potentially be beneficial for the student, making them notice different approaches and perspectives in music creation (Sørbø & Røshol, 2021, p.228). Also, the collection of these earlier analog technologies streamlined into the laptop has been perceived to erase the division between composer, listener and performer (Dyndahl, 1999). The data shows that even further, the line between performing on stage and creating music in studio is becoming somewhat blurred. The approach of live recording and arranging “from scratch” is also found in this thesis (Ian) and other studies show the approach to emerge somewhat in popular culture by e.g. Imogen Heap (Knowles & Hewitt, 2012).

Although composition is not explicitly mentioned in the curriculum for “immersion instrument”, there have been experiments with integrating composition into piano lessons at upper secondary school (Kvalsvik, 2013). For laptop, which shares the same curriculum, the data shows it would be hard, or close to impossible to learn the instrument without simultaneously creating music. It seems the data complies with the statement “laptop music is more an approach than a genre”, with specifically different approaches than traditional instruments (Wolek, 2012). The teachers all teach composition through feedback on student works, and data describes teaching elements like combining time signatures, creating a dynamic interesting piece and application of applicable music theory. Though composition is not mentioned in the national curriculum for “immersion-instrument”, it can be used as a method to comply with curricular goals.

6.4 “If you can click, you can create”

The findings portray the laptop’s affordance of making the earlier separated roles like musician, producer, mix-engineer and even a label (through services like Soundcloud). This confirms the perceived trend of the “do it yourself” (DIY) musician, as the division between the roles become blurred, even removing the need for recording instruments through programming MIDI in the piano-roll (Bell, 2015a). Inge describes the popularity in EDM of “writing a track” with “drag and drop” and typing in MIDI-notes, which in some ways share similarities with composers creating music using notation as the mediator of musical information for the musician. Instead of writing for an instrumentalist, the DAW itself serves as the musician which without any mistake will play the part from the composer. The findings of the notable established approach to the

“piano roll” leads to expanding the somewhat problematic statement “if you can tap, you can play” (Bell, 2015a) into what I perceive as “if you can click, you can create”.

When music notation was invented in Europe technologies were primitive, and the notation system was invented on the basis of existing technologies. One can view the digitalised piano roll almost as a notation system based on digital technology. In the piano roll in a DAW, all pitches are clearly laid out, and it is a highly intuitive process to understand the setup: programming velocity, pitch and duration of the notes. The composer who has spent numerous hours perfecting knowledge of notation can view programming as a sub-par skill, still the intuitive layout in the piano roll functions to democratise music creation for musicians who cannot write notation. On the other hand, as Magnus explains, some students are so quick with this tactile technique that they can “write” a piano live, and this action is described to require practice and knowledge of the DAW to perform. Still, all the teachers express they value their ability to play a more traditional instrument and use the laptop as an instrument to sample, loop and process their own playing as well. Additionally, the YouTube search (fig 7.1) and informants in Nupen (2017) implies that live looping is also common in combination with acoustic and electric instruments looped by either a DAW or a loop pedal, where this as well is described as an instrument-specific affordance for the laptop.

6.5 Playing with instrumentalists in band

In the data we discover that there can emerge multiple challenges when performing with laptop in band. The laptop musician needs to decide which role to fill and potentially requires much preparation through music creation even before playing with other musicians in band. In addition to these decisions by the laptop musician, the group needs to decide who will be the time-keeper and if the band will utilise some form of metronome or not, described to vary between performance situation and genres.

The affordance provided to play a software-synth within the DAW through MIDI-device can be viewed as the “privileged affordance” of the laptop in band, the path of least resistance, as it requires less preparation and decision processes. As the laptop is mentioned to be capable of being used “in a hundred ways” (Øyvind), the teachers all encourage utilising the laptop’s affordances to record, loop, sample, process and create “tracks” for musicianship in bands. An example of not utilising the affordances well is the findings of Wallumrød (2019), as a culture

school mentioned using the laptop to replicate a cello voice. This relates to Marrington, who portrays the computer either as a digital tool or a digital medium. When the computer is used as a tool it acts with a purpose to make pre-digital era practices faster or easier, and on the other hand the computer is also used in ways which would be impossible in pre digital times (Marrington 2011, quoted in Hein, 2017, p.386). In this comparison the use of Sibelius for creating sheet music for a band will be to use the laptop as a tool. Additionally, many software synthesizers are made as a digital representation of analog synthesizers, e.g. Arturia's V-collection. As Øyvind does not wish for a curriculum for many years, he can potentially have the underlying thought that much of the DAW now represents actions from the pre-digital era, and we are simply in the start of using the DAW through approaches not coming from the pre-digital era.

6.6 A different approach to repertoire

The use of repertoire also seems to differ from lessons on traditional instruments, and even though some laptop teachers say they don't have any repertoire, they still use repertoire through a different approach. In traditional instrument lessons, one learns a song for a combination of learning value and motivation, and when the song is performed and perfected, the teacher and student decide on a new song to learn (in addition to scales, chords, applied music theory). The laptop teachers describe using repertoire for learning mixing aesthetics, skills and as a reference point for student mixes. Repertoire from band class tends to also be incorporated into the lessons.

The teachers' perspective on repertoire relates to the *Bildung* theory of Wolfgang Klafki, which separates formation (translated from Norwegian *danning*, or the process of life-long formation into a self) through the learning material or learning activity (Hanken & Johansen, 2013, p.72-76). Within this view of "formation" through learning activity, the teacher believes it is the skills learned which formulate the student. As an example, it is not too important that the student learns pioneering synth compositions as Øyvind mentioned, but it is rather important the student learns synthesis to create sounds from scratch. This perspective is called a "formal-formation", which then is divided into methodical and functional formation. The perspective of the teachers can be similar to methodical formation, as the teachers decide content and assignments which will create learning in new techniques, skills and knowledge for the student. Although 45 minutes each week for three years is just a small part of a life of education, one can argue that the tools for learning and finding resources for learning music technology in general are achieved through learning activities and repertoire in lessons. This relates to Øyvind describing "You can touch a little of one and a little of the other" in the large world of electronics through upper secondary school, which implies functional formation can be desired when the possible

content to teach is vast. Thereby also achieving the goal of functional formation for making the student equipped for life-long learning in music technology (Hanken & Johansen, 2013, p.77).

The table of laptop musicians/artist/producers (fig. 5.2) used as repertoire or as inspiration is also debatable. The teachers all have a different background, and some were very busy now and probably not noticing the emails asking for musicians to be included. Two of the teachers have education in jazz from the same institution, which could also impact the table. The teachers with the most common laptop artists are also from western Norway, which potentially could have some affliction. So at least there is a shared idea that the Norwegian experimental club-jazz scene with Eivind Aarset and Jan Bang, in addition the creator of ambient music Brian Eno and the alternative rock band Radiohead have been influential for laptop and/or used in the lessons. There also were many more notable musicians mentioned, but then only by one teacher. It can seem like the approach of utilising technology as an instrument to expand sonic possibilities of traditional instruments in similar ways to Aarseth, which Fagereng (2008) researched in his thesis, is a movement which is under fascinating development now. At the Grieg academy saxophonist Kjetil Møster is doing an artistic PhD immersing in the use of electronics to expand his saxophone, premiering at NattJazz 2021 (Husabø, 2021).

6.7 Notable inspiration from informal structures

As the laptop is in the process of being formalised into music schools, we are witnessing a transition from informally to formally trained laptop musicians. To categorise how the teaching practice is inspired I will now analyse the teachers' practices through the five points of formal and informal ways of learning by Göran Folkestad (2006, p.141-142):

1. *The situation:* The learning takes mostly place on the school within a recording studio of various standards. In observations some lessons took place in a room with an audio interface, monitors and a midi-keyboard, and others in an industry-standard recording studio. Two teachers also describe making students visit them in a studio outside of their school. In other words, the situation is placed in a formal institution/setting and is shaped as a lesson with clear social roles between student and teacher and goals for the lesson.
2. *Learning style.* The learning styles observed in the one-to-one lessons are varied, but can often be summarised by the student showing results from an assignment given and the teacher gives feedback into elements of performance, composition, mixing or other related aspects. Sometimes the student and teacher together agree upon the learning activity, a large part within the lesson, as the student observed often will have created music for the

teacher to evaluate. The lessons are shaped as learning activity-focused more than the tradition of listen-learn-perform from lessons in traditional instruments, although instructional practices are described by Ian as somewhat similar. Additionally a somewhat large part is learning of effects and processing, which derives an explorative and experimental learning style in the lessons when compared to traditional instruments.

3. *Ownership.* All different teachers imply that in laptop lessons the student has a role in the decision of what the content of the lessons are. As most students come from a producer background, they are often most familiar with the role as music creators, and will be developing new music all the time. This is the basis for some of the lessons, looking at potential improvements in the composition in all the different aspects of production, composition and mixing. In observation of lessons the student has sometimes ability to change the course of the lessons, like in the “synthesis/sound design lesson”. The student wondered how to create a similar lead-synth to a song he liked, which they worked towards in the remaining time of the lesson. In the “lesson preparing for band class” the student proposed uncertainty in social aspects and his role in the band. After the issue came up, much of the lesson geared towards creating a good solution for all in the band and showing them musical ideas and thoughts early in the collaboration. Magnus indirectly made his student propose solutions for his mix through discussion of possible solutions, making the student shape their own mix through guidance. Thereby the ownership of the student is somewhat large through findings in the observed lessons and data from interviews.
4. *Intentionality:* The intentionality of the lessons is to learn students to use the laptop as an instrument for performance, music creation and processing/mixing music. Some teachers describe the intention of making electronic music more “live”, and others express the goal of making students being able to realise their musical ideas. The goal is to learn, but also with a somewhat “open approach” to what is correct or not, as in e.g. mixing there exist commonly used approaches, but nothing is 100% correct for every situation. Although the intention is learning, the road towards that goal can be more open than in traditional instruments which are described as having clear expectations of progression and canonised song repertoire.

By using the model it is clearly laid out that the lessons are mostly formed as formal learning situation, although the ownership and the learning style of the lessons have big elements from informal structure, in addition to approaches for decision of content. As also mentioned the students shape the content of the lessons through their own compositions being an

“assignment in itself” (Øyvind), which is not too common for other instruments in upper secondary schools in Norway (Kvalsvik, 2013). Looking towards videos as inspiration for performance is as well in large case possibly more common in laptop, as well as a YouTube channel “mix with the masters” with famous sound/mix-engineers who share tips and tricks from their artistic practice are mentioned. Additionally, Magnus mentioned channel Andrew Huang for inspiration for music theory, synthesis and production in lessons. The degree of informal inspiration is described as natural by Inge as the teachers will be more “open” as they need to explore and develop a new type of teaching practice. Like Ian explains in guitar lessons, there is a bigger focus on learning and internalising the muscle memory when playing. Here there is already a set goal in the music how the performance should sound, and which techniques are needed to perform the music at all. Thereby the content of a lesson and techniques learned can be to a larger extent “set in stone” in comparison. The findings are to a degree expected, but lessons take more inspiration from informal structures than assumed.

6.8 The lack of perception of music technology

The lack of technological knowledge and familiarity of electronic music in the remaining teaching staff is described to be affecting both the process of implementation, additionally making the student be in a larger extent “on their own” outside of laptop lessons. In this case technology can be viewed as flattening the power structure between the student and teaching staff, whereby the student has knowledge in a field the teachers playing traditional instruments does not understand, thereby democratising the spread of knowledge in the group (Folkestad, 2006, Green, 2002).

The teaching staff at upper secondary schools seem to be very familiar to the producer wave from Norway (KYGO, Alan Walker etc.), but not necessarily approaches to laptop performance and what the laptop musician is actually doing on stage. The producer Deadmau5 mentioned “we all hit play”, on his Twitter account in 2013, following with the statement: “it’s no secret. when it comes to “live” performance of EDM... that’s about the most it seems you can do anyway.” (Parkinson, Bell, 2015. p.2). As performances with little live interaction is connected to the laptop in media representations, some teachers mention can they understand resistance against the laptop in music schools. One can see comparative similarities to the Dunning-Krueger effect. The meta-ignorance (ignorance of ignorance) by traditional instrumentalists not familiar with music technology can be hindering for laptop being formalised, and through their own experience of vast technical practice see laptop as an “easy way out” (Magnus), with little skill

needed to perform (Dunning, 2011). One can link this to how Bell explains Garageband was marketed with “if you can tap, you can play” which explains one does not need skill to play in the DAW, and this approach to marketing could have negatively affected the perception of how complex laptop musicianship can be within some circles. At the same the statement sounds very inviting, and similar marketing most likely has opened the world of music for many laptop musicians (Bell, 2015a). As the affordances of the laptop becomes somewhat more familiar to the individual, the individual realizes the skills and knowledge needed outside of technical motor skills, and also how little they themselves understand it. Thereby one achieves the realisation that one is not capable on the laptop without practice and learning, similarly to e.g. a violin. This is as well described by Magnus, as he mentions traditional musicians may need a comparative explanation to “bridge the gap” between the world of acoustic/electric and digital music to eliminate “misconceptions” towards the laptop as a musical instrument.

Some young people may even be surprised to find that musicians still play “real” instruments nowadays, spending hours or days to get the “perfect take” in a recording. By collecting laptop musicians together with traditional instrumentalists, this will potentially lead to more shared knowledge between instrumentalists’ fields in coming years. The statement “It is primarily through their use that technologies become musical instruments, not their form” applies somewhat to the laptop, but arguably the form, or portability, of laptop is allowing the distance between studio and stage become blurred (Théberge 1997. Referred in Bell, 2015a, p.46). This development even allows for specific hybrid live situations to take place, and the lines to be effectively blurred.

6.9 A new form of teaching practice

Using the model of curricular components by Van den Akker (2007), one can identify very similar elements described by the teachers in interviews:

As the instrument is so new, and the teachers in almost all cases were the first to teach at their institution, they need to decide a *rationale* for laptop learning, and the vision for their teaching. In the data, the teachers describe their goals for teaching which are to make the students able to achieve success as a musician, to make electronic music with more interactive elements in performance and be able to realise musical ideas.

The aims and objectives of the lessons is another factor of consideration, which for the teachers are somewhat flexible and varied: some follow a progression plan over a span of time, some plan for shorter spans of time with a lot of co-decision with the student. The aims and objectives are often described as related to performance, music production, mixing, processing and learning to utilise the affordances within the DAW.

The content of laptop lessons is a major concern of this thesis, and the teachers all have different content/repertoire and approaches to using it. The teachers describe testing out different content to experiment and leaving less successful content behind, a natural element in a teaching practice. The idea of possible content, gear and genres to teach in laptop is described as vast, which makes it a challenge to evaluate which skills and knowledge are important for the laptop musician. Also, the background of the teacher seems to have a major impact on the content, as production techniques vary between genres. The content is often shaped as learning activities, incorporating learning of skills as a product of the given activity, and sometimes directed towards a single skill to learn. The teachers all play traditional instruments and four have taught traditional instruments, so comparing to similar earlier teaching situations can be a natural way to plan lessons. Inge mentions sometimes wondering about the “laptop’s similarity to a saxophone lesson” to plan content for performance and other fields. Should one warm up with a live-sampling session of the teachers’ playing like Magnus tried out? Should one spend much time working on the students’ own music creations? The possibilities of content are almost endless, as Øyvind explains “there are a hundred ways” to use the laptop in music.

The teacher role is also an important factor, and something which the teachers must consider. The teacher role can be divided into the view of the teacher as a gardener or sculptor, which will affect the didactic practice and content of lessons (Hanken & Johansen, 2013). Should one attempt to fix the students’ works by showing how an experienced mix-engineer like Ian would mix the track? Should the teacher make the student reflect upon what is *not* working, discussing the possibilities together, thereby making the student feel the mix is their work, like Magnus did? The teachers all mention taking the goals and ambitions of the student into account, which is described by Vygotsky as important factor for motivation (ibid, p.47). Also, all the teachers work with students’ own creations, showing interest for the musical identity of the individual student. On the other end of the spectrum, neglecting the music culture the student identifies with can be detrimental for the relationship between teacher and student (ibid, p.49). Even the teachers’ perspective of the word “instrument” can influence different approaches to content. Anders, for example, describes mixing and live sound as contexts for the laptop as an instrument in addition

to the mix console. Utilising the analog mixer to mix a track live is also described by Knowles & Hewitt (2012) as a way of performing studio music in a live context.

Materials and resources are a huge factor to consider for the laptop teachers: what DAW should be used (three having Ableton as the obligatory DAW), which equipment and facilities are needed to teach. The data shows that there is a vast difference in the quality of school-studios, as well as different levels of working within the DAW or using external gear. The DAW along with the portability of the laptop have made the computer the studio and every room a possible recording room, removing the “need” for an analog mixer and other large equipment, which had created the need for a studio to house the equipment in the first place. Additionally, the world of the DAW is described as “having everything” (Anders) and the laptop providing the affordances of portability and practicality. There are good reasons as well to focus mostly on the DAW along with MIDI-controllers in upper secondary school, an approach Anders and Øyvind take for large parts of their practice.

Grouping is one of the parts mostly decided by the national curriculum, as the lessons are in most cases done one-to-one. Ian explains how he has linked different laptop musicians with Ableton on a WLAN-network, building a song from scratch as content in a lesson. It can be of pedagogical value to practice collective performance in lessons as well: producer duos performing live together is common in electronic music (e.g. Chainsmokers, Empire of the Sun) and would open students to the idea of playing in a miniature “laptop orchestra”. From this perspective, making the students use the same DAW as the teacher could open up for more collaboration and “laptop only” music. Additionally, one can always approach other methods for linking, as well as utilising analog synths, drum machines and samplers linked together with MIDI to encourage interaction with “live electronics”.

Time as well has proved to be a factor for some teachers in the data as they teach at multiple schools. Some teachers have a separate job outside of teaching, and some must travel and thereby “collect” hours at one day every two weeks like Øyvind. This also makes the laptop teachers in the thesis a bit less involved as members of the teaching staff since most do not have a full-time job at the school. As the laptop teachers do not teach in band class and the performance on laptop is less culturally familiar, this makes the laptop student more autonomous. This creates valuable learning processes for the student as well as being a potential “pitfall” for the student which can turn to e.g. playing synth in band-class. In addition, all laptop teachers are active musicians in their own projects, which provides real-world experience, aiding

the objective of making school relatable to the world outside of school (Hanken & Johansen, 2013).

Assessment is also described as an important factor. Anders mentions this as a particular challenge as it's his first job as an instrument-teacher, and the largest assessment would be the summative assessment in performance they are working towards in the final year of upper secondary school. Along the way, the student receives formative assessment through feedback on their mixes, performances, and music they turn in through compositional and aesthetic elements. But when the instrument is so new, the criteria can be a bit unclear to decide upon for the teacher. If a laptop student is very skillful at production and mixing, but not comfortable in a live situation, is the performance aspect going to lower the grade of the student? Magnus mentioned a reason for making the translated curriculum into a way of systematizing his teaching practice also in relation to assessment. As the instrument shares few affordances with electric and acoustic instruments in a general sense, the idea of how and what to evaluate is a larger challenge for laptop in comparison to if a new acoustic instrument is included in the possible choices of instruments.

When relating to the curricular components by Van Den Akker (2007), the teachers have a knowledge base unshared by most of the teaching staff, they have a national curriculum which is open, the instrument is new, and the teachers are in most cases are the first to teach the subject at their school. One can argue that within the structures of the national curriculum, the teachers all create their own "curriculum" and approach towards teaching laptop, developing a holistic vision for their teaching practice and perceptions of what is important to teach in the vast world of laptop.

6.10 The laptop for core curriculum

The teachers describe the traditional instruments are creating sound based on the instruments' physical form created by the instrument itself, the laptop which is mostly based on reproducing, shaping and playback of sound is definitively the odd one out. The laptop is also found to have music creation as a highly integrated element within the teaching practice and is also the same artifact one uses for work-related activities in everyday life. Through this one can argue that learning of values within the core curriculum is highly achievable through laptop (fig. 6.3). The core curriculum is developed by the Norwegian ministry of education and contains six core values which serve as the basis for education from primary school to the end of upper secondary

school (Kunnskapsdepartementet, 2017). With reference to the “Spiderweb Model” by Van Den Akker (2007), these points can be understood as the core rationale for schooling in Norway. The laptop might still be in many ways the “better option” for development of some core values:

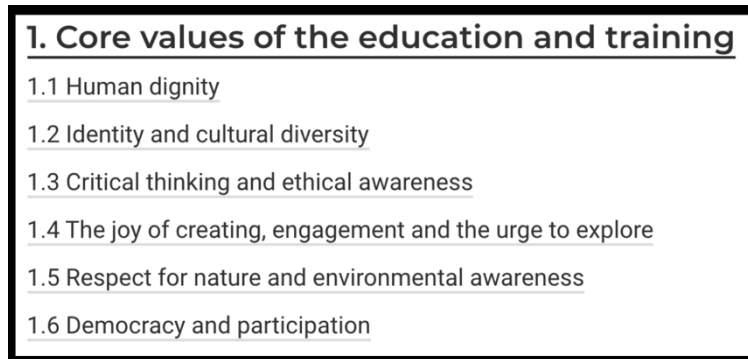


Fig.6.3: “Core curriculum (Kunnskapsdepartementet, 2017)”

1. *Critical thinking and ethical awareness:* As the teachers’ mentioned, the laptop is provided with the affordance of access to the internet as an endless source for collection of samples and information for learning new skills in the wide world of DAW. The laptop musician will need to find and reflect on use of samples in regard to copyrights, as well as searching and reflecting on educational online content on the instrument itself.
2. *The joy of creating, engagement and the urge to explore:* As Øyvind mentioned, on the laptop you create as an integral part of the instrument. As well as having the compressed digital collection of analog gear like synthesizers, samplers and effects, the instrument contains the biggest affordance of music creation. Exploration in sound design as mentioned is a world of unlimited possibilities, so many that it is easy to get lost in the available options (Eno, 1985). As observed in the “synthesis/sound design lesson”, the exploration of synthesis provided a glance into the world of synthesis for the student who was further motivated to explore sound design by himself.
3. *Identity and cultural diversity:* Using a DAW-based sampler and collecting samples online, or through presets on various software synthesizers, one can access and play sounds from instruments from a vast number of cultures. If one can find the isolated instrument on YouTube and sample, one can play a sampler-edition of the instrument.

On the other hand, there is reason to imply the laptop is the instrument least capable of achieving learning in the values of democracy and participation. The laptop musician can alone perform all the roles within music creation, and data portraits there is a risk of the laptop musician working alone, thereby not partaking in musicianship with other instrumentalist outside the compulsory

band-class. In my bachelor thesis researching band musicians' collective composing and learning related to participation in pop/rock bands found that musicians explained the band as a small democracy (Iversen, 2019). Thereby instruments linked to pop, rock, jazz can seem more be linked to development of values in relation to participation in democratic processes, in addition to classical instrumentalist in somewhat flat-structure ensembles.

6.11 Technology and heritage

The teachers describe that the laptop for now can be somewhat culturally unfamiliar in performance, in addition to electronic music for a large amount of teaching staff. Øyvind mentions the story from when he was performing in the 90's/2000's, and how the laptop is going to be more familiar in the future. The theory of digital natives and immigrants (Prensky, 2001) explains that the younger generation will be more familiar with technology and thereby have a better understanding of what digital technologies potentially can do. It is an established fact that younger generations learn information technologies at rapid speed, exemplified through the saying "If you want to know something about technology, ask a 10-year old" (Freedman, 2013, p.15). In 10 years, there will be a turnover of teaching staff, and the new teachers will be increasingly familiar with both electronic music and the laptop as an instrument. In the data the teachers imply that other teachers mostly are interested and curious about the instrument, as the direction of popular music since 2010's with the "DJ being the star" (Inge) has made laptop a central sound in popular culture.

The arguments against the laptop in seminars described by Magnus and also statements from the teachers (e.g. laptop being "just a buzz" mentioned by Ian) can be viewed as arguments for the preservation of culture. Teachers can perceive the laptop dominating pop culture without the need for being formalised into schools, and that it is of bigger importance to teach older epochs and traditions in music education. Teachers with these opinions can be viewed as carrying the perspective of the "teacher as a sculptor" and the carrier of knowledge and cultural heritage to pass on to the student. This somewhat pedagogic fundamentalism could be slowing the legitimization of the instrument in certain circles (Parti, 2017; Hanken & Johansen, 2013). This perspective is, on the other hand, not without important reasons. A fellow master student at a seminar in Malmø described the state of the folk music scene in Norway by saying: "if it is not dead yet it at least smells funny", paraphrasing a quote Frank Zappa made about jazz music in USA. The focus on pop/rock music has made much of the folk tradition disappear from music in compulsory education. In this perspective, looking at the laptop's mainstream popularity,

teachers are mentioned to sometimes have the fear that the laptop will “take over” student numbers on traditional instruments. Though some of the teachers also imply that this can happen, Ian also implies that laptop students are people who do not think they belong in music education, tapping into potential students who would not be studying music in the first place. Other teachers describe how instruments will co-exist and the numbers of laptop students will increase without “taking over” the student numbers of other instruments.

As another perspective, new cultural expressions can in a few decades be viewed as music which is a basis of national cultural heritage. Jazz music for example has existed for about one hundred years and is now a big part of the American cultural heritage. In my home town Bergen there is a “Walk of Fame” similar to the one in Hollywood, USA. Here Bergen citizens who have had an impact on culture, politics, sports and other fields e.g. Edvard Grieg and Frank Aarebrot are represented with their names on the sidewalk. Included here is a photo of me at the Walk of Fame with two professional laptop musicians (fig.6.3). Both Kyrre Gørvell-Dahl (KYGO) and Alan Walker have received their own tile, which can point to how cultural expressions of today may already be internalized and indoctrinated as a part of Norwegian cultural heritage. While the teachers in this study are not necessarily fond of KYGO and Walker, the teachers explain that these producers have been popularising the instrument and inflicting the student numbers.

Additionally, all major instruments have inarguably existed in pop culture for a somewhat long timespan before they become implemented into music education, and it seems that the world of music education need for an instrument to develop in the music scene before it is included into both academia and music schools.

6.12 Legitimation process into schools

The teachers mentioned in the interviews how the producer-wave of the 2010’s have legitimised and popularised the instrument amongst



Fig.6.3: “Bergen Walk of Fame”

many young musicians. The performance perspective linked to mainstream producers has also created misinterpretations by non laptop-musicians regarding how many approaches to performance exist in addition to affordances provided by the DAW environment. Norman describes the perceived affordances, the perspective of affordances provided by the programmer of the software is not as important as how the user of the laptop perceives them (Bell, 2015a, p.47). The whole argument of legitimation can be discussed through perceived affordance. Once the teaching staff and leaders in music schools understand the links to history, experimental uses and affordances, they move the perspective from laptop being a non-active live instrument to a instrument which can fill many roles with large extent of live interaction.

7 Conclusion

Introduction

In this thesis there have been, as common to case studies (Yin, 2018), many unpredicted points of data in both the interviews and observations, as well as rich descriptions enabled by the focused objectives of the study. In this concluding chapter I will answer the four research questions one by one on basis of the empirical data and discussion, and then develop a holistic conclusion on the implications of findings from this thesis. Then I will summarize the perspectives for further research on the laptop as a musical instrument as well as the pedagogical and didactic perspectives of the instrument. I will start with implications for future research of interest found, following with concluding thoughts about the formalisation of the laptop as a musical instrument.

7.1 Main findings

RQ1: About affordance of the laptop as a musical instrument

What do laptop teachers identify as the laptop's affordances as a musical instrument, and which forms of live musicianship appear in the lessons?

The teachers describe the affordances being centralized around the instrument-specific abilities to record, process and edit, in addition to digital synthesis. The instrument is viewed as a portable digital recording studio used for performance, as many techniques come from the “producer role” mixed with elements from the traditional instrumentalist-performer. The live musicianship, as described and observed, is divided into three main categories utilising the affordances to a high degree, which I refer to as “modes of laptop performance” (fig.7.1):

1. Live processing, the performance technique with pre-recorded material and the laptop musician doing live processing of effects. In band a laptop musician can be in the role as live processor, connecting instrumentalists/vocalist to the DAW and processing them as performance.
2. Live looping. The musician either starts from scratch and records instruments and sounds which then repeat in a loop, or with some pre-recorded sections and record loops on stage. Through discussion of “privileged affordance”, earlier research and the YouTube search (fig.5.1), the DAW Ableton privileges looping and thereby leads the performer into loop-based music and performance.
3. Live sampling. The performance technique based on recording, cutting, mapping samples to a device (optional) and processing them. As Ian mentioned, one can record a drummer, process the clip, and later play a sampled section with “a new twist”.

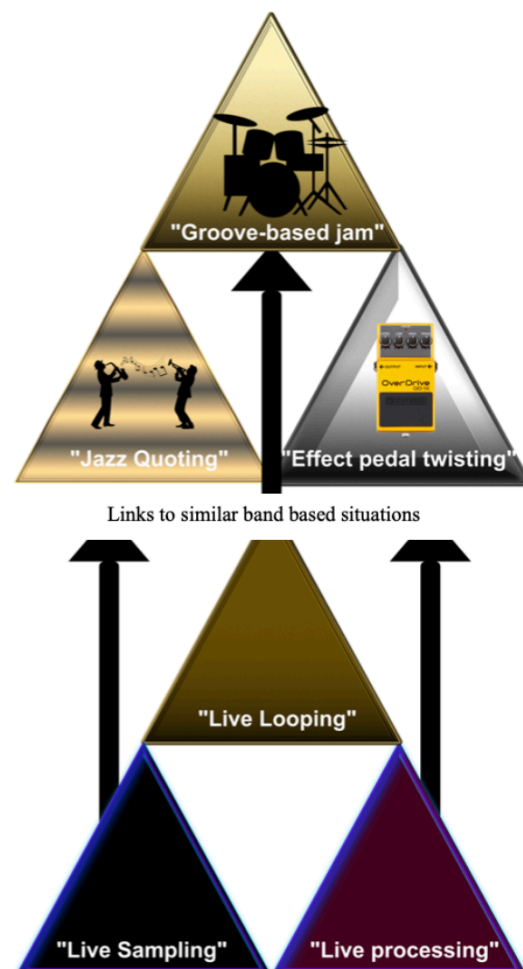


Fig 7.1: “Modes of laptop performance”

The modes of live laptop performance are rather new, and thereby less culturally familiar for musicians. Nevertheless, one can see similarities to situations with traditional instruments, as the figure explains: Sampling has happened in jazz for a long time when performers “quote” sections from earlier solos, live processing of the guitar is a tradition in many genres that

feature electric guitars, and live looping is similar to how a jam can develop where musicians listen and add their instruments one-by-one to the mix. Although similar, the listed modes can often require more preparation and decisions about which role to fill in a band. This can lead the laptop-student to choose the “path of least resistance”, playing MIDI-keyboard with the laptop as sound processor, which functions almost identically to a digital synthesizer, or they may end up playing synthesizer in band-class as result of extra processes of preparation and elements to consider. Also, the question of who should be the time-keeper, and how other musicians relate to the fixed metronome of the laptop is almost an instrument-specific issue.

For the laptop musician to be able to perform either within one of the three modes or a combination of them, Inge explains that non-performance skills are viewed much like “scale practice” as a comparison to traditional instruments. Mixing, recording, sampling, digital synthesis and studio routing are perceived as separate techniques, akin to a guitarist who practices vibrato to play a song utilising the technique. In the case of laptop, such practices rely to a larger extent on cognitive skills than physical techniques, although Inge offers an example of “learning to play a MPC” (finger drumming on pad) as a skill for the laptop, and this physical surface will require practice and internalization of physical technique to perform likewise to traditional instruments. Additionally, music creation is described as an integral part of laptop musicianship, and laptop includes the affordance of programming, or “writing” notes in the “piano roll” so the performer can be reliant on only cognitive and tactile skills for creation and performance. Moreover, all teachers stress the importance of MIDI-devices for live performance, allowing for interaction with multiple elements simultaneously. Skills in applied music theory and composition are also a part of the lessons in laptop at upper secondary schools, as the affordances related to the production and organization of music are a unique and “integral part of the instrument” (Øyvind).

RQ2: About teaching content/repertoire

What are the instructional strategies and "repertoire" in laptop lessons?

Analysis of the teaching practices through Folkestad’s model of informal learning in music portrays noticeable elements from informal learning structures within the lessons. The ideation of the laptop as an instrument is found in the literature review to be increasingly explored from the start of the 2000’s, and the teachers (except Anders) were the first ones to teach at their school. This “newness” makes for an open, democratic and explorative teacher-role whereby working on students’ musical creations is an integral part of the

lessons in the data. The lessons are to a larger extent inclined to be focused on learning activities and less focused on using repertoire for covering existing music, a huge tradition in acoustic/electric instrument lessons. Still, existing repertoire is used for other purposes: learning aesthetics for mixing, as a “reference” for music creation/synthesis and ideas for live shows/setups. The song repertoire is described as chosen on the basis of motivational factors and containing the potential for important learning outcomes. Additionally, a noticeable section of repertoire derives from band class, covers for student concerts, and vocalists wishing to work with popular music. The teachers try out different approaches to teaching, either focusing on a single field like compressors or learning the different skills when encountering compositional or productional challenges within a song. The focus on learning activities fits with the formation theory of Wolfgang Klafki, both formal and methodical formation, providing tools for lifelong learning. The “agreement of repertoire in laptop” (fig.5.1) shows that the laptop has links to the Norwegian club-jazz scene with guitarist Eivind Aarset, and producer/live electronics musician Jan Bang (prof. University of Agder), in addition to the inventor of ambient music, Brian Eno, and also the alternative rock band Radiohead which has experimented with soundscapes utilising music technology. Older composers exploring tape technologies like Steve Reich and synthesizers like Stockhausen are also mentioned in the data, complying with existing literature.

RQ3: About legitimization of the laptop as a musical instrument

How have the teachers experienced the laptop's process towards academization and legitimization?

The venture of the laptop as an instrument started in the late 90's and the laptop has become an integral part of both work and leisure in everyday life. The teachers describe the world of digital music and music technology as increasingly culturally familiar to the public and in music schools. Still, the teachers experience that other teaching staff can be unfamiliar with the world of electronics, although mostly fascinated by the instrument and performances. Still some laptop teachers experience the legitimization of the instrument is lagging behind within circles with less familiarity to electronic music. Some teaching staff perceive the laptop as “just a buzz” (Ian), simply a trend within upper secondary schools. The producer-wave in Norway is mentioned as a factor contributing to the instrument's availability in upper secondary schools, and that affected its student numbers, which ultimately also opened possibilities for learning live-performance with high degrees of live-interaction. The teachers

explain that the school they teach at offered laptop either because of the wish to be “modern and actual” (Inge, Magnus) or that students have applied to learn laptop (Ian). Øyvind explains the first student at his school applied for laptop for two years, to then finally receive tuition by Øyvind for the last year at upper secondary school. A problem for the laptop’s legitimation can be that one does not “need” to practice physical technique for years to be able to create sound. Still, the laptop musician learns to utilise a vast amount of skills related to both cognitive skills and technical knowledge. Also, it is harder to connect performed actions to music in live performance, also the laptop is represented in performances with little live interaction in mainstream media, which may have impacted legitimation. According to Magnus, creating links and comparing laptop to instruments like the organ, rooting laptop history to the evolution of synthesizers, sequencers and samplers have been effective for legitimation amongst teaching staff and administration. Also, the Facebook group created by Magnus has impacted the laptop teacher milieu in Norway, by enabling the gathering of teachers for sharing of relevant experiences and news.

RQ4: About legitimation in relation to the curriculum

How do laptop teachers view the curriculum's applicability, and which arguments do they use to legitimate the laptop as an instrument"?

The teachers have different perspectives about how applicable the national curriculum is for the laptop. In the new curriculum in 2020, some specified curriculum goals were removed (e.g. *prima vista*, or “sight-reading” of notation), which created more room for content in the teaching practice. Either way, the curriculum goals can be perceived as so open that the teachers all reach the goals through their teaching practices on laptop. Through analysis the laptop can potentially be an instrument which serves the goals of the national core curriculum as well, since e.g. music creation leading to training of creativity is very integral to the laptop as a musical instrument. The teachers argue for the laptop as an instrument because of its wide array of affordances to create and process music. Additionally, they note that it serves as both a first-instrument and secondary-instrument for traditional instrumentalists to record, compose and alter their instrument. Moreover, the widespread use of the DAW in music production and the increasing use of digital instruments in the popular music scene have made learning a DAW a major advantage in the world of the entrepreneurial musician, who can fill all roles from recording to release, by themselves. With this, the teachers describe the laptop as part of the future of music and argue for its legitimation through what Hanken & Johansen (2013) call the “individual-perspective”, and the “society-perspective” as laptop-music is “the sound

of now”, creating a bi-product of income and attention from popular music. There are divided opinions regarding the notion of a laptop-specific curriculum. The national curriculum was “translated” by Magnus to applicable fields for the laptop, which Inge also used for inspiration. This implies that a laptop-specific curriculum could function well as a structured approach for other laptop teachers. Still a laptop-specific curriculum might in other ways hinder important development and exploration of the instrument.

7.2 Pedagogical implications

The ideation and application of the laptop as an instrument for music performance has been developing over the past 20 years, and now the instrument is in the process of becoming formalised and accepted as a full-fledged instrument in schools similar to the electric guitar. The affordances of this unique instrument provide interesting approaches to performance, and there is a possibility of even more distinctive approaches developing in the future. As the laptop has been used for DJs, producers and various aspects of an array of live shows, the laptop performer can take on many roles and performance approaches compressed into the portable device of the laptop. Skills like music creation, production, mixing and digital synthesis are all a big part of laptop lessons, and are good to know in the performance situation. Learning the overview and functions within the DAW is described as somewhat “translatable” from other programs with which “digital natives” have familiarity (Bell, 2015a; Prensky, 2001). As the instrument is so newly formalised into music schools the teaching practice is relatively explorative and informal, as the students’ goals and decision power in the lessons are to a larger extent taken into account than in the learn, play, perform repertoire-approach which is a central element on traditional instruments (Mosnes, 2019). The pedagogical approach found in the data shows a large extent of democratisation in the teaching relationship. The approach toward content seems related to Klafki’s vision with its focus on formation through learning activities instead of musical material (Hanken & Johannesen, 2013). When Bell (2015a) explained how Garageband was marketed with “if you can tap you can play”, the absence of actually needing training of physical technique is filled with a vast amount of cognitive, technological and tactile skills and knowledge utilised by the laptop musician for musicianship. A laptop-specific curriculum could potentially develop over time, and there are both positive sides to legitimation, as well as negative sides like limiting the exploration and creative development of the laptop as a musical instrument. When looking at the history of structured material in traditional instruments, there will probably be more structured learning resources for the laptop over time, which will structure teaching and formalize the laptop to a larger extent.

All in all, this thesis has explored what this new instrument can be, how the lessons are shaped, as well as how perceptions of the instrument have developed. The laptop using a DAW is described as influential in popular culture, and also democratizing and blurring the lines between the musician, technologist, producer, mix-engineer and composer: even blurring lines between stage and studio. The implementation of the laptop is arguably among the most exciting developments in upper secondary schools and higher education in the 21st century.

7.3 Future research

A good further step will be to have more research done over a longer period of time on the performance aspects of live music using the laptop, as there probably will develop new ways of performing and creating music which we have not thought about yet. It is a problem that the field of music technology is so dominated by men, and there has only been one female student observed, as well as only one known female laptop teacher in Norway who unfortunately was not teaching at the time of this thesis. This thesis only lightly touched upon the subject of gender, but there is much more research needed in this area and most of all, real world action needs to be done. If women musicians in the future do not develop skill and knowledge in the DAW, there will be a greatly skewed distribution of the agency to be able to compose and produce modern music. If not changed, this tendency could lead to further exacerbation of the traditional roles of the male creator and the female singer or player of instruments seen across genres, extending even to classical music. There are actions being taken, however: on Ableton's YouTube channel, there seems to be close to a 50/50 representation of genders, and similar representations will potentially make more women immerse in laptop musicianship over time.

Philosophical research is also needed on the definition of what a musical instrument is, because the idea of what an instrument can be changing across time. In pedagogy, concepts and approaches from informal learning and peer-based learning have become more popular as inspiration for formal teaching of music. Within pedagogy, researching laptop teaching can in the future become an important topic, as the training of the modern all-around live and creative musician can potentially be much more than teaching traditional instruments.

In a decade or more, I think the laptop could potentially be served by having developed an instrument-specific curriculum through extensive research of existing pedagogical practices. The plan should be created by laptop teachers in upper secondary schools along with a group of researchers, and should serve as an alternative to the teacher wishing for a more structured

approach, as Inge explained. This could be limiting to the potential development of the instrument, yet a curriculum could have positive effects in terms of both student numbers as well as the legitimization and spread of the laptop.

7.4 Concluding remarks

Fears that the laptop might take over in popularity so few students will play “real” instruments in schools of the future have been mentioned. Still, most of the teachers in this study (and myself) do not really see this outcome as a likely consequence of legitimization of the instrument. The traditional instruments are to such a degree bound to our culture that how to get sound out of the instrument for an individual who has never previously played is pretty visible and logical to find when compared to the laptop. Additionally, one cannot (at least in 2021) copy the feeling of being in a room with acoustic instruments, for listening to a symphony orchestra’s acoustic sound live is an experience in itself. Just as the electric guitar did not stop new musicians from learning acoustic guitar, and just as the electric violin has never come close to taking over the world of classical music, the laptop as an instrument could rather invite soon-to-be musicians who never have wished to learn band instruments to join in as musicians. Music education thereby broadens to include more students, and perhaps those attracted by laptop musicianship in time develop into also learning other instruments, like Ian described.

As these teachers provides important knowledge in their fields and instruments, is it a good idea for a giraffe be trained in the skills of the elephant? I do not believe so, and I believe that digital literacy in teaching staff will be improved over time. There are also research projects with the goal of change in the Norwegian music teacher education, like FutureED (Western Norway university of Applied Sciences, OsloMet) wherein I participate in the steering-group. The status quo of the music teacher education will likely be challenged in the coming years. Additionally, a couple fellow students working in primary and secondary schools has mentioned to me that one of the main interests within their class was to learn how to make music they feel relate to them, which would be the DAW-based popular music of today for the most part.

For music in itself, adding laptop musicians to formal music studies can prove to be an important step into the future of live music. As there now exists bands with guitarists, bassists, singers, drummers, pianists and more, the agency and situation with these instruments is very familiar by now. The laptop can add excitement to the future of band-based music, as advanced production techniques which earlier were difficult to reproduce live is achievable by a laptop musician doing

live processing. The cases of KYGO and Alan Walker show us that music producers from Bergen can attain international attention and commercial success that even benefits the economy of the country. Therefore, it is even of national economic interest to promote the formalization of the laptop as a musical instrument. The success of such high-profile laptop musicians has contributed with money to the state through data streams, concerts and merchandise tax, additionally bringing attention to the county, and even leading to increased tourism. For example, we in Bergen have a lot of “Blackpackers” visiting, black-metal fans wishing to see the city where church burnings happened. The Inferno Festival in Oslo also has more international visitors than Norwegians (Bonsaken, 2018), therefore it would only be logical for the government to wish for training in more modern musical instruments and expressions from an economic perspective.

7.5 Summary

Around 30-40 years ago it was common to have print encyclopedias in most homes, but now the internet provides answers to almost all questions. For the topic of this thesis, there is so much information that it is easy to get lost. One day I ended up googling to search for a simpler answer to the question that served as a basis for this entire thesis. Surprisingly the answer was there all along. (fig.7.1):

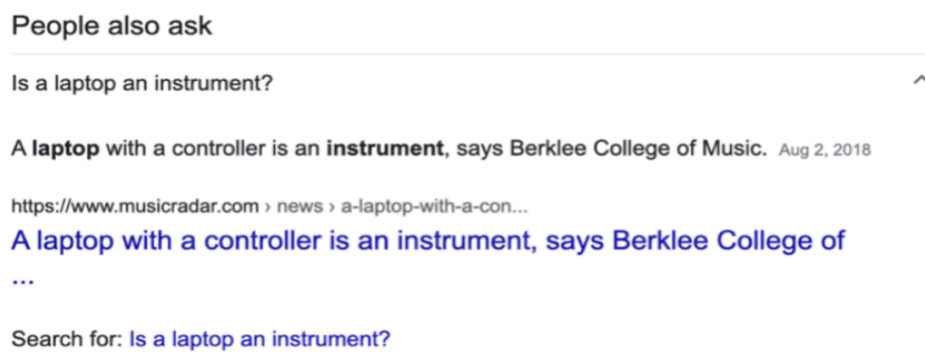


Figure 7.1: “Google search “is the laptop a musical instrument?”

So to summarise: *Yes. The laptop is a musical instrument.*

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Appendix

Screenshots confirming use of full names

Hei Kristian!

Hyggelig å høre fra deg igjen. Skal skrive ned litt tips, ja. Ikveld eller imorgen. Trenger ikke være anonym, nei. Kjekt at folk vet litt om hvem som driver på med dette. Blir gøy å lese og så må du ha lykke til videre.

Hilsen Magnus

Heisann

Stilig med Ableton og Eldre.

Du må bare bruke navn. Det er ikke noe stress. Noe klokt må jeg vel ha sagt.

Med venleg helsing,

Ian Kolstad

Musikkterapeut, Eining for kultur

Stord kommune

www.stord.kommune.no

Ver merksam på at all dialog på e-post som er arkivverdig etter arkivlova vil bli registrert i vår offentlege postjournal.

Ver venleg å ta omsyn til miljøet – skriv berre ut det som er naudsynt.

...

Det er supert. Takk for innsatsen med NSD. Gleder til å lese.

Øyvind

tir. 19. jan. 2021 kl. 11:24 skrev Kristian Tverli Iversen <151775@stud.hvl.no>:

Hei Øyvind! Godt nyttår!

Så at jeg i kampens hete i denne perioden har glemt å svare på siste epost, der jeg fikk sett meg masse rundt på Straumen og hadde en veldig fin opplevelse oppe hos dere i Inderøy.

Det live klippet var utrolig kult! Syns både musikken og det visuelle imaget i tillegg til den drakten gjorde det veldig stilig. Du lignet litt på han fra Prodigy på den tiden også haha.

Jeg ville bare si at jeg har snakket med NSD angående anonymitet. Dersom jeg får en skriftlig godkjenning av at du ønsker å stå frem med eget navn da du skal utvikle en egen bok går det

Til: Kristian Tverli Iversen

Med denne mailen bekrefter jeg at Kristian Tverli Iversen har tillatelse til å bruke mitt fulle navn, Anders Surguy Paulsen, i sin masteroppgave.

Mvh

Anders Surguy Paulsen

Sendt fra [E-post](#) for Windows 10

[Svar](#) | [Videresend](#)

Hei! Jepp, jeg kan absolutt skrive en liste :) Navnet mitt kan stå, men ja, da kan det være fint å få se over sitater, tipp topp :) Skal få sendt en liste med navn ganske snart!

Vil du delta i forskningsprosjektet

Musikkteknologi i pedagogiske situasjoner

”Laptop som hovedinstrument i videregående skole”

- Fremtidens instrument?

Dette er et spørsmål til deg om å delta i et forskningsprosjekt hvor formålet er å utforske det relativt nye fenomenet laptop/live lyd som hovedinstrument. I dette skrivet gir vi deg informasjon om målene for prosjektet og hva deltakelse vil innebære for deg.

Formål

Formålet med dette forskningsprosjektet er å kunne utforske forskjellige lærere sine undervisningspraksiser innenfor laptop som hovedinstrument. Laptop er et relativt nytt instrument som flere og flere skoler tilbyr som hovedinstrument, der det trolig vil være flere land som kommer til å tilby instrumentet etter hvert desto mer digital verden blir.

I denne undersøkelsen er det tre forskningsspørsmål som skal utforskes:

RQ1: Laptop sin affordans som idiomatisk instrument

Hvilke former for musisering eksisterer i undervisning på laptop som hovedinstrument?

RQ 2: Om valg av undervisningspraksis

Hvilke utfordringer relatert til utvalg av innhold og repertoar oppstår med innføringen av laptop som hovedinstrument?

RQ 3: Om legitimering av laptop som instrument

Hvordan legitimerer lærere laptop i henhold til gjeldende kompetansemål og som instrument?

Forskningsprosjektet er en masteroppgave, der oppgaven potensielt vil bli utgangspunkt for en artikkel som skal bli publisert i et musikkpedagogisk/musikkteknologisk tidsskrift. Dette vil øke rekkevidden for hvem som får informasjon og prosjektets betydning, der erfaringene fra Norge kan bidra med kunnskap flernasjonalt til innføring av laptop i en-til-en undervisning i hovedinstrument.

Hvem er ansvarlig for forskningsprosjektet?

Høgskulen på Vestlandet er ansvarlig for prosjektet.

Student/forsker: Kristian Tverli Iversen

Veileder: prof. David Gabriel Hebert (Grieg Academy music education research group)

Hvorfor får du spørsmål om å delta?

Utvalget har blitt valgt ut basert på relativ geografisk nærhet, der du er en av pedagogene som underviser på laptop som hovedinstrument. Det er blitt sendt ut meldinger til et utvalg av skoler og pedagoger som til slutt skal bli til 5 lærere som utgjør empirien til denne masteroppgaven, der det relativt nye fenomenet laptop som hovedinstrument utforskes.

Epostadressen din har blitt gitt av institusjonen som du jobber på for å komme i kontakt.

Hva innebærer det for deg å delta?

Undersøkelsen benytter kvalitativ metode, der deltagelse vil innebære to bolker datainnsamling med *en/to måneders mellomrom* (etter avtale):

Bolk 1: Intervju om deg som lærer i laptop/live lyd som hovedinstrument, etterfulgt av ikke-deltagende observasjon av 2-3 undervisningstimer med forskjellige elever. Observasjon dokumenteres via videokamera (kun video av instrument og musisering), og lagret på passordbeskyttet minnekort. Det vil ikke hentes ut noen informasjon om elevene, der læreren er fokuset for forskningen.

Bolk 2: Observasjon av undervisning med samme deltagere som sist, etterfulgt av et et semi-strukturert intervju på rundt 1 klokke. I intervjuet vil det stilles spørsmål relatert til din praksis som lærer i utøvende laptop, der spørsmål om musiseringsteknikker, utvalg av repertoar, og legitimering av instrument og undervisningspraksis. Intervju blir lagret på ekstern lydopptaker for å videre bli transkribert til tekstformat, og lydopptak blir videre slettet etter transkribering.

Det er frivillig å delta

Det er frivillig å delta i prosjektet. Hvis du velger å delta, kan du når som helst trekke samtykket tilbake uten å oppgi noen grunn. Alle dine personopplysninger vil da bli slettet. Det vil ikke ha noen negative konsekvenser for deg hvis du ikke vil delta eller senere velger å trekke deg.

Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger

Vi vil bare bruke opplysningene om deg til formålene vi har fortalt om i dette skrivet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket.

Ved behandlingsansvarlig institusjon er det veileder og student som har tilgang på opplysningene i dette prosjektet.

Opptak, kontaktopplysninger og data vil bli lagret på kryptert minnekort, der ekte navn blir erstattet med alias.

I publikasjonen vil alt anonymiseres, der eneste opplysningene som vil brukes er utsagn fra intervju og observert materiale som ikke fører til noen form for identifisering av informanter.

Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?

Opplysningene anonymiseres når prosjektet avsluttes/oppgaven er godkjent, noe som etter planen er 18.05.2021. Anonymiserte data vil bli lagret til videre publisering av artikkel og potensiell videre forskning i det musikkteknologiske/pedagogiske fagfelt. Alle videoopptak og opptak av intervju vil bli slettet etter prosjektslutt, slik at det ikke er noe mulighet for identifisering av deltagere i prosjektet.

Dine rettigheter

Så lenge du kan identifiseres i datamaterialet, har du rett til:

- innsyn i hvilke personopplysninger som er registrert om deg, og å få utlevert en kopi av opplysningene,
- å få rettet personopplysninger om deg,
- å få slettet personopplysninger om deg, og
- å sende klage til Datatilsynet om behandlingen av dine personopplysninger.

Hva gir oss rett til å behandle personopplysninger om deg?

Vi behandler opplysninger om deg basert på ditt samtykke.

På oppdrag fra *Høgskulen På Vestlandet* har NSD – Norsk senter for forskningsdata AS vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.

Hvor kan jeg finne ut mer?

Hvis du har spørsmål til studien, eller ønsker å benytte deg av dine rettigheter, ta kontakt med:

- Høgskulen på Vestlandet ved prof David Gabriel Hebert, dgh@hvl.com, tlf 55 58 57 64.
- Høgskulen på Vestlandet ved student Kristian Tverli Iversen, 151775@stud.hvl.no, tlf 45102621
- Vårt personvernombud: Trine Anikken Larsen, tal@hvl.no, tlf 55 58 76 82

Hvis du har spørsmål knyttet til NSD sin vurdering av prosjektet, kan du ta kontakt med:

- NSD – Norsk senter for forskningsdata AS på epost (personverntjenester@nsd.no) eller på telefon: 55 58 21 17.

Med vennlig hilsen

Prof. David Gabriel Hebert
(Forsker/veileder)

Kristian Tverli Iversen
(student)

Samtykkeerklæring

Jeg har mottatt og forstått informasjon om prosjektet *Laptop som hovedinstrument - fremtidens instrument?*, og har fått anledning til å stille spørsmål. Jeg samtykker til:

- å delta i observasjon
- å delta i intervju
- At data fra observasjon og intervju brukes som empiri til masteroppgave
- At data fra observasjon og intervju publiseres i masteroppgave

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet

(Signert av prosjektdeltaker, dato)

NSD evaluation of project

NSD sin vurdering

Prosjekttittel

Musikkteknologi i pedagogiske situasjoner - Laptop som hovedinstrument i videregående skole

Referansenummer

550048

Registrert

23.06.2020 av Kristian Tverli Iversen - 151775@stud.hvl.no

Behandlingsansvarlig institusjon

Høgskulen på Vestlandet / Fakultet for lærerutdanning, kultur og idrett / Institutt for kunstfag

Prosjektansvarlig (vitenskapelig ansatt/veileder eller stipendiat)

David Gabriel Hebert, dgh@hvl.no, tlf: 45030892

Type prosjekt

Studentprosjekt, masterstudium

Kontaktinformasjon, student

Kristian Tverli Iversen, kristian.tverli.iversen@gmail.com, tlf: 45102621

Prosjektperiode

10.08.2020 - 18.05.2021

Status

19.01.2021 - Vurdert

Rights of participants

DE REGISTRERTES RETTIGHETER

Så lenge de registrerte kan identifiseres i datamaterialet vil de ha følgende rettigheter: åpenhet (art. 12), informasjon (art. 13), innsyn (art. 15), rett til sletting (art. 17), begrensning (art. 18), underretning (art. 19), dataportabilitet (art. 20).

NSD vurderer at informasjonen som de registrerte vil motta oppfyller lovens krav til form og innhold, jf. art. 12.1 og art. 13.

Vi minner om at hvis en registrert tar kontakt om sine rettigheter, har behandlingsansvarlig institusjon plikt til å svare innen en måned.

FØLG DIN INSTITUSJONS RETNINGSLINJER

NSD legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1 f) og sikkerhet (art. 32).

For å forsikre dere om at kravene oppfylles, må dere følge interne retningslinjer og eventuelt rådføre dere med behandlingsansvarlig institusjon.

OPPFØLGING AV PROSJEKTET

NSD vil følge opp ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.

Lykke til med prosjektet!

Kontaktperson hos NSD: Simon Gogl

Tlf. Personverntjenester: 55 58 21 17 (tast 1)

Evaluation 1 and 2 of project

17.08.2020 - Vurdert

Det er vår vurdering at behandlingen av personopplysninger i prosjektet vil være i samsvar med personvernlovgivningen så fremt den gjennomføres i tråd med det som er dokumentert i meldeskjemaet med vedlegg den 17.08.2020, samt i meldingsdialogen mellom innmelder og NSD. Behandlingen kan starte.

MELD VESENTLIGE ENDRINGER

Dersom det skjer vesentlige endringer i behandlingen av personopplysninger, kan det være nødvendig å melde dette til NSD ved å oppdatere meldeskjemaet. Før du melder inn en endring, oppfordrer vi deg til å lese om hvilke type endringer det er nødvendig å melde:

https://nsd.no/personvernombud/meld_prosjekt/meld_endringer.html

Du må vente på svar fra NSD før endringen gjennomføres.

TYPE OPPLYSNINGER OG VARIGHET

Prosjektet vil behandle alminnelige kategorier av personopplysninger frem til 18.05.2021.

LOVLIG GRUNNLAG

Prosjektet vil innhente samtykke fra de registrerte til behandlingen av personopplysninger. Vår vurdering er at prosjektet legger opp til et samtykke i samsvar med kravene i art. 4 og 7, ved at det er en frivillig, spesifikk, informert og utvetydig bekreftelse som kan dokumenteres, og som den registrerte kan trekke tilbake. Lovlig grunnlag for behandlingen vil dermed være den registrertes samtykke, jf. personvernforordningen art. 6 nr. 1 bokstav a.

PERSONVERNPRINSIPPER

NSD vurderer at den planlagte behandlingen av personopplysninger vil følge prinsippene i personvernforordningen om:

- lovlighet, rettferdighet og åpenhet (art. 5.1 a), ved at de registrerte får tilfredsstillende informasjon om og samtykker til behandlingen
- formålsbegrensning (art. 5.1 b), ved at personopplysninger samles inn for spesifikke, uttrykkelig angitte og berettigede formål, og ikke viderebehandles til nye uforenlige formål
- dataminimering (art. 5.1 c), ved at det kun behandles opplysninger som er adekvate, relevante og nødvendige for formålet med prosjektet
- lagringsbegrensning (art. 5.1 e), ved at personopplysningene ikke lagres lengre enn nødvendig for å oppfylle formålet

Vurdering (2)

19.01.2021 - Vurdert

NSD har vurdert endringen registrert 18.01.2021.

Det er vår vurdering at behandlingen av personopplysninger i prosjektet vil være i samsvar med personvernlovgivningen så fremt den gjennomføres i tråd med det som er dokumentert i meldeskjemaet med vedlegg den 19.01.2021. Behandlingen kan fortsette.

Zoom ble lagt til som databehandler i prosjektet. NSD legger til grunn at behandlingen oppfyller kravene til bruk av databehandler, jf. art 28 og 29.

Videre ble det registrert at personopplysninger skal lagres på private enheter. NSD forutsetter at dette er i tråd med HVLs retningslinjer om behandling/oppbevaring av personopplysninger i studentprosjekter.

OPPFØLGING AV PROSJEKTET

NSD vil følge opp ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.

Lykke til videre med prosjektet!

Kontaktperson hos NSD: Simon Gogl

Tlf. Personverntjenester: 55 58 21 17 (tast 1)

Communication with NSD anonymity



Melding fra Simon Gogl

19.01.2021 07:46

Hei Kristian,

Når dere har avtalt/han godkjenner at han kan gjenkjennes i oppgaven, er det helt greit. Kanskje kan han bekrefte dette i en e-post til deg slik at du har noe skriftlig.

Mvh,
Simon Gogl



Melding fra Kristian Tverli Iversen

18.01.2021 15:24

Den er grei, gjennomført! Det var også en av informantene til oppgaven som lurte på om det var mulig å ikke være anonym da han følte at noe av det han sa var hans idéer som skulle utarbeides til noe større ved en senere anledning, hvordan er mulighetene for dette i prosjektet?



Melding fra Simon Gogl

14.01.2021 13:57

Hei Kristian,

På siden "Behandling" kan du krysse av for "Ekstern tjeneste eller nettverk (databehandler)" og "Databehandler" og oppgi Zoom i i tekstfeltet nederst på siden. Vi forutsetter at bruken av Zoom er godkjent av HVL, dvs. at HVL har en databehandleravtale med Zoom. Husk å sende skjemaet inn på nytt når du har foretatt endringen.

Mvh,
Simon Gogl

Interview guide

Deler av intervju	Spørsmål	Mulige oppfølging spm	Hensikt
Innledning	Informere deltageren om: 1. Intervjuets form 2. Datalagring, bruk, behandling 3. Egen bakgrunn	Samtaleform, spørre om informant forstår alt til nå og er klar for å gå i gang.	Gi forståelse
Bakgrunnsspørsmål	1. Fortell om deg selv og din musikalske karriere/yrkeskarriere 2. Hva fikk deg til å bli interessert i musikkteknologi? 3. Hvilke sjangre er de du liker best å jobbe med/høre på? 4. Hvilke instrument spiller du? 5. Fortell hvorfor din skole bestemte seg for å tilby laptop som instrument.	Masse potensiale for oppfølging, i tillegg til at intervju blir styrket ved aktiv lytting.	Få innsikt i informant, for å kunne beskrive informant. Det å kunne kartlegge motivasjon og bakgrunn til yrkesvalg i tillegg til data om innføring av laptop.
Om musisering	1. Hvilke aktiviteter foregår i en "vanlig" time? 2. Beskriv en "vanlig" undervisningstime fra start til slutt 3. Hvilke former for utøvende musisering blir det fokusert på? 4. Hvilke forutsetninger for programvare og utstyr kreves for elevene? 5. Hvor går grensen for hva som er laptop musisering og når en spiller på hardware tilkoblet til en laptop? (utvidete laptop begrep)		For å kunne få svar rundt første forskningsspørsmål
Innhold/repertoar	1. Er det noe form for repertoar som du vil anse som viktig for en laptop-musiker? 2. I eksempelvis el-gitar er det en låtkanon av flere gitarister som en "bør" lære som gitarist pga teknikk eller nyskapning (jimi, Gilmore, Santana). Er det noe tilsvarende for laptop? 3. Er det en form for progresjon av repertoar som kan passe eksempelvis i andre året på MDD?	1. Hvordan går dere frem når dere skal velge ut repertoar i lag? 2. Mange store digitale musikere og produsenter (deadmau5, KYGO, Skrillex) gjør mye av musikken sin live på playback. SEr fokuset deres på 100% live fremførelse? 3.	For å få svar på spm 2

Deler av intervju	Spørsmål	Mulige oppfølging spm	Hensikt
Om legitimering	1. Nye instrument møter ofte en del motgang i starten, hva er din erfaring med å legitimere laptop som et instrument?	1. Hva gjør du når det skjer?	Besvare spm om legitimering i forhold til andres tanker, om institusjon og til læreplan.
	2. Hvordan har det vært å tilpasse undervisningen slik at laptop oppfyller kompetansemålene for hovedinstrument?	2. Hvorfor det?	
	3. Hvilke reaksjoner føler du selv har kommet fra lærere og elever etter innføringen?	3. Kan du fortelle mer?	
	4. Hvordan beskriver elevene dine at folk reagerer på at de ikke "lærer seg et ekte intrument"?	4. Har du noen lignende erfaringer?	
	5. På hvilke måte har du selv møtt reaksjoner som dette?	5. Hvis jeg var.. og hadde sagt.., hva hadde du svart som motargument ?	
	6. Hvilke fordeler og ulemper har laptop som instrument kontra de mer tradisjonelle instrument i din mening?	6.	
	7. Hva ville du svart til noen som sier at laptop ikke er et ekte instrument?		
	8. Tror du folk ville behandlet deg annerledes om du hadde vært en god pianist?		
	9. Har du noen venner/kollegaer som har møtt reaksjoner på at de bruker laptop?		
	10. Hvorfor er det slik at folk har fordommer mot laptop?		
	11. Om du ville ha et barn, ville du at den skulle lært et fysisk instrument eller bare laptop?		

Deler av intervju	Spørsmål	Mulige oppfølging spm	Hensikt
Avslutning	<p>Da er jeg tom for spørsmål, er det noe du ønsker å legge til mer vi runder av?</p> <p>Tusen takk for intervjuet, det har kommet frem mye god informasjon som vi har jobbet frem. Bare å ta kontakt i etterkant om det er noe du lurer på eller andre innspill til prosjektet.</p>		<p>Runde av intervju på en positiv måte der intervjuobjektet føler at det har vært et positivt møte</p>

Glossary of music technology terms:

808: Drum machine by Roland introduced in 1980, a very important instrument for the evolution of hip hop. Still in use today, the bass sound of the machine especially often used in trap music and trap inspired sound.

Automation: Programming a change in one or multiple parameters over a set period of time.

Akai MPC: A hardware sampler which introduced the 16 pad-surface, introduced in 1988. The 16 pads have become a hallmark of both drum rack (Ableton) and is a largely influential design for other pad-developments.

ADSR: Attack, Decay, Sustain, Release. Attack. These parameters are frequently used in samplers to alter the shape and duration of a sound (see figure).

Digital Audio Workstation (DAW): Software used for creation, processing and performative musicianship.

MIDI: A communication protocol transmitting information containing information of pitch, duration and velocity. Since it's release in 1981 the protocol has remained unchanged, but the new edition MIDI 2.0 is in 2021 soon to be implemented.

Pad: A square often with rubberised surface. A pad-controller

has a certain number of these, used to send midi-signals to the laptop or activate samples on the pad itself.

Generative: Music created as a collaboration between machine and human through programming limitations in key, pitch, rhythm, and randomness into a program.

Push II: A midi controller provided by Ableton, which functions as a physical representation of the DAW. One can record, loop, launch and stop clips and samples representing the "session-view" and the 64 pads serves as a surface to play instruments within the DAW.

Sampler: A unit that can use audio, often can "chop and cut" the samples into smaller sections to be played on the sampler.

Resampling: Re-recording a sample with desired edits and processing

EDM: Electronic Dance Music. An umbrella term for a vast number of genres and subgenres like house and deep house/tropical house.

LFO: Low frequency oscillator, an inaudible signal modulating the oscillators of a synth.

Csound: Coding software used in relation with music

EQ: Equalizing, editing levels of different frequencies of sound.

Parameter: An element which can be manipulated to change timbre or aspects of sound.

Macro: A set of parameters made into one, e.g. "twisting" a macro makes five different parameters move simultaneously.

