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Remixing dub reggae in the music classroom: A practice-based case study on the educational value of music production for listening skills and stylistic analysis

ABSTRACT

This article examines learning opportunities of music production tasks by an exemplary unit on dub reggae following an action research approach. It addresses the educational areas of sound design, musical knowledge, analysis and listening skills, taking the sound of dub reggae as starting point for learner-centred activity. The main premise is to advocate music production technology as an effective tool for music learning allowing students to experience techniques of music production first hand, vividly illustrating creative approaches of remote musical cultures, their successive influence on popular music, and aesthetic experiences special to technologically created sound. The overall goal is to facilitate a higher

KEYWORDS

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awareness and a more detailed understanding of produced sound, and practical competences of integrating technological sound into musical action. The study took place within two vocational college courses for social and health (N = 10; 7 women, 3 men; average age 21 years) and art and design (N = 9; 5 women, 4 men; average age 18.3 years), and aimed to investigate the methodical practicability and the success of the suggested educational approach. It provides preliminary insights along with recommendations for improvements and further applications.

INTRODUCTION

The introduction of electrical means of recording, reproducing and transmitting music in the early twentieth century greatly influenced the aesthetics of popular music. Music technology has provided new opportunities for live performances, and particularly for studio work where specialized hardware and software are adding to aesthetic qualities. Popular genres, such as dub reggae, psychedelic rock or electronic dance music, have benefited from this development. Until today, technological innovation is closely linked to musical change, and to the emergence of new subgenres of popular music.

Over the last 20 years there has been a lively academic discourse on technologically produced sound including aspects of sociocultural functions (Frith 1986; Hawkins 2002; Moore 2012; Sterne 2012), phonographic developments (Chanan 1995; Cunningham 1996; Eisenberg 2005; Katz 2010; Moorefield 2010), and the art of record production (Moylan 2002; Frith and Zagorski-Thomas 2012; Zagorski-Thomas 2014). So far, this extensive knowledge of produced sound has not gained equal attention in popular music education (Herbst 2014). Educational research has been undertaken primarily on: the influence of technological progress on composing, songwriting and producing (Savage and Challis 2001; Savage 2005; Tobias 2013a; Brown 2015), facilitating listening skills of production aspects for higher education music technology programmes (Moylan 2002; Bierman 2011), the chances of technology for music education based on the idea of participatory cultures and collaboration (Seddon 2006; Tobias 2013b), and technology and creativity (Mellor 2008). Although music technology has increasingly become an area of research in music education, issues of sound and the tonal importance of popular music are of varying importance. Inevitably, using music technology means working with sound. However, the focus must be on recording, mixing, producing and analysing rather than on composition to explicitly address sound (Tobias 2013a).

This article aims at raising awareness of the learning opportunities of music mixing and production by an exemplary unit on dub reggae following an action research approach, which was conducted in a vocational college with two classes of different speciality (arts and design, and social and health). It addresses the educational areas sound design, analysis and listening skills as well as musical knowledge, taking the sound of dub reggae as starting point for learner-centred activity. The main premise is to advocate music production technology as an effective tool for music learning and experiencing music production first hand (Dewey 1938). The underlying Ph.D. project identified a low ability of many students in public schools and vocational colleges to consciously perceive details of the sound created in the music studio (staging, equalization, effects processing). Thus, the overall goals of several units were to

facilitate a higher awareness plus a more detailed understanding of produced sound, stylistic knowledge of dub reggae and practical competences of sound production. This article intends to study the methodical practicability of the unit, and to evaluate the success of the educational approach. Furthermore, it purposes to inspire music lessons in general schools, vocational colleges and higher education undergraduate courses.

TECHNOLOGY AND POPULAR MUSIC EDUCATION

Popular music genres, such as electronic dance music, hip hop, rock, heavy metal and pop, rely heavily on music technology with the production shaping the music to a considerable or even major degree compared to the composition (Tobias 2013a; Herbst 2014). While productions until the late 1990s required special equipment and experts, the increasing availability of affordable gear has enabled musicians to take greater control at all stages of recording, mixing and mastering (Théberge 2012). This development inevitably changes the understanding of what counts as musical activities, and how musicality must be defined (Brown 2015: 5). Therefore, Brown (2015: 5) suggests that educators 'need to accept contemporary musical practices, such as being a DJ, record producer, or app developer as valid, and teach the associated skills,' for example recording, engineering, mixing, producing and programming. These creative skills either extend instrumental or vocal performances, or offer entirely new artistic means of expression (Brown 2015: 6ff). Applying digital audio workstations (DAW) into the classroom enables creating music that could not be realized by any other means (Savage 2007).

Benefits may arise when music production is added to the curriculum. According to Brown (2015: 22), challenging students with unfamiliar software or hardware to create exceptional musical products may lead to increasing motivation and experiences of flow (Csikszentmihalyi 1975). The results of Savage's (2005: 171) Dunwich studies on the creative uses of sound processing technologies confirm the motivational potential since the 'pupils were clearly captivated by the new sounds produced through the use of basic effects on a sound processor'. Besides interest in mixing sounds, the pupils valued the explorative approach outside the realm of right and wrong in traditional composition (Savage 2005: 171). Moreover, working with sound processors 'encouraged a free, improvisatory-type approach to the production and manipulation of sounds' (Savage and Challis 2001: 142) that empowered and encouraged pupils with little formal music training. In line with this research, Tobias (2013b) has advocated remixing and mash-up as a way to establish a participatory culture within music classes that represent musical practices outside school.

Music production in the classroom has the potential to facilitate traditional educational aims like analysis and listening skills, imagination and knowledge. For instance, mixing and remixing tasks help to understand the function of parts, instruments and voices of a song (Brown 2015: 59). Moreover, mixing can be expected to build up students' awareness and detailed understanding of produced sound in a way hardly any traditional musical action does (Herbst 2014). Tobias (2013a: 12) therefore suggests 'that as students gain experience in their recording and mixing abilities they may become more efficient and accurate, allowing for additional time to listen for aesthetic aspects of the music on their track as they did when creating their songs'. Not only may the mixing lead to the capability to evaluate sound aesthetics on the basis of knowledge and experience, it also trains aural skills of identifying

artistic means of production strategies. Whereas Brown (2015: 7) highlights the opportunity of listening more closely to the overall sound or to individual instruments while mixing, Tobias (2013a: 15) reports his participants having learned to listen as producers by reproduction and modifying music through frequency manipulation, space alteration and effects processing. Given the high importance of produced sound for contemporary popular music (Tobias 2013a; Herbst 2014), it seems like a reasonable claim to extent aural training from structural parameters to the strategies and effects of music production. Introducing students to music technology with a focus on the different stages of production, and addressing diverse characteristics of popular music styles, is likely to strengthen their understanding of produced sound (Herbst 2014). In combination with music analysis and further information, music production tasks can introduce students to stylistic characteristics of popular genres.

METHOD

This study follows an 'action based' design. Although there is no universally accepted definition of action research (Kelly et al. 2000: 1), there is a broad agreement that it is designed to bridge the gap between research and practice. According to Zuber-Skerritt (1996: 83) the 'aims of any action research project of programme are to bring about practical improvement, innovation, change or development of social practice, and the practitioners' better understanding of their practices'. Action research can be used for studying teaching methods, learning strategies, attitudes and values (Cohen et al. 2007: 297).

Even though there are different understandings about action research, most definitions agree to common characteristics. A defining feature is the participatory action in the sense that educators work to improve their own practices (Kemmis and McTaggart 1992: 22f). This highlights the close interconnection of action and reflection, presenting a holistic perspective (Kelly et al. 2000: 2). Action research is always an iterative process that utilizes four main phases. Sagor (2005: 4) depicts a model, which (1) clarifies visions and targets, (2) articulates a theory, (3) puts it into action to collect data and (4) reflects on the findings with future practice in mind.

Action research can be executed with different instruments for data collection (Cohen et al. 2007: 309), and may be drawing upon quantitative and qualitative approaches (Mettetal 2001: 9). Since it is based on the practice of one or several practitioners, action research often utilizes a qualitative case study format, which consequently might not be representative and lack validity. Mettetal (2001: 7) argues that validity can be achieved by data triangulation, still, the main 'focus is on the practical significance of findings, rather than statistical or theoretical significance'. The practitioner's personal involvement has been criticized for being biased, but referring to Zuber-Skerritt (1992: 56) there cannot be a neutral or objective reality since reality always is individually constructed. On the upside, action research can be more realistic than other research methods because, by studying 'real' problems in 'real' situations, the practitioner's work reality may be better understood and improved (Kelly et al. 2000: 3). Central to the quality of research is the researcher's reflexivity for being part of the situation to be studied.

The research scope of this study was to investigate teaching methods for facilitating awareness, knowledge and basic practical competences of produced sound in context of a unit on popular music. Several approaches and lesson contents of the Ph.D. project were tested in five music classes (three art and

design, two social and health) between September 2013 and June 2014. The majority of these students neither played an instrument nor were trained in using music technology of any kind. The unit to be researched was carried out with one social and health class (hereafter referred to as SH) of 10 students (7 women, 3 men; age span from 18 to 27; average age 21 years) and one art and design class (hereafter referred to as AD) of 9 students (5 women, 4 men; age span from 17 to 19; average age 18.3 years). The SH students had knowledge in social psychology of music, reception research and advanced understanding of music therapy, the AD students were introduced to musical aesthetics of various phenomena of popular music. The unit took place over a 3-week period (90 minutes/session). To ensure the criterion of collective reflectivity (Kemmis and McTaggart 1992: 5), the lessons were evaluated with the students. Two methods were used: first, participatory observation inherent in action research with written discussion results on the board, written analysis and description of perception of each student, and the music production results; second qualitative and quantitative content analysis of written theme-centred interviews and students' written data of the lessons. The cyclic methodology was applied mainly for planning and reflecting of the teacher/researcher but also for testing and reworking the educational ideas within the Ph.D. project.

LESSON CONTENT AND OBJECTIVES

With an empirical study of 1323 journal articles and 40 books for general school music classes in Germany, Herbst (2014: 199–243) analysed the educational practices of music technology and produced sound. While there was an extensive focus on instruments such as keyboards, electric guitars and drum computers, and few information on music production and phonography, both issues, deliberately producing music and using music technology in ensemble practice, were not prevalent. Despite its vast influence on hip hop (Brewster and Broughton 2000: 116ff) and modern electronic music (Pfleiderer 2001), dub reggae's history, its production aesthetics, Jamaican's cultural background and its impact for dub's remixing approach (Veal 2007), and its influence on succeeding popular music are nearly non-existent.

Dub reggae offers several learning opportunities with its characteristic aesthetics, its cultural background and its technological approach to music making. The emergence of dub reggae in the early 1970s is closely linked to the extension of audio technology (Pfleiderer 2001: 100), and to the unconventional use of production equipment (Veal 2007: 64). In the late 1960s, instrumental 'versions' were published on the B-sides of reggae singles, and additionally, they were processed in the studio by early dub pioneers like King Tubby (Williams 2012: 237f; Brewster and Broughton 2000: 127ff). Those productions were always improvised on the spot: 'Most of Tubby's dubs were mixed live, with the engineer playing his board like a great jazzman blowing solos on his horn, deconstructing and reinventing the music' (Barrow in Pfleiderer 2001). Or as Veal (2007: 77) describes it:

> What makes the music so interesting is the way improvisation at each stage (performance, studio, DJ, selector) results in such an interesting song surface. [...] As a form of real-time improvisation performed by engineers on the multitrack mixing console, dub's combination of fragmentation and its manipulation of spatiality gave a new perspective on the pop song.[1]

1. Butler (2014: 125ff) describes a common approach within composition and production of electronic dance music that shows similarities to dub reggae. In both styles, music technology is used to 'jam' with existing audio while recording. The same applies to performances in the EDM club and dub sound systems (Henriques 2011).

Fading of musical sources, and shifting them within the stereo placement, are the most significant stylistic features of early dub reggae (Pfleiderer 2001: 101; Brewster and Broughton 2000: 129f). Mute and fader controls are used to 'create abrupt shifts in ensemble texture' (Veal 2007: 64). Unlike other approaches to contemporary pop and rock productions in the 1970s that experimented with overdubs for adding more to the arrangement, dub reggae reduced its rhythmic and tonal texture (Henriques 2011: 158). For a stylistic formula 'we can understand dub as a style marked by the composition of vertical events against a relatively static horizontal background' (Veal 2007: 77). The sounds replace the melody while being modulated against the static drums and bass. The mixing board is used for the spontaneous composition by deconstructing and reconstructing a song's architecture 'while increasing the overall power of the performance through a dynamic of surprise and delayed gratification' (Veal 2007: 78).

Apart from fragmentation by muting and volume control, the virtual space of the production is one of the defining characteristics of dub reggae. The soundscape is always moving and 'continually morphing in dimension and texture' (Veal 2007: 73). The intention is not to be realistic, but to establish a constant motion to achieve a hypnotic effect (Pfleiderer 2001: 103f). For McLeod (2003: 342), room treatment of such kind stands for Afro-futurism, leading to an auditory image of outer space. This spatial characteristic impression, special to dub productions, is achieved by the extensive use of reverb and delay effects (Williams 2012: 238ff; Brewster and Broughton 2000: 130f). According to Veal (2007: 71), the use of reverb is a 'fundamental strategy of the dub mix' for simulating 'a spatial dimension within a recording'. He stresses the importance of reverb for deconstruction, and, for the reverse effect, holding together the sonic fragmentation of the arrangement to ensure some sense of continuity. Delay serves for a different scheme, mainly to affect the rhythm (Williams 2012: 245). Its use decentralizes sonic figures and 'disjunct[s] timings in order to spin jarring rhythmic tangents against the basic riddim' mainly for disruption and tension, but also to decentralize harmony for creating an impressionistic soundscape (Veal 2007: 73). Utilizing an equalizer as effect is another relevant characteristic of dub style (Williams 2012: 239ff). The manipulation of frequency is intended to boost a signal's presence, to change its perceived size in the mix, and to achieve frequency sweeps (Veal 2007: 73). It also alters the vertical perception of a sound; an effect dub legend King Tubby used in combination with reverb and delay to create a virtual room in a mono mix (Williams 2012: 241). Modulation effects like phaser or flanger are inserted for further alienation. Unlike engineers of most styles of popular music, Williams (2012: 244) considers the dub producer to be 'a highly skilled musician performing with a musical instrument' that, in this case, is the mixing desk with its associated effects devices. This audio technology is operated with great speed, economy of movement and agility (Williams 2012: 244).[2]

The unit described in this article pursues several educational objectives, which can be categorized into four distinguishable kinds of knowledge according to Swanwick (1994).

Propositional (declarative) knowledge:

- noticing sound to be of decisive importance for popular music, particularly in dub reggae, and its succeeding music like electronic dance music and hip hop,
- understanding the role of a dub producer,
- gaining an understanding of remixing common in contemporary popular music styles,

2. Williams (2012) reconstructs the technology used by dub reggae innovator King Tubby. He shows how the music resulted of the four-track system, the MCI desk and the limited number of auxiliary channels greatly affected Tubby's approach to mixing.

Procedural (action-proved) knowledge:

- acquiring detailed listening skills for subtle changes of sound and instrumental parts,
- acquiring basic competences of music production with computer technology,
- being able to express oneself, to compare and evaluate results, and to develop criteria of aesthetic evaluation,

Acquaintance (knowing about) knowledge:

- gaining awareness of the musical and aesthetic value of technologically produced sound,
- discovering methods to create music other than in classics, rock or pop,

Attitudinal (valuing) knowledge:

- acknowledging the musical skills of music producing and engineering with analogue and digital equipment.

The research interest is to explore whether and how these educational aims, covering a vast area of music educations' objects, can be achieved with the lesson design set out. The overriding assumption is that active analysis and production tasks will achieve both, increasing the students' awareness and understanding of sound, and building competences of intentionally creating sound by using music technology.

LESSON DESIGN

Computer hardware with sequencer software, headphone amplifiers and sufficient headphones are required for the unit. The sequencer must support virtual busses. Ideally, USB mixing desks or DAW controllers are connected for a more authentic controlling, and to give 'access to the embodied nature of musical experiences, as opposed to the often disembodied nature of music technologies' (Brown 2015: 140). The students listen to 'Blunt Dub' (2007) of the London-based dub producer and engineer Mad Professor (Neil Fraser), and concentrate on the effect of the music with its associations. Then, they compare their impressions, and reflect about any previous experience of such a musical style.

After discussing the listening experience in groups, the results are compared in class. Next, the students listen to the song for a collective analysis focussing on tonal aspects. Should they not make the sound design an issue, the teacher redirects the focus. The analysis should aim at detail by concentrating on single sound gestalts such as instrumental lines, added sound effects and room placement. This phase provides an opportunity for analysing sound in relation to the underlying musical composition. For a deeper understanding of dub's musical characteristics, the production principles and aesthetics such as fragmentation, deconstruction, and its sophisticated use of various audio effects ought to be analysed. If necessary, the production tools and effects like reverb, echo, equalization, and stereo placement could be introduced by the teacher. Such an excursus in studio equipment is helpful for linking information of music technology with listening representations.

Figure 1: Screenshot of idiomatic effects presets of a dub reggae mix.

A complete arrangement with instrumental and vocal tracks must be available for each group. Since the dub remix is not limited to reggae, a recording of Lady Gaga's 'Beautiful, Dirty, Rich' (2008) in a funk style with single tracks for kick and snare drum, overheads, electric bass and guitar as well as vocals was used for the lesson. Depending on the students' knowledge of dub reggae, effects with preselected presets can be integrated into the project file, or student groups create their own settings. Adequate effects are tape delays, moving frequency filters combined with stereo settings, modulation effects and reverb (Figure 1).

Setting up idiomatic presets may help reduce complexity and enable students less familiar with audio technology and dub aesthetics to achieve convincing results (Breeze 2009). Every single instrument or vocal track is routed to a separate track, allowing it to be recorded with effects while listening to the arrangement. After a successful recording, the original track can be muted.

Depending on the skill level and the availability of hardware such as DAW controllers, there are different approaches for producing a dub mix of the song. In its most basic form, every single track is produced in real time, just by activating and bypassing different audio effects, by room placement and muting, or by controlling the volume during the recording. Coordinating the instruments with their volumes and effects in real time is challenging because it requires advanced listening and improvisation skills (Veal 2007: 77; Butler 2006: 208ff). Various versions of all instrumental and vocal parts are recorded, and the most compatible tracks are mixed. After several takes, the difficulty is automatically increasing due to the density of the arrangement. More advanced approaches may include changing effects settings in real time

or recording several tracks simultaneously, which resembles 'real' work of a dub engineer, or of an electronic music DJ (Veal 2007: 77). Yet, dividing up the task into several recordings is not a problem, since even original dub engineers in the 1970s sometimes had to bounce their work due to the common use of four-track recording devices (Williams 2012: 236).[3] In order to acquire idiomatic production conventions, and to get creative input, students compare their productions to the original dub song.

When all tracks have been re-recorded with effects, a second task requires to produce the final mix by improvisation. By comparing the provisional results, the students are likely to recognize their creative work is still lacking some dub characteristics like fragmentation. Therefore, all previously processed tracks are mixed focussing on track levels, room position and muting, and are recorded live to a stereo track. In order to achieve a more authentic result, students should produce several versions and compare them to the original. For further increasing the acquired competences, the single steps should be performed simultaneously to experience the production approaches of dub engineers, and to get to know basic skills of modern DJs (Butler 2006: 51ff).

Finally, each group presents its results, which will be evaluated regarding creativity and authenticity. To support the analysis, and to deepen the understanding of dub and its creative use of audio technology, it may be sensible to refer to the previous analytic results, and to the optional introduction of audio effects. As primary learning outcomes, students ought to be able to identify music as dub, to define its characteristics, and if possible, to be capable of using audio technology in an idiomatic way.

3. According to Williams (2012: 244), the restrictions of four tape channels (drums, bass, rhythm guitar and horns, vocals) have been a central element of early dub reggae aesthetics that have been altered by the extension of tracks.

RESULTS

Participatory observation

The first listening experience of 'Blunt Dub' (2007) revealed similar associations for the students of both classes such as 'lying on a beach', 'sun and beach' or 'relaxing'. A hypnotic effect was recognized leading to 'absentmindedness', 'reverie' or even 'apathy', which was explained by reverb and frequency alteration, without mentioning the audio effects by name. Despite these relaxing effects, the infectious groove was highlighted. Most students assumed the reasons for these attributions to be the countless repetitions, the lack of a clearly structured form, and the use of audio effects.

In the analysis, the AD students began noticing the dominance of bass frequency (Hitchins 2014: 73ff), and the bass being added after the vocal intro; hence they perceived the idiomatic intro of dub reggae (Pfleiderer 2001). The SH students began by stating the lack of 'traditional' melody and of any standardized form. The students of both classes did not pay attention to harmony, probably due to its low relevance for the perception of the song. Instead, they recognized the music being constituted of a flow of sounds. They all correctly detected dub's constitutive principle of fragmentation and reasons for the unstable effect of the virtual room design. Audio effects were highlighted even though the students could neither explain any details nor name the effects. Nevertheless, they described their listening experience in such a way that reverb, delay, frequency filters, modulation effects and volume controls were felt as meaningful stylistic characteristics. The statements indicate that single sound gestalts were differentiated in the overall sound, for example when a musical phrase was described while exemplifying the roles of musical structure

Figure 2: Group mixing levels for fragmentation.

and sound design. The collective analysis within both classes was accompanied by several arising hypotheses such as the music being completely digital because of its spectacular sounds. Repeated listening caused the SH students to doubt their initial hypothesis since the bass sound was gradually decided to be 'natural', whereas an AD student familiar with electronic music convinced those who disagreed that their assumption of a synthesizer and computer-based production must be wrong. Such discussions led to an analysis of instruments and their sounds. Help was needed for analysing the virtual room of the production. After a short introduction to Moore's (2001: 120–126) sound box model, the students became aware of the differences between 'virtual' and 'real' room perceptions. With this new tool, they quickly grasped idiomatic production approaches in the audio example. Since the students had no prior knowledge of audio effects, another short introduction of effects by listening to music examples, and additional explanations helped to form listening representations.

During the production phase, all groups chose to re-record single tracks. Some groups, however, did not limit themselves to activating and bypassing different effects, but experimented with effects settings. All students participated in their group production and compared their results among themselves and with the original. They agreed on recognizable idiomatic dub features; yet, the preselected presets would hardly allow any results totally out of style.

Producing the final mix by setting volumes and room placements of the tracks for achieving dub's typical fragmentation was highly motivating for the students (Figure 2). However, it must be admitted that the outcome did not meet all stylistic characteristics of the original dub mix. Especially volume control and panning for the purpose of fragmentation were used much less than in the original mix. Some of the AD students recognized differences to the dub example due to their listening experience

with electronic music, and those tried their best to create the sounds, which equal the ones in their minds.

In the presentation, all results were evaluated positively concerning the creative quality and its authenticity. This can be ascribed much more to the use of effects than to fragmentation by volume and room control.

Content analysis of written interviews

The written questionnaire was designed with open theme-centred questions about dub reggae, the learning results of the lesson, and the role of sound for music (listening). The data were interpreted using qualitative and quantitative content analysis. Due to open interview questions, quantitative analysis allowed multiple responses.

The analysis of the written feedback (N = 19) on the lesson shows that the majority of the two classes (84%, N = 16) considered dub reggae of high importance for music education. The reasons for dub's educational value were widespread and comprise the everyday relevance, an exceptional ambient character, tonal aspects, the influence on electronic music and an interest in its cultural background. Fifty per cent (N = 8) who stated that dub reggae is useful for music education explained it with its modern appeal: 'I think that contemporary music genres are an extremely rare issue [at school]. For me, it is more interesting to learn something about contemporary genres that are favoured by today's generation than to study classical music' (AD, f, 19). Other 38% (N = 6) highlighted the musical diversity of dub reggae: 'I think dub reggae is interesting because you can see that electro sounds can be combined with reggae sounds. You get to realize how versatile music can be' (AD, f, 17). Another 31% (N = 5) would like to see a greater integration of dub reggae to the music curriculum as they favour this style: 'It should be part of music education because it is attractive to me. I listen to it in my free time' (AD, f, 19). The students not agreeing either could not decide (5%, N = 1), or explained that dub reggae may not be pleasing to everybody (11%, N = 2).

A series of open questions about the relevance of sound for music and personal listening habits reveal a close connection of sound with atmosphere. Without any predefined answer choices, 68 per cent (N = 13) stated the high relevance of sound for their mood: 'In the everyday experience, sound and mood are interconnected. You listen to a sound because of a certain mood, and your mood depends on the sound you hear. Therefore, sound is important for music because it determines the mood' (SH, f, 18). Other 68 per cent mentioned their newly gained insight on sound, stating it to be a musically important parameter: 'A song can sound completely different when its production is slightly changed. This can lead to new atmospheres and evoke different associations' (AD, f, 19). Some students seem to have increased their attention towards produced sound and the ability to capture it in greater detail. Fifty-three per cent (N = 10) of the students referred primarily to aspects of high fidelity: 'The sound is the most important thing because when it is badly mixed [it remains unclear whether the student means the mix or the quality of the hi-fi equipment] it may alter the entire song, and, hence, it sounds bad' (AD, f, 19). The open answers indicate that most students were unable to differentiate between song-inherent sound qualities of the mix and mastering, and its medial reproduction.

The overruling assumption of this study was that tasks combining analysis and reproduction would increase the awareness and understanding of

produced sound. For confirmation, the students should take a stand, verbally and in written interviews, on how their attention towards sound might be changed in the future. Verbally, many students reported to be listening to dub reggae more sophisticatedly now, and to having gained extended perceptual representations, leading to a more detailed comprehension of sound characteristics. Qualities like sound effects, or the effect of a staged virtual room were described as interesting phenomena that had not been noticed before. Sixty-three per cent (N = 12) approved of having gained an extended awareness of produced sound. Six of these students ascribed it to the newly acquired knowledge about music production like the use of effects, mixing and room placement: 'This lesson has extended my understanding of sound. Now I know, how the overall sound is composed of different parts. When I listen to a song now, I listen to it more carefully' (SH, f, 27). Other students stressed the everyday relevance of their acquired knowledge: 'In your everyday life you get confronted with technological sound all the time. I learned, how these are created and what cultural significance they obtain. Therefore, I watch out for those sonic details and I am interested in them in my free time' (SH, f, 20). Five of the twelve students who agreed to pay more attention to sound in the future explained it with advanced perceptual competences, and a greater awareness of production details. Those new listening attitudes go hand in hand with more intensive listening experiences: 'Due to my new listening skills, the music is more intense' (SH, m, 20). Another point to consider is the newly acknowledged relevance of the sound design, and the attention to previously unknown musical aspects like room and effects design: 'The sound is an important issue in music listening. Where are the instruments? What instruments are there and how do they relate to the musical genre? I listen for the interplay of the instruments, playing techniques, the technical equipment. The sound of those is what makes music colourful' (SH, m, 22). Another student (SH, f, 20) stated that she cannot avoid watching out for meaningful sound phenomena anymore.

Regarding music technology, 89 per cent (N = 17) wished to work with computer sequencers in the lessons more frequently to record original material, and to improve their (re)mixing skills: 'The software we worked with was very interesting. We should work with it more often' (AD, f, 19). The mixing task led to recognizing that producing electronic music is a great deal of work, and demands skills just as playing an instrument does, only in a different way.

DISCUSSION AND IMPLICATIONS FOR POPULAR MUSIC EDUCATION

The primary aim of this study, as part of a larger Ph.D. project, was to explore whether students' awareness and understanding of produced sound can be extended by engaging actively with digital technology. Based on the assumption that technology can facilitate multiple educational uses (Tobias 2013a; Brown 2015), further aims of music education within Swanwick's (1994) model of knowledge were expected to be achieved too.

Listening skills and awareness of produced sound

Both participatory observation and student feedback indicate that the production tasks have facilitated an increased awareness and understanding of produced sound. The students' initial analysis of the dub example demonstrates that they were capable of identifying sound details like an

emphasis on bass, a flow of sounds and the lack of any standardized form. Hence, a basic awareness of sound, at least when asked to analyse music in the lesson, could be expected of the students. Introducing the classes to conventional production effects (reverb, delay, flanger, chorus), and to the sound box model (Moore 2001) in combination with analysis and active production tasks, however, further extended the students' awareness and understanding of sound, as their statements clearly show. The results comply with Brown's (2015) claim of music technology being amplifier of musical skills such as listening, analysis and knowledge. By experiencing music production first hand, and by comparing the results to the original, the students received reflective, critical and objective feedback (Brown 2015: 43). The observations also confirm Tobias' (2013a: 12f) assumption that the time spent on mixing and producing not only strengthens students' abilities to work with software and hardware but also helps to develop criteria to evaluate production technically and aesthetically. Most groups noticed their productions lacking some dub qualities, yet they vividly discussed what to improve by regularly comparing their work to the original. The iterative approach to mixing, evaluating and analysing can be expected as an important way of learning, and it is also found in Tobias (2013a) study, when he reports his participants having constantly revised and refined their tracks throughout the songwriting and production process. Hence, an immediate feedback to the creative work is presumably an advantage of music production over traditional composition, and it helps to develop students' aural skills. The results of this study also comply with Savage's (2005) Dunwich study. His conclusion 'that new technologies facilitate and enable a closer analysis of, and engagement with, the micro-phenomena of sound' (Savage 2005: 171f) is clearly supported by this lesson.

Propositional and procedural knowledge of music technology and the dub style

For the majority of the participants, the unit on dub reggae has been their first encounter with sequencer software. The experiment showed that it is worthwhile introducing students to DAWs through dub reggae. Even though there are some specific aesthetics involved, students are rather free to explore and improvise with effects, volume levels and panorama settings without following strictly defined confining stylistic regulations (Savage 2005). Besides, considering the aim to facilitate an extended understanding of sound, the dub remix, in contrast to a composition (Tobias 2013a), does not require concentration on formal aspects other than varying dynamics and shaping the flow of sounds. Another important finding is that the approach of this educational unit is likely to achieve an informed understanding of production techniques without needing many explanations. Regarding style, propositional knowledge has been gained by noticing similarities between dub reggae and modern genres, by experiencing remixing practices, and by slipping into the role of a Jamaican dub reggae producer. For further cultural knowledge, the students should be confronted with the sociocultural conditions of the early dub reggae practices in Kingston (Veal 2007; Williams 2012; Hitchins 2014), and with cultural studies theories such as re-appropriation and bricolage (Certeau 1984). Expanding the connections to either hip hop (Brewster and Broughton 2000) or electronic dance music (Pfleiderer 2001) would require further theoretical explanations and analytical actions.[4]

4. Subsequent to the introduction to dub reggae, the sociocultural context in Jamaica could vividly be shown with Bruno Natal's movie *Dub Echoes* (2009). The stylistic connections of dub to electronic dance music were explored by analysing tracks of Schiller (Summer Rain, 2004, trance, ambient), Rocksonix (Music in Me, 2011, dubstep) and Skream (Sandsnake, Goth Trad Remix, 2010, dubstep). These additional contents and tasks proved to increase both the understanding of dub reggae and of produced sound.

Effects presets helped the students to achieve authentic results. The use of predefined templates can be understood as a limitation, or as support to focus on the vital aspects of a production. In line with Breeze's (2009) research, the presets were useful because the students did not need to set up the technology prior to their creative work. This simplified approach proved to be sensible for students with low experience of working with music technology since no one was overwhelmed by the task, but still not unchallenged. Moreover, the presets could be modified if desired. As expected, students started experimenting with the settings to adjust the sounds to their imagination, and to explore the options after having remixed several tracks. The main concern was experimenting with sounds (Savage 2005), yet, in so doing led to neglecting other characteristics of the dub mix like volume control and panorama settings. Thus, the results of most groups lacked some authentic dub characteristics, which not necessarily reduced the quality of the work. It remains unclear whether deviations from the original occurred as a result of a lacking understanding of the music, or rather stem from the short time of practice with the DAW. The discussions suggest that both aspects come into play. The students stated to need more time for experimenting with effects settings to translate their inner representation to their productions. This indicates that sufficient time is required to introduce students to music technology while simultaneously facilitating listening and analysis skills, as well as stylistic knowledge. Despite this drawback, the groups discussed lively about the quality of their mixes inducing them to produce several versions, which resulted in improving the students' aesthetic argumentative competency (Rolle 2013).

Motivation and acquaintance knowledge

During all phases of the unit, most students of both classes were remarkably motivated for several reasons. Working with music production technology proved to be attractive, and the majority (89 per cent) of the participants stated in their written feedback to like working with DAWs more often. Likewise, the feedback clearly demonstrates the dub reggae style to be of high interest to the students (84 per cent). Combining listening tasks, analysis and production resulted in the willingness to engage with the original dub reggae culture and its appropriation in Europe. This approach allowed working with the classes theoretically, which normally would meet less interest. A major goal of the lesson design was to facilitate a participatory culture (Tobias 2013b) that included every student regardless of formal training (Gall and Breeze 2007). The lessons suggest that the tasks could be carried out at different levels, offering stimuli for everyone in heterogeneous classes.

The written questionnaires indicate that acquaintance and attitudinal knowledge have been attained. Most students stated having gained awareness of the aesthetic significance of technologically produced sound. The lessons also showed that respect for the competences needed to produce sound analogously (traditional dub reggae) and digitally (modern electronic music) was acquired.

CONCLUSION

The exemplary unit on dub reggae demonstrates the high potential of music technology for the music classroom, not merely reduced to a method but as a content in its own right. This study showed evidence for music technology to impart several aims such as developing detailed listening skills, discovering

differences between musical styles, understanding and imitating musical ideas, and gaining insight into unknown musical cultures.

The underlying Ph.D. thesis argues that an awareness of sound details is a starting point for working with technologically produced sound theoretically and practically in the classroom. Yet, for the purposeful application within music lessons in the areas of analysis and interpretation, the awareness of sound by itself can hardly be sufficient. It has to be supported by theoretical knowledge, and, above all, by combining theory, listening skills and previous personal experiences through practical tasks. Moreover, there is evidence that the process of acquiring musical ideas from medial models benefits from collective musical action by discovering stylistic conventions, and from the challenge of reproducing them (Ahlers 2015). Such practices also provide many stimuli for comparing aesthetic products, developing skills of aesthetic argumentation, and not least, for openness, cultural curiosity and democracy.

The major limitation of this study is the small sample. In spite of the successful accomplishment of the educational aims, the effectiveness of the suggested approach should be evaluated in further research, exploring different methods with control groups. Also, a longitudinal study might shed light on the students' ongoing attention towards sound, and on how their listening skills are developing. Despite action research's weaknesses to produce hard empirical data, the study has laid down a theoretical educational framework. Methods for the practical use were shown, and real educational experiences were reflected. Hence, the project can be understood as an example inspiring future work, and furthermore, for extending teaching methods on technologically produced sound, and not least for discussing different approaches. This article finally aims at encouraging to adapt the research on sound of the different academic traditions (art of record production, sound studies, popular music studies, media theory) to music education; this seems to be adequate to the music, makes the educational dealings with popular music more authentic, and, ultimately, may increase the students' motivation and interest.

REFERENCES

Ahlers, M. (2015), 'Opening Minds: Style Copies as Didactical Initiators', *IASPM Journal*, 5: 1, pp. 181–194.

Biermann, B. (2011), 'Appreciating the mix: Teaching music listening skills through sound-mixing techniques', in N. Biamonte (ed.), *Pop-Culture Pedagogy in the Music Classroom: Teaching Tools from American Idol to YouTube*, Lanham: Scarecrow Press, pp. 3–18.

Breeze, N. (2009), 'Learning design and proscription: How generative activity was promoted in music composing', *International Society for Music Education*, 27: 3, pp. 204–219.

Brewster, B. and Broughton, F. (2000), *Last Night a DJ Saved My Life: The History of the Disc Jockey*, New York: Grove Press.

Brown, A. R. (2015), *Music Technology and Education: Amplifying Musicality*, 2nd ed., New York: Routledge.

Butler, M. (2006), *Unlocking the Groove: Rhythm, Meter, and Musical Design in Electronic Dance Music*, Bloomington: Indiana University Press.

——— (2014), *Playing with Something That Runs: Technology, Improvisation, and Composition in DJ and Laptop Performance*, Oxford: Oxford University Press.

Certeau, M. d. (1984), *General Introduction to the Practice of Everyday Life*, Berkeley: University of California Press.
Chanan, M. (1995), *Repeated Takes: A Short History of Recording and its Effects on Music*, London: Verso.
Cohen, L., Lawrence, M. and Morrison, K. (2007), *Research Methods in Education*, 6th ed., London: Routledge.
Csikszentmihalyi, M. (1975), *Beyond Boredom and Anxiety: The Experience of Play in Work and Games*, San Francisco: Jossey-Bass.
Cunningham, M. (1996), *Good Vibrations: A History of Record Production*, Chessington: Castle Communications.
Dewey, J. (1938), *Experience and Education*, New York: Collier Books.
Eisenberg, E. (2005), *The Recording Angel: Music, Records and Culture from Aristotle to Zappa*, New Haven: Yale University Press.
Frith, S. (1986), 'Art versus technology: The strange case of popular music', *Media, Culture, and Society*, 8, pp. 263–279.
Frith, S. and Zagorski-Thomas, S. (eds.) (2012), *The Art of Record Production: An Introductory Reader for a New Academic Field*, Farnham: Ashgate.
Gall, M. and Breeze, N. (2007), 'The sub-culture of music and ICT in the classroom', *Technology, Pedagogy and Education*, 16: 1, pp. 41–56.
Hawkins, S. (2002), *Settling the Pop Score: Pop Texts and Identity Politics*, Aldershot: Ashgate.
Henriques, J. (2011), *Sonic Bodies: Reggae Sound Systems, Performance Techniques, and Ways of Knowing*, New York: Continuum.
Herbst, J.-P. (2014), *Netzwerk Sound: Eine didaktische Herausforderung der populären Musik [Network Sound. An Educational Challenge of Popular Music]*, Augsburg: Wißner.
Hitchins, R. (2014), *Vibe Merchants: The Sound Creators of Jamaican Popular Music*, Farnham: Ashgate.
Katz, M. (2010), *Capturing Sound: How Technology Has Changed Music*, Berkeley: University of California Press.
Kelly, M., Davey, H. and Haigh, N. (2000), 'Use of the action-research methodology in the development of accounting education', *Accounting Educators' Journal*, XII, pp. 1–11.
Kemmis, S. and McTaggart, R. (1992), *The Action Research Planner*, 3rd ed., Geelong: Deakin University Press.
McLeod, K. (2003), 'Space oddities: aliens, futurism and meaning in popular music', *Popular Music*, 22: 3, pp. 337–355.
Mellor, L. (2008), 'Creativity, originality, identity: Investigating computer-based composition in secondary school', *Music Education Research*, 10: 4, pp. 451–472.
Mettetal, G. (2001), 'The what, why and how of classroom action research', *Journal of Scholarship of Teaching and Learning*, 2: 1, pp. 6–13.
Moore, A. F. (2001), *Rock the Primary Text: Developing a Musicology of Rock*, 2nd ed., Aldershot: Ashgate.
——— (2012), *Song Means: Analysing and Interpreting Recorded Popular Song*, Farnham: Ashgate.
Moorefield, V. (2010), *The Producer as Composer: Shaping the Sounds of Popular Music*, Cambridge: MIT Press.
Moylan, W. (2002), *The Art of Recording: Understanding and Crafting the Mix*, Amsterdam: Focal Press.

Pfleiderer, M. (2001), 'Riddim & Sound: Dub Reggae und Entwicklungen der neueren Popularmusik' [Riddim & Sound: Dub reggae and the development of contemporary popular music], in T. Phleps (ed.), *Populäre Musik im kulturwissenschaftlichen Diskurs II*, Karben: Coda, pp. 99–113.

Rolle, C. (2013), 'Argumentation skills in the music classroom: A quest for theory', in I. Malmberg and A. D. Vugt (eds.), *European Perspectives in Music Education II: Artistry and Craftsmanship*, Wien: Helbling, pp. 51–64.

Sagor, R. (2005), *The Action Research Guidebook: A Four-Step Process for Educators and Teams*, Thousand Oaks: Corwin.

Savage, J. (2005), 'Working towards a theory for music technologies in the classroom: How pupils engage with and organize sounds with new technologies', *British Journal of Music Education*, 22: 2, pp. 167–180.

——— (2007), 'Reconstructing music education through ICT', *Research in Education*, 78, pp. 65–77.

Savage, J. and Challis, M. (2001), '*Dunwich Revisited*: Collaborative composition and performance with new technologies', *British Journal of Music Education*, 18: 2, pp. 139–149.

Seddon, F. A. (2006), 'Collaborative computer-mediated music composition in cyberspace', *British Journal of Music Education*, 23: 3, pp. 273–283.

Sterne, J. (ed.) (2012), *The Sound Studies Reader*, London: Routledge.

Swanwick, K. (1994), *Musical Knowledge: Intuition, Analysis and Music Education*, London: Routlege.

Théberge, P. (2012), 'The end of the world as we know it: The changing role of the studio in the age of the Internet', in S. Frith and S. Zagorski-Thomas (eds.), *The Art of Record Production: An Introductory Reader for a New Academic Field*, Farnham: Ashgate, pp. 77–90.

Tobias, E. S. (2013a), 'Composing, songwriting, and producing: Informing popular music pedagogy', *Research Studies in Music Education*, pp. 1–25.

——— (2013b), 'Toward convergence. Adapting music education to contemporary society and participatory culture', *Music Educators Journal*, 99: 4, pp. 29–36.

Veal, M. E. (2007), *Dub: Soundscapes and Shattered Songs in Jamaican Reggae*, Middletown: Wesleyan University Press.

Williams, S. (2012), 'Tubby's dub style: The live art of record production', in S. Frith and S. Zagorski-Thomas (eds.), *The Art of Record Production: An Introductory Reader for a New Academic Field*, Farnham: Ashgate, pp. 235–246.

Zagorski-Thomas, S. (2014), *The Musicology of Record Production*, Cambridge: Cambridge University Press.

Zuber-Skerritt, O. (1992), *Professional Development in Higher Education*, London: Kogan Page.

——— (ed.) (1996), 'Emancipatory action research for organisational change and management development', *New Directions in Action Research*, London: Falmer, pp. 83–105.

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