

# Composing, songwriting, and producing: Informing popular music pedagogy

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## Abstract

In forwarding comprehensive popular music pedagogies, music educators might acknowledge and address expanded notions of composition in popular music that include processes of recording, engineering, mixing, and producing along with the technologies, techniques, and ways of being musical that encompass these processes. This article advances a perspective of popular music pedagogy that is situated in the role production plays in contemporary music-making. Drawing upon a single intrinsic case study focusing on secondary students' creation and production of popular music, as well as theoretical frameworks that highlight recording, mixing, and production processes, this article provides an expanded perspective of composition and songwriting within a popular music context and proposes related pedagogical considerations. Themes addressed include: developing a theoretical framework within music education that addresses the role of production in contemporary music-making, expanding notions of aural skills and music literacy appropriate for producing popular music, and incorporating production processes in music classrooms.

## Keywords

aural skills, composition, popular music pedagogy, production, secondary music education, songwriting

Music educators' development of popular music pedagogies benefits from a growing number of studies addressing the creation of original music in various popular music contexts, including rock bands (Abramo, 2011; Davis, 2005; Jaffurs, 2004) and hip hop crews (Söderman & Folkestad, 2004), and with extensive use of technology (Gall & Breeze, 2008; Hickey, 2009; Mellor, 2008). To forward comprehensive popular music pedagogies, music educators might also acknowledge and address expanded notions of composition that include processes of recording, engineering, mixing, and producing along with the technologies, techniques, and ways of being musical encompassed therein (King, 2008; Moorefield, 2005; Savage & Challis, 2001; Théberge, 1997; Zak, 2001). Given the diversity of popular musics and correlative practices with which people engage throughout the world, it is fitting that music educators develop and draw from an equally rich spectrum of pedagogical approaches.

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While theoretical frameworks pertaining to music production exist (Gracyk, 2004; Moorefield, 2005; Zak, 2001), this discourse is largely absent from music education, and empirical research on production processes in school music programs is lacking. The purpose of this case study was to understand how students create and produce original music in a secondary school songwriting and technology course.

After outlining an expanded conceptualization of creating original popular music, I explore Zak's (2001) notion of songs and tracks as a useful framework for contemporary musicking when creating and producing popular music. I then discuss findings related to the case study of students' processes and experiences as they engaged in the final project for a specific songwriting and technology course. In doing so, I consider various music production processes such as recording, mixing, and editing and discuss how these relate to aural skills and music literacy. In weaving together data and theoretical frameworks derived from the literature, I discuss curricular and pedagogical considerations of popular music's contemporary sound world and how it is produced. This article aims to broaden discourse and practice of popular music pedagogies and consider implications of production as a way of being musical.

## **Review of literature and conceptual framework**

### *Creating original popular music*

Tracing research on compositional processes in music, Wiggins (2007) suggests that the creation of original music has been framed primarily as composition and improvisation within music education. Kaschub and Smith (2009) explain that "the process of composing involves ordering sounds into forms with expressive potential" (p. 36). However, the term "composition" carries a set of normative associations that characterize some but not all of what people do when creating music through production. Zak (2001) argues that "the terms 'composition' and 'musical work'" along with "musicological studies of compositional process themselves have histories in which rock has no part" (p. 37). Popular music discourse in music education has typically referred to students' creation of original music as songwriting rather than composing. The term songwriting, however, also carries a set of norms, usually referring to the creation of music with lyrics, harmony, and a melody, often represented in the form of a lead sheet or loosely notated version of the music (Zak, 2001). Due to the importance that recording, editing, and mixing play in the finished product of most popular music, it is sometimes difficult to ascertain what exactly constitutes the "song". Zak (2001) asks:

Are melody, chords, words, tempo, and arrangement set before recording begins? Have they been carefully worked out in pre-production rehearsals? Are they at least generally indicated by a demo tape? Or is the "song" just an outline, or perhaps merely a title that provides some guidelines as to mood and atmosphere? (p. 134)

Furthermore, while songwriting traditionally occurs before recording (Izhaki, 2008; Zak, 2001) it may also occur simultaneously with recording when one uses technology to assist in the creative process. Songwriting and composing can thus be seen as overarching processes that include production or as smaller phases in a larger chain of processes that also includes production.

Studio recording and production discourse is typically framed in terms of three overarching stages: preproduction, production, and postproduction. As King and Vickers (2007) explain, "Pre-production involves preparing for a session by setting up technical equipment

(microphones, mixing desks and recording apparatus) and musical (drum kit) instruments. Production is the actual recording, and post-production the modification and balancing of the recorded track" (p. 62). Pre-production can also encompass artists creating and preparing their music prior to recording in a studio (Moorefield, 2005). King and Vickers (2007) suggest that educators and industry experts also refer to these three stages as "production" from a more holistic perspective. It is from this perspective that I will use the term production as it pertains to processes related to the creation of a track in this study. Production can take place in a studio environment after a song is created or throughout the creation process in varied environments where one has access to technology. Whereas one might engage in production while recording and mixing a song created by others, musicians may also produce their own music. Furthermore, the role of production in the musical creative process can relate to stylistic aspects and musical practices of particular musical genres.

### *Composing, songwriting, and producing*

Discussing the changing role of the producer, Moorefield (2005) stresses the centrality of recording in conceptions of creating and producing popular music. Differentiating a recording from a composition, Moorefield asserts that "the recording replaces the written score as the definitive artifact" (p. 26). Zak (2001) reconciles the difficulty of addressing this paradigm shift, suggesting that "while it is clear that records are musical works and that they are created through a compositional process, the traditional meanings of these terms must be expanded if they are to be understood in this context" (p. 43).

Zak (2001) expands the concept of a musical work, stating that "ideas are not merely *expressed* in sound; rather, ideas *become* sound. Thus, concept and performance enter into an integral relationship" (p. 43). Théberge (1997) highlights the importance of focusing on the song as "sound," arguing that "although there are certainly valid distinctions to be made between 'songs' and their realization in sound, for much popular music such distinctions have become increasingly difficult to make" (pp. 190–191). Tracing the development of recording technology, Théberge articulates a point at which "pop songs were no longer simply composed, performed, and then recorded. More and more, the studio became a compositional tool in its own right" (p. 216). Musician Brian Eno (2008) engaged in a process that he calls in-studio composition:

Where you no longer come to the studio with a conception of the finished piece. Instead, you come with actually rather a bare skeleton of the piece or perhaps with nothing at all . . . Once you become familiar with studio facilities, or even if you're not, actually, you can begin to compose in relation to those facilities . . . actually constructing a piece in the studio. (p. 129)

As Moorefield (2005) suggests, "producers, engineers, and the acts they worked with began to use the expanded capabilities of the recording studio to extend it into a device for arranging and composing" (p. 43). Théberge further argues that it was "the producer, more than anyone else, whose judgment prevailed within the studio environment" (1997, p. 217).

Given the creative processes and decisions involved in producing popular music, and the increasing role that shaping sound through digital means plays in creating a wide range of popular music, producing can be seen as a way of composing or creating music. This can apply to musicians producing their own or others' music at varying stages throughout the creative process. Given the importance of production and technology in creating original popular music, a framework is needed to understand how music moves from concept to sound.

Sequencing and recording processes along with concepts of songs and tracks (Zak, 2001) are integral for developing a conceptual framework to discuss students' engagement in this study and a broadened approach to popular music pedagogy.

### *Creating and producing songs and tracks*

Recorded music traditionally refers to analog sounds such as a voice or an electric guitar captured using microphones or Direct Input (DI) into a recording device. In music education, recording with MIDI is typically considered sequencing (Airy & Parr, 2001; Seddon, 2006; Webster, 2007). Distinguishing between recording and sequencing can be important when focusing on mixing processes. Izhaki (2008) notes that "the production process of sequenced music is very different in nature to that of recorded music. In a way, it is a mixture of songwriting, arranging, and mixing – producing for short" (p. 30).

To demonstrate how recording and sequencing affect the mixing process, Izhaki (2008) proposes two typical processes outlining the creation of a finished recording. Sequenced music follows a process consisting of production to mixing to mastering, where production includes a mixture of songwriting, arranging and mixing. Recorded music, on the other hand, follows a process of songwriting to arranging to recording and editing to mixing to mastering (p. 30).

Zak (2001) views a recording as consisting of three compositional layers: the song, the arrangement, and the track.

The song is what can be represented on a lead sheet; it usually includes words, melody, chord changes, and some degree of formal design. The arrangement is a particular musical setting of the song. It provides a more detailed perspective plan: instrumentation, musical parts, rhythmic groove, and so forth. The track is the recording itself. As the layer that represents the finished musical work, it subsumes the other two. That is, when we hear a record, we experience both song and arrangement through the sounds of the track. (p. 24)

In this case, songs refer to musical ideas conceptualized and created but not physically recorded. When more fully fleshed out, the song is considered an arrangement, similar if not equivalent to the construct of a composition. Zak (2001) explains that an "analytical division between track and arrangement may sometimes be artificial and misleading" (p. 32). Rather than treating an arrangement as a separate compositional layer, and depending on the particularities of one's creative process, I propose including it as part of the song or track layer. In this way, songs and tracks can be discussed in terms of their development. In order for a song to be heard it must be instantiated in sound, thus performed or recorded. The track, then, is the sonic manifestation of the song and the digital information used to make it audible, involving: making, capturing, and shaping sound and its formative elements (Zak, 2001, p. 46).

### **Research context**

This case study focused on secondary students' creation and production of popular music in a United States Southwestern high school songwriting and technology course, hereafter referred to as the "STC." The STC is a class in Shady Gecko High School's "Contemporary Music in Our Society" program, seeking to provide students with the skills, knowledge, and dispositions required to enter the music industry or advanced education focusing on live sound, recording, and production. Throughout the year, STC students listened to teacher-directed presentations regarding live sound, recording, mixing, and editing music; worked on music theory exercises;

and completed short-term projects related to curricular content. While students could perform original music on instruments or voice and learn instruments independently in class, the course did not address instrumental or vocal technique.

This study focused on the students' final project, which consisted of approximately 4 weeks of consecutive project work without teacher-directed lessons. The music teacher typically sat at the front of the music room or in his office making himself available to assist students upon request, and did not walk around to observe students or ask questions. At some point in their projects, all of the participants used a computer in conjunction with an audio interface, as well as the music application Pro Tools as a recording device.<sup>1</sup> Several also leveraged the affordances of Pro Tools to record digital information from a MIDI controller or the software itself. All students included vocals and, with the exception of Alice, acoustic or electric instruments in their music. Upon completing STC projects, students shared their music with the class by opening their Pro Tools session on a computer connected to two large speakers and clicking the play button.

## Method

After I gained institutional review board (IRB) and school district approval to conduct research at Shady Gecko High School, the music teacher introduced me to the students.<sup>2</sup> I informed students in two separate classes of the STC of the research purpose and process, recruited participants in each class, and selected potential participants for inclusion. Participant selection was based on: students' assent and their guardians' informed consent; the development of a participant group representing diversity in approaches to creating music; and the development of a participant group representing, to the greatest extent possible, the diversity of gender and ethnicity evident in the school population. The following three individuals in class one, and three groups in class two, were included:

- Alice, a 17-year-old white female who created *IV League* in an "Evil Piano Pop" style
- Esmerelda, a 16-year-old white female who created *Rage & Love* in an acoustic pop style
- Sara, a 15-year-old white female who created *Solid Ground* in an acoustic pop style
- Marcus and Liz, a 16-year-old white male and 18-year-old female who created *Here* in an acoustic pop style
- John, Carl, and Jay, 17-and-16-year-old white males, and a 16-year-old Asian/white male, who created *Doom Metal Song* and *Little Green Men* in a doom metal and techno style respectively
- Mark, Bert, and Jebidiah, a 15-year-old "Mediterranean" male and two 16-year-old white males who created *Eyes Inward* in a technical metal style

The data most relevant to this article were generated through observations, video recordings, video-based shared reflections, and computer screencasts that recorded video and audio of students' actions within the computer environment as they were occurring. At the start of each class, participants informed me of where they would be working, and what they would be working on, during that period. I then set up the screencasting software, a video camera mounted on a small dolly and, if needed, a laptop with video-recording capabilities. A second laptop and notebook were with me constantly in order to take field notes. Throughout the period I moved between the three participants or participant groups, observing, conducting unstructured interviews, generating field notes, or operating the video camera and laptop as needed.

The screencasts and video recordings were critical for reviewing participants' actions that would have been difficult to record by observation alone. Informal and semi-structured interviews allowed for member checking, confirming, and disconfirming evidence. Video-based shared reflections (Tochon, 2007) consisted of participants viewing and discussing video footage of themselves engaged in their project work. Video-based shared reflections were recorded with screencasting software that captured both the original video and the discussions of this data. Data were transformed and transcribed as text, which was time coded and synchronized with the original video recordings using the application Transcriva. Using HyperResearch I generated and assigned codes to transcribed data. I also reviewed phenomena in the data by continually displaying selected codes or a combination of codes and related data. These processes were iterative and recursive, loosely resembling that of grounded theory (Glaser & Strauss, 1967). I wrote detailed accounts of participants' or participant groups' creative processes with rich description (Geertz, 1973) juxtaposing data from observations, interviews, and video-based shared reflections to assist in within case analysis and immersion in the data.

Using the program Mindmanager, I organized data relating to emerging themes and related literature as mindmaps. I also generated diagrams of participants' overarching creative processes available as supplementary material in appendices B–G. These processes assisted in identifying patterns and relationships in the data and conceptualizing how participants created music in relation to existing production and musical creation frameworks. Through combining the aforementioned processes and continually reviewing and writing about the data reflexively, I identified, modified, and verified emerging themes.

While analyzing students' creative processes, it became apparent that existing literature related to student composition addressed aspects of students' creation of original music but did not fully explain the role that production played. After reading more deeply on production processes, related research, and producers' perspectives while continuing to analyze data, I determined that Zak's (2001) concept of songs and tracks was a key theoretical framework for describing students' production and creative processes. Given the lacuna of music education literature addressing production processes in relation to students' creation of original popular music, this article focuses on articulating a conceptual framework based on existing literature on production and related findings from the study.<sup>3</sup>

## Findings and discussion

In this section I first briefly discuss general aspects of students' creation of original music and explain why framing their creative processes through the concepts of songs and tracks is helpful to understand the role that production played in their musical products and processes. Findings related to participants' specific creative processes and production are then presented in the context of a song and track continuum. Appendices B–G provide visual references of students' processes as they created their music.

### *Conceptualizing students' creation of original music through a song and track continuum*

Neither composition nor songwriting in their traditional sense fully encompass students' engagement in the STC due to the inclusion of production in their creative processes. This was the case for many of the genres and sub-genres within the STC students' musical milieux ranging from doom and technical metal to what Alice described as "evil piano pop."

Participants overwhelmingly referred to what they were doing as songwriting or more specific forms of engagement such as “recording” or “jamming.” Complicating the notion of composing and songwriting in terms of how students worked with songs and tracks was critical to understand how they moved through various aspects of creating and presenting their music.

In creating songs and tracks, all of the participants worked through phases of recording, editing, and mixing, but did so idiosyncratically and at different points in the process. Some worked in ways more akin to sequencing while others took an approach more similar to recorded music. Participants’ original works and thus the music emanating from the speakers could be considered final mixes, Pro Tools sessions, recordings, compositions, or songs. If the final mixes or recordings were indeed the students’ works, what were they recording? At what point were participants’ works considered a song (or composition), and when were they engaged in songwriting (or composing)? These questions provided a focus for analysis.

Zak’s (2001) concepts of a song and track are helpful in distinguishing between participants’ approaches to creating music. In this study, a track is anything that was created, recorded, or produced through Pro Tools in the STC (though other music applications could be used for the broader framework proposed). The constructs of songs and tracks as used in this study and framework are not dichotomous. Some students created the song and track simultaneously using a computer and MIDI controller to create, practice, record, and edit music recursively (see Appendix B). The type and use of technology plays a significant role in determining if one is working on a song, track, or both simultaneously. Furthermore, a song could be presented both as a song and as a track. Marcus and Liz performed *Here* as a song with acoustic guitars and voice at a school concert and presented *Here* as a track by having it played from a computer through speakers during the STC final presentation.

Participants’ work often crossed through aspects of pre-production, production, and post-production in an overlapping manner, making it difficult and at times inappropriate to use these overarching categories to organize their creative processes. Thus, along with the constructs of songs and tracks, I use a holistic concept of production as it pertains to the creation of tracks in the STC. This “production” encompasses recording, mixing, editing and related processes or decisions that might occur in an overlapping manner (King & Vickers, 2007; Moorefield, 2005; Porcello, 2005; Zak, 2001). The following section applies a song and track continuum as a framework for understanding students’ recording, editing, and mixing as they created and produced original music in the STC.

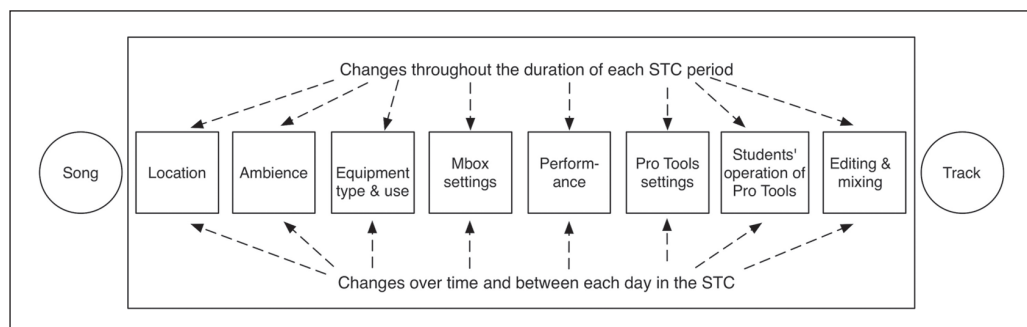
*Recording processes.* All participants recorded their music as digital audio with some recording MIDI through sequencing to create their music. How and when they recorded in their overall process differed. Music education literature has traditionally framed recording as an act of preservation (Folkestad, Hargreaves, & Lindström, 1998; Gall & Breeze, 2008; Kaschub & Smith, 2009). In the context of studio production, however, recording one’s music requires decisions and creative processes that transform the song into a track. Tankel (1990) explains, “the essence of audio recording is the ability to preserve sound, but the process also permits mixing (setting sound parameters and relationships during and after recording) and editing (reorganizing sounds after the performance)” (p. 37). Framing STC participants’ recording processes beyond acts of preservation is crucial to understand how their music was materialized in sound. Though their songs may have been formed and realized through performance, the recording process and track creation changed the sonic material.

When students recorded their music, the song or musical ideas were inherited in sound and became fixed in digital form (though mutable through digital means). While one might argue

that the song “sounded” a particular way prior to being recorded and that sound was “preserved” through recording, it was also being transformed from song to track through the choices of recording methods and circumstances involved in the recording process. Each decision participants made while recording factored in the end result of their tracks and how the songs would be heard. As Zak (2001) explains:

The particular sonic configuration and expressive shape of the performance are influenced by such things as the choice of recording tools, the space in which the recording takes place, and the dynamics of the interaction among the members of the recording team. (p. 43)

For example, in the case of recording a vocal part, one’s knowledge and application of microphone technique such as what microphone to use, its location in a recording space, and the optimum distance between the microphone and vocalist, affect the track as much as issues such as vocal production or intonation. These factors, which were interrelated and changed throughout any one period and between classes, both impacted and were a result of participants’ decisions during the recording process. Findings related to these factors are summarized as a composite in Figure 1 and described below.



**Figure 1.** External factors at play during the recording process in the STC.

A close look at Esmerelda’s recording process demonstrates how such external factors factored into students’ final products. Esmerelda chose to use an external pickup positioned over her guitar’s sound hole. Had she chosen to use a microphone or electric guitar her track would have contained the characteristics of those recording methods. Esmerelda had to position the pickup on her guitar, which also factored into the recording. For her vocals, Esmerelda chose a dynamic microphone that she held in her hand. Once Esmerelda set up her guitar or microphone in a way that she found satisfactory, an additional set of factors based on the Mbox audio interface settings came into play. As Esmerelda explained, the Mbox was used by students throughout the day and thus was never in exactly the same setting as when she used it last. Additionally, every adjustment Esmerelda made to the Mbox factored into the input levels at which her guitar or voice was recorded. Working alone, Esmerelda had to start and stop Pro Tools and cue each of the recording points while holding her microphone, making consistency a difficult prospect.

The inconsistencies between the Mbox settings, room ambience, placement of the pickup and microphone and Esmerelda’s vocal performance, all became a part of Esmerelda’s track. Similar issues played out in other participants’ recording processes. Marcus and Liz had to address ambient sounds such as doors closing in their recordings and John, Carl, and Jay

recorded direct from their keyboard's audio output instead of using it as a MIDI controller. While creative and technical decisions throughout the recording process were significant in the majority of participants' creative processes, Mark, Bert, and Jebidiah recorded their song and created their track only after they were confident with their performance. The majority of their time could be considered a form of pre-production (Zak, 2001) during which they focused on the creation of a song and its high intensity performance. Bert referred to the STC as "just like the equivalent of our studio." The low priority given to the track, the order in which they recorded their individual parts, their use of Pro Tools, and the recording time constraints, resulted in technical issues and difficulties limiting the group's ability to shape the sound of their final track as they desired.

*Recording: Affordances and constraints of technology.* With the exception of Carl and Jay during the doom metal song, participants recorded each instrumental track separately. This was afforded by the use of Pro Tools's multitrack capabilities (Moorefield, 2005; Savage & Challis, 2001; Zak, 2001). Ensemble performance was thus constructed rather than performed live and organically. Schippers (2010) suggests that in some cases, musicians leveraging multitrack recording and digital technology can do without "external performers" as they "realize a creative process from initial concept to final product" (p. 70). While technology enabled individual students to create an ensemble performance, it also led to isolated performances from group members who normally performed together. Mark, Bert, and Jebidiah negotiated balancing between layering multiple tracks of individual instruments via Pro Tools while maintaining the sense of an organic and live feel to their music. Though they would have preferred to perform live as a group with each of their instruments recorded to separate channels and tracks allowing for post-recording editing and mixing, they were unable to record with this approach due to time constraints and logistics. To assist with maintaining the feel of a live performance as they recorded their parts separately in Pro Tools, Mark played his guitar through an amp connected to isolation headphones for Bert to play along with when he recorded the drum parts. They engaged with overlapping aesthetic perspectives, some related more closely to their performing and others more closely to their recording process. This could be attributed to the affordances of, and their knowledge of, multitrack technology.

The use of digital audio in participants' recording processes is also significant given prior research studies in which students were unable to realize their songs into tracks due to the sole use of MIDI capabilities (Folkestad et al., 1998). Folkestad et al. (1998) found that students had to either perform their guitar parts on a MIDI keyboard into a computer or play the parts on a guitar along with the computer since they had no way of recording the actual guitar sound. They argue that, "this way of creating music presupposes that the composer's instrumental keyboard skill is good enough to be able to realise the musical idea" (p. 88).

Even if students possessed advanced keyboard skills, the characteristic sounds and techniques of strumming acoustic guitars or technical and virtuosic electric guitar performance would be difficult to translate into a MIDI keyboard performance. Similarly, Bert's ability to play a drum set allowed him to record the sound of and perform his part on the drum set rather than a MIDI keyboard controller or other MIDI device (Airy & Parr, 2001). Given the importance of maintaining a sound characteristic of technical metal, particularly with his double kick pedal work, it is doubtful he could have recorded the drum parts on a MIDI keyboard controller. Using microphones and DI to record their instruments enabled participants to create tracks that encompassed the instruments they wished to record. This may become less of an issue as technologies and musical interfaces evolve and music programs include digital and MIDI instruments and devices such as electronic drum sets and MIDI guitar controllers.

While using digital audio was more advantageous than that of MIDI technology to some participants, the option to record tracks using MIDI keyboard controllers and Pro Tools was critical for others. Alice relied on MIDI technology to record, edit, and input material recursively (Gall & Breeze, 2005; Savage, 2005a). Her ability to copy, paste, and manipulate MIDI material meant she could record short sections at a time (Airy & Parr, 2001). Alice's creative process consisted largely of manipulating this material. Her use of Pro Tools was integral throughout the entire process of creating *IV League* as opposed to being used to record music established outside of a digital context. Recording was thus internal to the computer and unaffected by external factors outlined in Figure 1.

*Mixing and editing processes.* All participants produced their music through mixing and editing to varying degrees, at different points, and idiosyncratically throughout their overall process. Along with recording, participants' mixing process played a direct role in shaping the sound of their track and final musical products. Zak (2001) defines mixing as:

The stage in the record-making process when all the elements accumulated during the recording stage are brought together in a composite image of an apparently unitary musical performance. The mix defines the nature of the sound world in which the music is taking place and links the two in a unique and permanent relationship. (p. 141)

A mix might also be considered "a sonic presentation of emotions, creative ideas, and performance" (Izhaki, 2008, pp. 4–5).

Mixing was not necessarily separate from recording or editing in the STC. In fact, many of the students mixed and recorded their music in a simultaneous and recursive process. While these processes were often intertwined, each had its particular focus. As Izhaki (2008) explicates:

There is some contradiction between the nature of the recording and mixing stages. The recording stage is mostly concerned with the capturing of each instrument so that the sound is as good as it possibly can be. During the mixing stage, different instruments have to be combined, and their individual sound might not work perfectly well in the context of the mix. (p. 30)

For Marcus and Liz, recording and mixing played a pivotal role in their creation of *Here* even though it occurred after they had created and practiced performing *Here* as a song. Once they began recording, Marcus constantly edited the track through deleting extraneous noise or mistakes and adjusting input and volume levels. Marcus was not editing ideas, but sound and digital material. Mixing their track was just as much part of creating *Here* as their creation of the song. Zak (2001) explains that, "the song's ultimate form should be allowed to emerge over the course of the [recording] process as the song absorbs the influences of the process itself" (p. 28). As noted earlier, the track subsumes the song; while Marcus and Liz worked on the track while recording and mixing, the sonic manifestation of *Here* as a song was also being created.

Esmerelda's mixing of the vocal track of *Rage and Love* in Pro Tools, made the track distinct from the song. Through mixing and performing volume adjustments to the sound object of the track, Esmerelda attempted to create a recording of a performance that had not occurred. Through multiple recorded takes, crossfades, and volume adjustments Esmerelda created a track or sonic version of her song. Editing was an integral aspect of Alice's creative process and inseparable from her idea generation, development, recording, and mixing. Due to Alice's creative process, which combined her work on the track and song, use of the MIDI notes view, and

MIDI keyboard controller, editing was synonymous with creating. Through editing, Alice could input digital material with the intent to sculpt and manipulate it into desired sonic content. Alice's creation and editing of musical material was facilitated by the affordances of Pro Tools and its visual representation of her music. Zak (2001) explains that, "some artists begin recording without songs, fully integrating the task of capturing sounds with that of musical invention" (p. 134). Unlike participants such as Mark, Bert, and Jebediah, who produced a track after creating a song, for Alice, producing was an ongoing aspect of her entire creative process.

Though participants engaged with mixing at a basic level, in interviews they articulated the potential that mixing might have for their music and creating tracks. The ability to mix creatively relies on a balance of thinking in sound, knowledge of the technical components of mixing, and ability to apply this knowledge. Izhaki (2008) discusses a three step process for creative mixing consisting of: having a vision for how the music should sound, determining actions such as what and how equipment should be used, and evaluating the results of one's actions. He explains that:

Just as some composers can imagine the music before they hear it, a mixing engineer can imagine sounds before attaining it – a big part of mixing vision. Mixing vision is primarily concerned with the fundamental question: how do I want it to sound? (p. 19)

The majority of participants were at the beginning stages of developing a mixing vision and realizing the potential for mixing in shaping the sound of their music.

*Constructing performances.* STC students regularly recorded, mixed, and edited their music to create recordings of "performances" that would have been impossible without the use of technology. Izhaki (2008) identifies two forms of editing related to recording and mixing. Selective editing "is primarily concerned with choosing the right takes, and the practice of comping – combining multiple takes into a composite master take," whereas corrective editing "is done to repair a bad performance" (pp. 32–33). While Izhaki (2008) discusses the splicing and construction of parts as a process of selective editing, Zak (2001) frames these editing techniques in terms of the decisions made during the recording and performing process. This could take the form of "recording many complete performances of a given part on separate tracks and then assembling a composite performance, or 'punching in,' that is, recording part of a performance (as little as a single note) within an existing one" (p. 55). Students' editing and mixing along with related decisions required technical knowledge of Pro Tools along with an understanding of how and when particular techniques should be applied.

Marcus and Liz engaged in what could be considered selective editing and decision making regarding their recording, mixing, and performing for several days as they recorded multiple takes and combined them into a finished vocal track, creating a seamless performance that never took place. Esmerelda engaged in corrective editing for several periods. Continually adjusting the volume levels of her vocal track before mixing parts of various takes, she spliced together, crossfaded, and made volume adjustments, creating a composite track with consistent dynamic levels that she was not able to perform live in one take. Overall, except for Esmerelda, students who used digital audio tended to work on selective editing. Sara and Alice often adjusted musical parameters with MIDI data, engaging in corrective editing. John, Carl, and Jay, in addition to Sara, also used MIDI similarly to ways in which others used digital audio. For John, Carl, and Jay this led to selective rather than corrective editing whereas Sara combined the two approaches. The regions and notes view of Pro Tools facilitated these editing methods (Airy & Parr, 2001; Gall & Breeze, 2005).

This use of technology demonstrates participants' ability to create "performances" through recording, mixing, and editing (Moorefield, 2005). They worked within a "reality of illusion" (Moorefield, 2005) paradigm as they recorded, spliced, edited, and mixed versions of their music. Moorefield (2005) contrasts the production of "real people in a real setting" or an illusion of reality with the production of a recording that "doesn't exist in the real world" or reality of illusion (p. 74). A reality of illusion occurs when technology and production are used to create a recording of a performance that did not exist. While some might find this problematic, the majority of participants, most of whom did not take formal lessons in their chosen instruments or voices, viewed it as a legitimate way of creating their envisioned music.

### *Listening and aural skills*

Participants' listening throughout their production was subjective, critical, contextualized within their experiences, and involved a range of aural skills. When working on the track, students focused on the sound qualities of their music beyond performance accuracy or quality of their ideas. This was evidenced as they made decisions throughout their recording, selective and corrective editing, and mixing of their track to achieve desired results. Liz, in discussing STC students' analyses of recordings throughout the year differentiated between the quality of a song and that of a recording, articulating that "even if the songwriting is amazing if the song sound quality sucks you can't get into that much" (Interview, May 20, 2009). Marcus discussed how he listened for timbral issues when recording Liz's vocals for the track of *Here*:

I listen to . . . different things. If you want a real thick voice you probably put more reverb on and it's like cloudy a little bit and if you want that kind of thing, there's people like T-Pain who has the electronic voice and stuff like that. It matters what you want. So, if I want to thin [Liz's] voice out I'll turn the treble up and then I'll lower the bass and pan it more. It's different. It's what you want so you're listening for what you want to hear. (Interview, May 19, 2009)

The ability to listen critically to issues such as the equalization (EQ) (see Appendix A) and timbral aspects of a voice informed Marcus's and Liz's decisions regarding their track. Participants also listened for the presence of artifacts or ambience in the recording and in ways to achieve volume consistency in their tracks. Esmerelda's critical listening for volume inconsistencies while recording and mixing informed her editing, assessment of how the vocals sounded in the song's larger context, and whether she should continue adjusting the volume or re-record a vocal part.

The majority of participants' listening focus was technical in nature when recording. This may have related to their basic grasp of technical knowledge related to recording, and their lack of experience as sound engineers. This was also true for the majority of participants' mixing processes. It is reasonable to suggest 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.

### *Learning to "read and write" music: The screen as score*

The STC students' ability to visualize their music through multiple means was important to their use of Pro Tools, editing, recording, and mixing processes (Airy & Parr, 2001; Gall & Breeze, 2005). All developed literacy in the notation systems used in Pro Tools, essentially using the screen as a dynamic and interactive score to mediate discussions, make decisions, create, and modify their tracks.

For many in the STC, reading notation related to understanding how to encode and decode MIDI information in a notes view, interpret the representation of digital audio as wave forms in the regions view, read and adjust velocity data, work within a volume automation view and with visual representations of volume controls, and read graphic displays of sound corresponding to plugins and effects. Selective editing usually took place via the regions view since participants typically deleted larger segments of the audio file and then cued the point for another take. Corrective editing of MIDI data typically took place in the notes view, where participants had direct access to duration, pitch, and velocity parameters of MIDI information.

Digital notation available through Pro Tools enabled students to interact directly with information such as pitch, rhythmic, and dynamic content, along with timbral qualities in ways that standard notation is incapable of providing. Participants' ability to work within these notation systems was critical to their production and how they shaped their tracks. Zagorski-Thomas (2008) argues that visual representations of music afforded by software play an important role in one's creative practice. Moore (2003) similarly argues that music software provides "new ways of representing music via notational systems," stressing that such "methods of representing music emphasize the fact that the art and aesthetic of music are in its hearing, not in its notation" (p. 116). Participants often used visual information with the corresponding sound to edit and adjust their music. Their use of visual information from Pro Tools to mediate their creative processes makes concrete Moore's suggestion that "to work effectively as a composer, a performer, and perhaps even as a listener with new musical environments will require understanding new notation systems for editing and transmitting musical information" (p. 116).

## **Implications for music education and popular music pedagogies**

### *Including producing in music programs*

Given the role that producing played in participants' creation of original popular music, this study supports incorporating production in music programs as a facet of contemporary musicianship. This means: reconsidering creative processes through synthesizing songwriting, composing, and producing; accounting for a song and track continuum; and assisting music students in gaining the skills and creative visions to record, mix, and edit their music. Peer-, teacher-, and self-assessment of students' music in such programs might also encompass issues and processes related to recording, mixing, editing and associated aural skills. In this way students might expand their abilities to think and speak about musical processes and products in terms of a song and track continuum.

### *Including recording*

Students' recording processes required them to think creatively, critically, aesthetically, and technically to shape the sound of their music. While technology facilitated this engagement, it was participants' decisions, problem solving, and actions that led to the creation of their music. Savage (2005b) suggests that:

The process of recording one's musical output is educative for any musician, whether performer or composer, but the opportunity to work interactively with technologies that accurately represent recorded sounds as compositional material demand[s] particular aesthetic qualities and judgments from pupils. (p. 178)

Music education ought to help students develop awareness of the considerations, intricacies, and nuances involved in recording music and the ability to make informed decisions when transforming their songs into tracks. This can take place throughout students' experience in music programs. For instance, along with introducing acoustic instruments to young students, music educators might include mixing consoles, MIDI controllers, and effects processors. In addition to performing and composing, students might be provided with opportunities to use microphones and input devices to record each other and then mix, remix, or edit the material. During formative and summative assessment educators might encourage students to reflect on how recording processes and decisions affect their music. Assisting students to develop both technical proficiency and aesthetic sensibilities involved in recording may assist them in realizing their musical intent when creating music. This includes reframing recording from pre-serving to creating music.

### *Including mixing and editing*

Mixing and editing were critical aspects of many participants' revising, developing, and crafting their tracks. Providing students with opportunities to expand and refine skills and understanding of selective and corrective editing with digital audio and MIDI may provide a strong foundation from which they can develop as musicians and creators. Similarly, incorporating mixing processes and ways of thinking in music programs might facilitate students' generation and expansion of musical ideas while developing their mixing visions. Just as Stauffer (2001) found that time, tools, and techniques were interactive in a young composer's work, the STC participants' engagement with Pro Tools to balance, EQ, and process their music (among other techniques), provided a context for future growth in familiarity and fluency with software to mix creatively and artistically (Izhaki, 2008; Stauffer, 2001). Assessment strategies might include students reflecting on the degree to which their tracks match their mix visions or how their mixing, editing, and related decisions played a role in their tracks. Popular music pedagogies ought to include strategies to help students develop the skills, knowledge, and creative thinking needed to envision, hear, and realize ideal mixes and tracks.

### *Considering the creative process through a song and track continuum*

While a case could be made that participants were composing, issues of language choice, semantics, and associated conceptual frameworks are at play in discourses present in and about the STC. Neither the terms songwriting or composing in their traditional sense fully encompass students' engagement in the STC due to the inclusion of recording, mixing, and editing as aspects of production in their creative processes. This study brings into focus the importance of the track in contemporary popular music and notion that "the recording in all its idiosyncratic particularity is the musical work" (Gracyk, 2004, p. 59).<sup>4</sup>

To account for the types of musical creation with which STC students engaged, along with issues of production and digital technologies, music educators might frame the creation of original music in terms of a continuum from song to track. Such a perspective might also inform music educators' and their students' decisions regarding the tools and techniques employed in the classroom along with developing appropriate approaches to providing feedback and scaffolding students' musical engagement and learning. Furthermore, music educators might provide students with opportunities to record, mix, and edit in varied ways across a song and track continuum ranging from Mark, Bert, and Jebidiah's approach where producing

took place after a song was created, to that of Alice where the song and track were created simultaneously and production occurred through the entire process. In doing so, music programs might enable students to determine and hone the processes that work best for them and their music.

### *Broadening types of listening and aural skills*

Participants in this study engaged in a range of aural skills to produce their music with desired results. They learned to listen as producers. Music educators might reflect on the aspects of music on which they ask students to focus their listening. What is included and excluded? When music educators have students listen to and reproduce recordings, to what extent are the values, processes, and results of production considered? Expanding aural skills to encompass more than pitch and rhythmic content is vital to addressing the increasing role that technology plays in mediating music. For instance, students might discuss and attempt to reproduce or modify the equalization, spatialization, effects processing, and other sonic elements of a recording. Here, songs and tracks along with live and recorded music are critical and productive topics for engagement in music programs. Production might then open creative spaces for students to listen, hear, and think musically in new ways.

Just as STC students worked to develop and achieve a mix vision, aural skills in the context of popular music pedagogy might encompass the ability for one to identify and/or achieve a desired “sound” when recording, mixing, and editing. While STC students might not be able to label intervallic relationships or use solfege syllables, they developed aural skills useful for creating, performing, and producing music. The aural skills traditionally in focus within Western classically oriented music programs, while important, can be seen as limited in scope and inadequate for contemporary musical practices involving production. Reflecting on the types of aural skills important for students’ lifelong musical engagement is key to forwarding popular music pedagogy and producing as a form of musicianship.

### *Acknowledging and leveraging the screen as score*

Music education discourse on popular music tends to frame the use of “notation” as standard notation and in most cases as less important than aural practices when learning and creating music. An expanded perspective on notation and music literacy might acknowledge the unique ways that musical representations available through software can mediate musical engagement and understanding. Given the digital contexts of contemporary music making, visual representations of sound – ranging from MIDI data and wave forms to ADSR envelopes and equalization levels – ought to be considered standard notation in popular music curriculum and pedagogy. Learning how to interpret and interact with such information can inform students’ technical and artistic decisions, forward their creative processes, and contribute to a deeper musical understanding. Music educators might broaden the types of notation addressed in music programs, providing students with opportunities to engage in production practices and music making that involve, or are mediated by, digital technology.

### *Broadening genres of popular music addressed in programs*

Approaching production and popular music pedagogy comprehensively entails widening the scope of the musical genres and styles we engage with, research, create, discuss, and include in

classrooms. As Green (2002) suggests, music educators could benefit from a broadened research agenda “look[ing] into the precise learning practices of musicians in different areas of popular music” (p. 10). Much of the research and literature of popular music in music education centers around variations of rock music and garage bands. STC students demonstrated that popular music is much more expansive and genre plays a key role in creative processes and products within a song and track continuum. Developing informed curricula and pedagogies that incorporate production necessitates considering what it means to create and produce music for specific genres, purposes, and places.

Along with continuing and building upon the strong foundation of research regarding social aspects and informal processes encompassing the creation of popular music (Green, 2002, 2008), music education might also address the intricacies, nuances, and genre-specific characteristics important to the music, its creation, and production. This includes celebrating the musical expertise and creative thinking involved when producers and artists know the exact timbre, spatialization, or equalization needed for a particular track, why it fits better than other options, and how it can be obtained. Just as the STC students worked to attain a particular sound indicative of specific genres, knowing how to apply the techniques and aesthetic decisions involved in creating a track depending on whether it is techno, acoustic pop or doom metal, or other genres is an aspect of being musically literate and educated in contemporary society. Forwarding popular music pedagogy thus requires researchers and practitioners to be cognizant of unwittingly essentializing and homogenizing popular music and its practices. Thinking in terms of production may prove helpful in addressing nuances and idiosyncratic aspects of popular musics important to developing appropriate pedagogies and curricula.

## **Conclusion**

Music educators might consider what is critical for students to gain and sustain agency as contemporary musicians, whether as future performers able to speak with producers and engineers about the sound they hope to obtain on a recording or as recordists and mix engineers determining the best way to record an artist's performance. Meintjes (2005) suggests that due to a blurring of roles in the music studio and ubiquity of music technology, artistic control will reside with those who have the “technological competence to manipulate electronic controls and to work through often complex user interface systems” (p. 27). Music education can provide students with a foundation for developing musical autonomy within this context. Väkevä (2009) highlights this possibility by urging educators to consider how digital music practices “might challenge our conventional ways of thinking about the way music can be conceived, both as an art form and as an educational subject” (p. 25). Including producing practices and ways of thinking in music programs is one step toward addressing such digital music practices.

The role of production processes and use of digital technology will only increase as popular musics and related practices change and develop. Similarly, the line between studio and stage will continue to blur as technology and popular music evolve and transform how we create, perform, listen to, and interact with music. Music teaching and learning ought to develop and integrate the types of skills, knowledge, and musical thinking in our classrooms and ensembles that relate to the landscape of contemporary music. We might then make the case that music education includes popular music pedagogies as diverse as our students' musical interests.

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The author declares that there is no conflict of interest.

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## Notes

1. Appendix A describes equipment and terms commonly used in the STC.
2. All names included in this study are pseudonyms to preserve participants' anonymity. All ethnicities and musical styles were self-identified by participants when asked about demographic information.
3. In-depth descriptions and analyses of participants' creative processes beyond a focus on production are articulated in the dissertation upon which this report is based (Tobias, 2010).
4. While this study focused on popular music genres with which participants created their music, the track is important in a broad range of popular musics across different eras.

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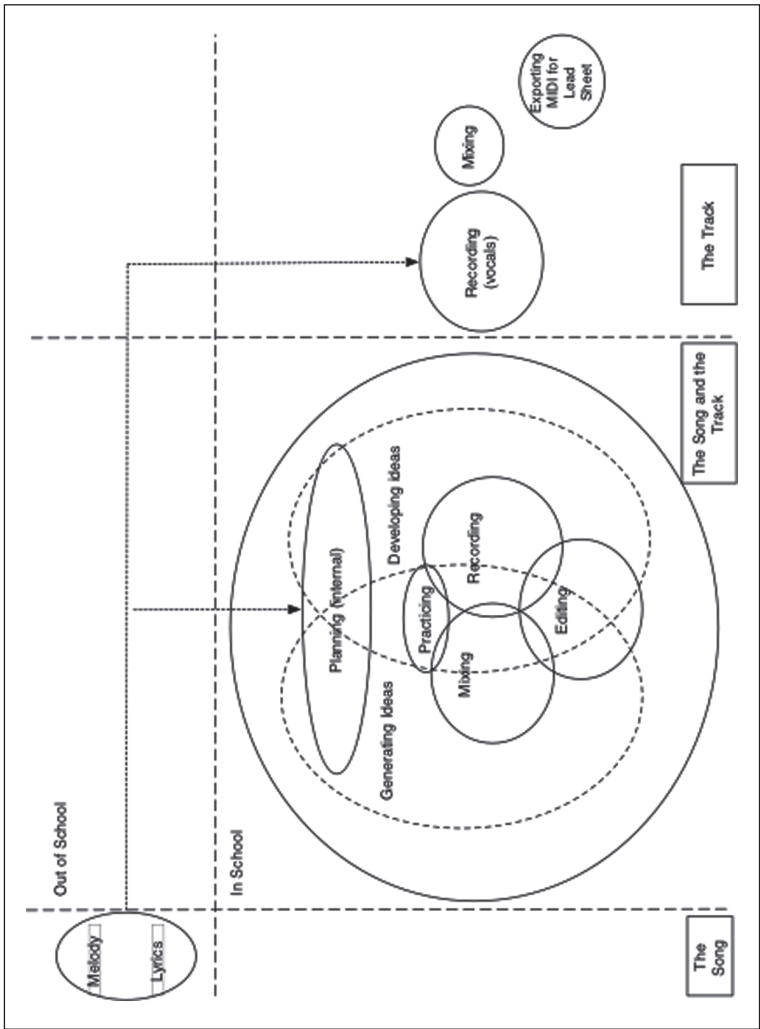
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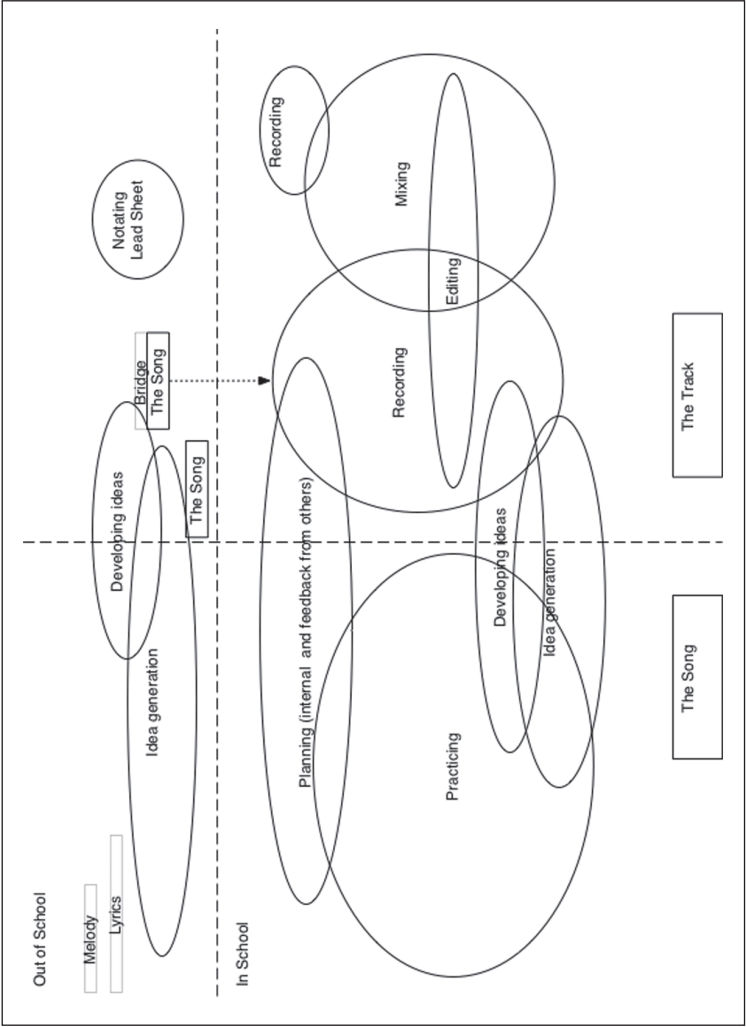
**Appendix A.** Equipment and terms.

Equipment/term	Description of equipment/terms
Pro Tools	A software program that allows for music to be created, recorded, edited, and mixed. It can record MIDI and digital audio, both represented visually. MIDI information can also be represented in standard notation if desired.
Session	An entire Pro Tools file.
Audio or MIDI tracks	Each Pro Tools session consists of audio or MIDI tracks, which are the parts of the program that allow for the creation or recording of content.
Regions view	A view in Pro Tools that allows the user to see the audio and MIDI tracks holistically. This view is typically utilized when using the edit window, which allows the user to see all audio and MIDI tracks in the session. Though Pro Tools uses separate labels for this type of view based on whether the track is audio or MIDI, STC students did not make this distinction and I use the term regions view to refer to both audio and MIDI tracks.
Notes view	A view in Pro Tools that allows the user to see the details of a particular track, typically used to adjust MIDI information.
Mbox (more precisely a Mbox 2 mini)	A microphone or analog instrument can be plugged into an Mbox, which converts the analog signal into digital information and transfers the digital signal into the computer to be used in Pro Tools.
Direct input (DI)	Students referred to the connection of an instrument directly to the Mbox as using direct input (DI) as opposed to recording the instrument or an amplifier with a microphone.
Digital audio workstation (DAW)	A software program such as Pro Tools can be considered a digital audio workstation (DAW) in that it allows for the recording and manipulation of digital audio content.
Mixing board	The Pro Tools setup in the primary control room (PCR) included a mixing board, which provided the opportunity for users to physically move sliders to adjust the volume of a session. In this case it received input from the Mbox.
Equalize (EQ)	To equalize (EQ) audio, in the context of the STC, means to adjust the frequency spectrum through a graphic user interface in Pro Tools.
Equalization levels	Visual representations of a specific frequency spectrum's volume.
Waveform	Waveforms are visual representations of sound and correspond to digital audio within the Pro Tools or other DAW environments.
ADSR envelopes	Visual representations of timbre in terms of the attack, delay, sustain, and release of a sound that can be manipulated within the Pro Tools or other DAW environments.

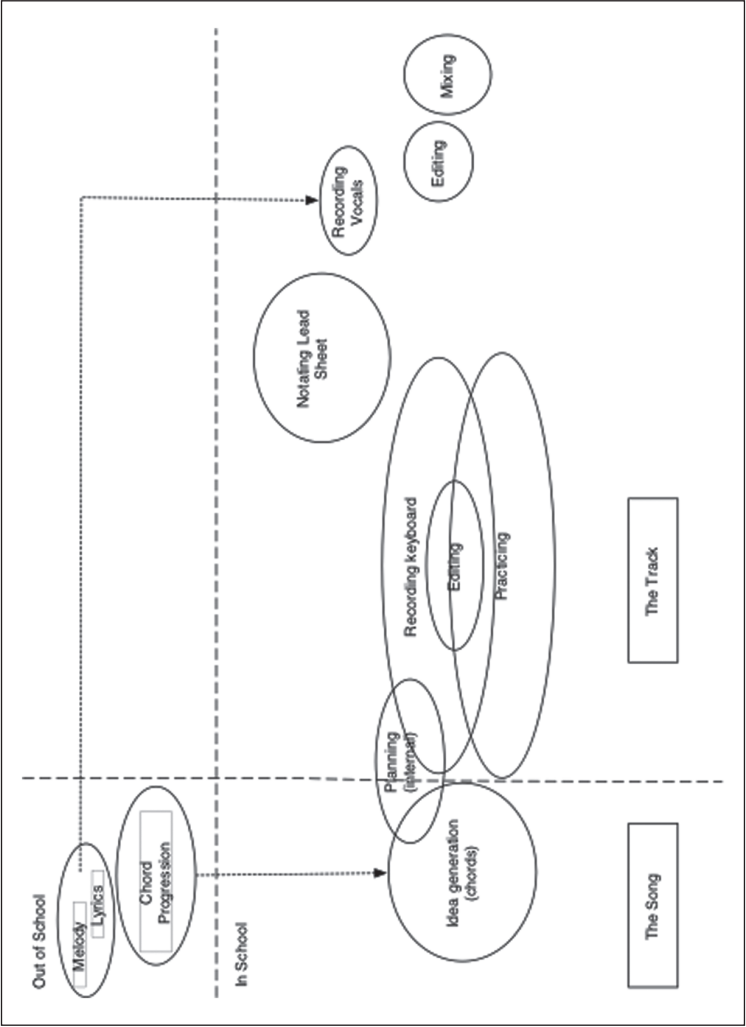


**Appendix B.** Diagram of creative processes for Alice's creation of *IV League*.

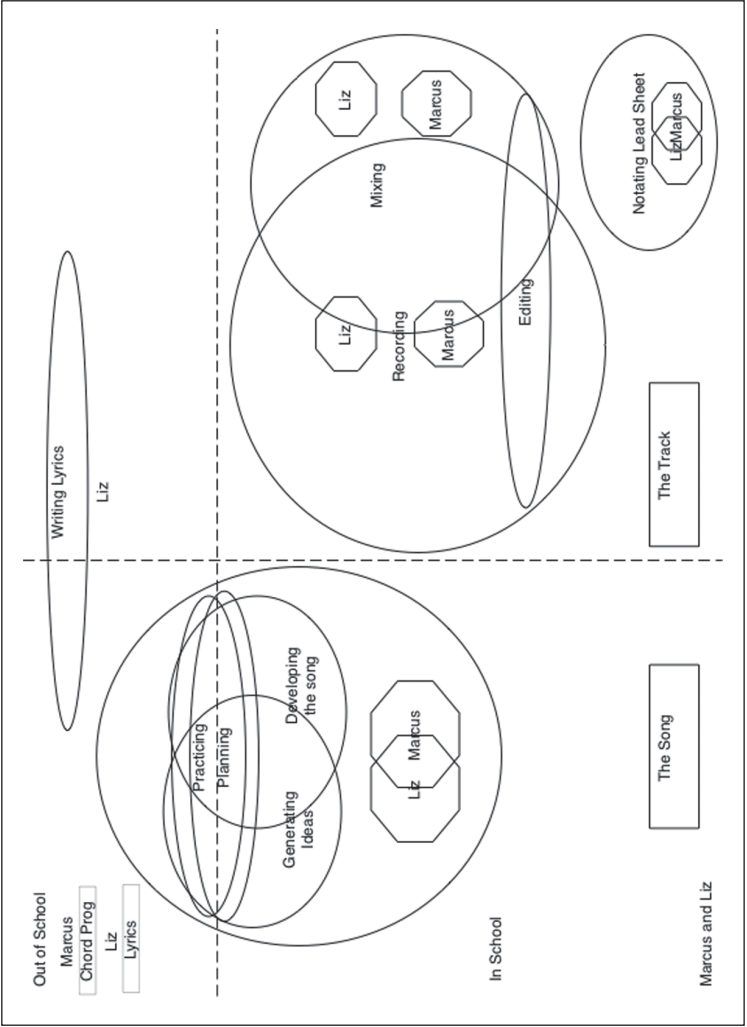
Note: Each diagram outlines participants' use of time throughout their projects. Divisions between in and out of school engagement or song and track layers are represented by horizontal or vertical lines, respectively.



**Appendix C.** Diagram of creative processes for Esmerelda's creation of *Rage and Love*.

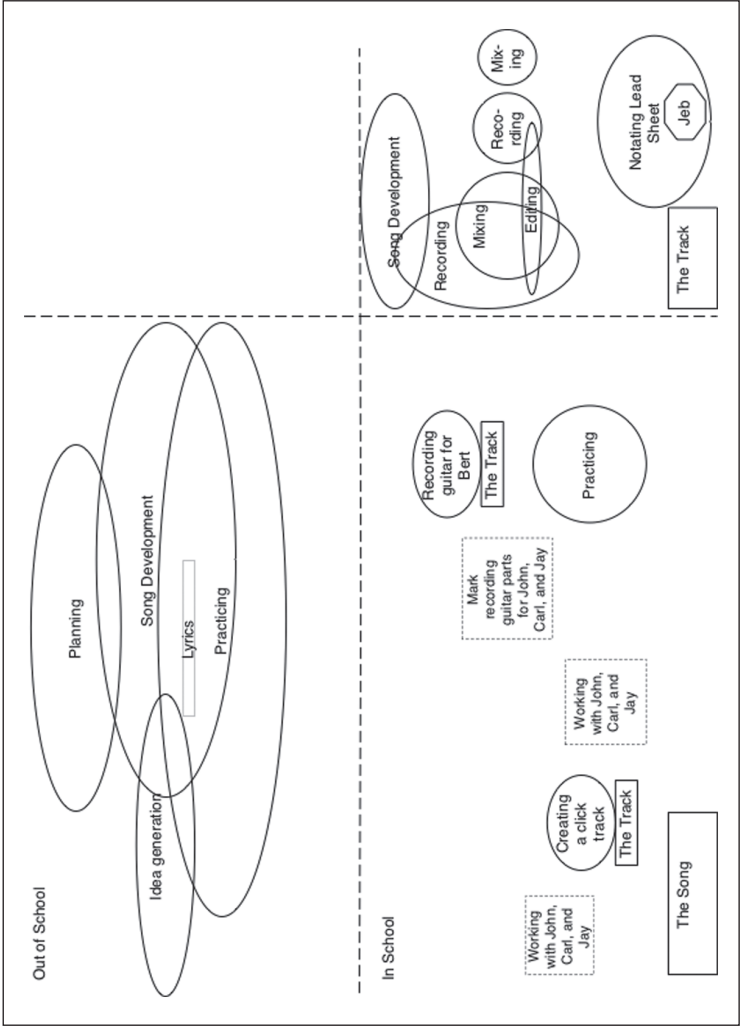


**Appendix D.** Diagram of creative processes for Sara's creation of *Solid Ground*.



**Appendix E.** Diagram of creative processes for Marcus and Liz's creation of *Here*.





**Appendix G.** Diagram of creative processes for Mark, Bert, and Jebidiah's creation of *Eyes Inward* and assisting John, Carl, and Jay with the Doom Metal Song.