Andrea Sangiorgio, Sarah Hennessy Fostering Children's Rhythm Skills through Creative Interactions: An Application of the Cognitive Apprenticeship Model to Group Improvisation based on a presentation given at the EAS 2012 Conference - 19-22 April 2012 - The Hague, The Netherlands. To quote this chapter: Sangiorgio, A., & Hennessy, S. (2013). Fostering children's rhythm skills through creative interactions: An application of the cognitive apprenticeship model to group improvisation. In A. de Vugt, & I. Malmberg (Eds.), European perspectives on music Education 2 – Artistry (pp. 105-118). Innsbruck, Esslingen, Bern: Helbling. Abstract This chapter illustrates a teaching/learning process for enhancing rhythmic understanding and skills through group improvisation, as it has been experienced by the teacher-researcher with a small group of 5-7-year-old pupils in the context of a doctoral research study on children's interactions in creative music making. The focus is, on the one hand, on what these children have learnt, specifically the kind of interactive skills that they developed – synchronising and entraining to each other, and being able to consistently produce and coordinate rhythmic figures on a pulse. On the other hand, it is relevant to see how they have learnt it: based on the model of cognitive apprenticeship, the subsequent phases of the teaching pathway are described, as a successful example of a social constructivist approach to musical creativity. Researching children's interactions in creative music-making activities In the primary school curricula of many countries it is explicitly recommended to include improvising and composing activities in the music curriculum. Thus, group musical creativity has emerged as an essential theme for both practice and research. This chapter aims to illustrate some of the results of the pilot study that I, as a PhD student of the University of Exeter under the supervision of Sarah Hennessy, carried out with a group of 5-7 year-old children between January and April 2012 in a private music school in Rome, Italy. The focus of the overall research study is on children's musical creativity, and in particular on the nature and value of children's interactions in the context of creative music activities, the factors that influence their collaborative work, and the meanings that they attribute to the experience of creating music in group. My broad aim as a teacher-researcher is to develop a theoretical-methodological framework for understanding children's creative music-making in educational contexts. This study can be characterised as interpretative, naturalistic research, based on a social constructivist and pragmatist stance. Methods include participant observation, analysis of video-recorded musical creative interactions, analysis of musical artefacts, and interviews and drawings, as means to elicit children's perceptions of their own experience. The aim of the pilot study was in the first place to explore the methodology and the methods – coping with the practicalities of videoing and documenting – and the theoretical issues linked to these. More broadly, the pilot was designed to set the research process in motion, to build a theoretical framework relevant to the theme, find connections between theory and practice, and identify some lines of thought about what happens when children interact and invent music together. I consider the following report and related considerations as a provisional snapshot of an evolving picture, provisional not only because these are the first tentative results of a doctoral study, but also because the kind of knowledge that can be produced by the interpretative, real-world inquiry of a teacher-researcher is by definition context-related, inescapably incomplete and partial, and continuously re-constructed and re-defined. The wish is that the end-result might offer to others (teachers or researchers) a trustworthy and possibly useful account about what I find to be an interesting issue. The pilot group consisted of four children: two sisters – Anna (5½ years) a very good observer, and Silvia, 7, who had already made two years of music in our school – and two male twins, Sandro and Tonio, Andrea Sangiorgio, Sarah Hennessy - Fostering children's rhythm skills through creative interactions 2 6, both very lively, whose main motive to participate was "to play the drums". All of them enjoyed a rich musical background in their families. We had weekly sessions of an hour from October 2011 until

May 2012. A teaching assistant supported me in conducting the activities. Largely orientated to the OrffSchulwerk approach (Haselbach, 1990), the sessions were centred on the creative use of percussion instruments (drums, Orff-instruments, other percussion instruments) and included a variety of activities: imitation and invention of rhythm patterns inspired by Gordon's Music Learning Theory (Gordon, 1997), playful approaches to the basics of instrumental technique, much movement and musical games, and some singing. We experimented with an array of different creative tasks, ranging from extra-musical stimuli – e.g. playing soundscapes and finding ways to associate sounds with imagery or narrative – to musical rules, which guided children in exploring different families of instruments or composing in pairs. We also undertook over a period of about three months a series of pair and group improvisations about free-rhythm-on-the-pulse, which ultimately led to the construction of a piece that the children performed for the parents. In this chapter I examine more closely this latter activity, and specifically the kind of musical skills that the children were developing and the features of the teaching/learning process that we followed. Learning goal: Coordinating rhythm and meter in improvisation A crucial turning point in the rhythmical growth of children is when they start to coordinate surface and deep structure, i.e. they can synchronise rhythm figures with the underlying pulse/meter, eg. coordinating the action of walking on the spot with chanting or playing rhythms. Table 1: The syntactical organization of rhythm (based on Gordon, 1997, p.108 and p.162) In my experience, this transition towards a higher-level perception of the syntactical organisation of music mostly occurs in a natural way when children are between 5 and 7 years old. As a music teacher, one of my goals is to support and possibly accelerate this important step forward in their musical development, as it opens up significant further possibilities of understanding, making, and enjoying music. For example, acquiring this skill points towards keeping a steady beat while playing rhythm phrases and, looking further ahead, it is the necessary prerequisite for performing rhythm polyphony and African and Latin American layered ostinati. The children of this group – with individual differences – still played rhythms as if they were 'floating', without being firmly anchored to a regular pulse. Or else they tended to concentrate on the meter itself, playing almost only the macrobeats and without being able to articulate some more elaborate rhythm patterns, let alone rhythm phrases. My impression was that they were still in the process of shifting towards this integration of the basic meter and the superimposed rhythm motifs. Since the beginning of the school year we had been doing activities so that each child could develop this ability. Among other things, for example, we had regularly worked on the imitation and invention of rhythm patterns, using the voice (expressing a rhythm in 4/4 or 12/8 with a neutral syllable "pa", a la Gordon) and associating it to various kinds of fluent and pulsating movement or body percussion patterns. The idea was to expand children's rhythmic vocabulary and at the same time to get them used to coordinating two differentiated levels, in this case that of the vocal rhythm and that of the motor pattern accompanying it. The lack of this coordination between rhythm and underlying pulse was clearly to be seen, as shown in some of the video recordings, in the case of the youngest member of the group, Anna, 5½, especially when she was playing the instruments (which requires an added set of bodily-cognitive operations). When, for example, we asked the children to invent a rhythm on the djembe and to repeat it four times, she could perform it so that the groupings were well-defined and consistent over the four repetitions, yet it was obvious that the rhythm was not grounded on the stable flow of the beat. It did not 'groove'. Andrea Sangiorgio, Sarah Hennessy - Fostering children's rhythm skills through creative interactions 3 Reflecting and trying to understand the (implicit) theoretical assumptions on which we were basing our action as teachers, I realised that what we were adopting was a cognitive-developmental, Piagetian-informed way of looking at the issue (see Paananen, 2006, and Gordon, 1997). We were conceiving of these two levels – rhythm and pulse – as

occurring within the individual player. Figure 1: Coordination between rhythm and meter as a property of the individual player Consequently, we were working with each single child on parallel tracks, so to say, and were not exploiting the potential of the group and of the interplay within the group. We had to look for other kinds of activities – in addition to the (effective) ones which we were already doing – which could enhance children's rhythm skills by activating new communication and interaction routes among the members of the group. That was the moment in which my observing, planning, and acting as a teacher started to shift towards a social constructivist/sociocultural approach (Fleer & Robbins, 2004; Palincsar, 1998; Rogoff, 1990, 2003). Learning to interact rhythmically with others The attempt was to situate this learning process in a creative group context. Adopting a social constructivist perspective, I interpreted the coordination between surface and deep structures as the ability to interact with a partner, whereby one plays the pulse, and the other plays the rhythms on it, forming an integrated whole. This way the musical functions were made clearly perceivable – were 'embodied' - in that they were enacted by the partners through different interactive roles. Figure 2: Coordination between rhythm and meter as a property of the interaction between two players Thus, we explored various ways to apply this specific context of children's creative music making to the notions of the zone of proximal development (Vygotsky, 1978), of scaffolding (Wood, Bruner, & Ross, 1976), and more broadly the pedagogical approach proposed by the cognitive apprenticeship model (Brown, Collins, & Duguid, 1989; Collins, Brown, & Newman, 1987). The perspective of cognitive apprenticeship appears to be particularly fruitful with regard to music learning (Elliott, 1995, p.74), and Vygotsky's ideas have already been found relevant to teaching for creativity in music education (see Hennessy, 1998). What is distinctive in the case reported in this chapter is the age range of the pupils and the application to a group interactive process. It must also be observed that the learning pathway that is portrayed here as a clearly structured process is actually a retrospective reading of what was in practice a partly intuitive, partly conscious process of search and discovery, where both children and teachers were engaged in coconstructing new kinds of knowledge, respectively as apprentice-musicians and as domain-experts guiding them. The openness of cognitive apprenticeship was appropriate in our case: as Collins, Brown, and Holum (1991) remark, "cognitive apprenticeship is not a model of teaching that gives teachers a packaged formula for instruction. Instead, it is an instructional paradigm for teaching". In other words it is a theoretical framework or a set of teaching strategies which has to be concretely adapted to the particular learning circumstances in which it is applied. Importantly, this approach proves to be useful for more complex tasks implying high-order cognitive and metacognitive processes – such as the creative activities we had in mind – rather than for direct instruction or rote learning. Andrea Sangiorgio, Sarah Hennessy - Fostering children's rhythm skills through creative interactions 4 A further reason for the applicability of the cognitive apprenticeship model to the context described here is the emphasis that it places on the role of the group and of collaborative learning: "If learning is a process of enculturating that is supported in part through social interaction and the circulation of narrative, groups of practitioners are particularly important, for it is only within groups that social interaction and conversation can take place" (Brown et al., 1989, p. 40). Working in/as a group is a central feature in this approach, because the group gives rise to synergies that may otherwise not come about. Also, the group provides the network of relationships within which conceptualisations and behaviours can be modelled, articulated, discussed or reflected on, resulting in higher-level cognitive and metacognitive learning. It is through the members' active participation in the group – meant as 'community of learners' (Rogoff, 1994) – that their knowledge and skills are co-constructed as a set of culturally situated tools. Indeed, the pedagogical potential of collective problem solving and of group work is fully acknowledged by the cognitive apprenticeship model, which in this sense shares with other

social constructivist approaches the focus on social interaction as an essential factor in learning and cognitive development. According to cognitive apprenticeship, three main phases of the learning process can be distinguished: modelling, coaching/scaffolding, and fading. In the following, I describe in some detail the successive learning steps that we took, interpreting what happened as an apprenticeship in thinking (creatively, in interaction with others, in music). Modelling the improvisational idea Modelling is when the teacher provides an example of expert performance of the task and at the same time makes the internal reasoning explicit by talking aloud about the considerations he makes or the decisions he takes, possibly making use of labels or imagery to indicate specific aspects of the activity. This verbalisation added to the demonstration helps the learner comprehend the overall problem solving process and build a conceptual model of how to carry out the task. In cognitive apprenticeship the central point is in 'making thinking visible' (Collins et al., 1991). With these children, the teaching assistant and I demonstrated and explained how the task could be solved, also directly instructing them about the appropriate strategies to use. One of us would start playing a basic meter on the djembe, the other had to listen, look, start to swing on the beat, and then improvise a few different rhythms, checking at each point that he was maintaining the connection to the pulse provided by the partner. Then we would swap roles. While we were playing the rule we were kind of thinking out loud, so as to make the process of reflection and meta-cognition explicit. It was also important to introduce the concepts of 'pulse' and 'rhythm' by referring to the actions we were doing and emphasising the labels we were using to define them. It is important to notice that what we were modelling was a procedure – how they had to think and act in order to play according to the rule – and not what exactly they had to play – the rhythms, indeed, could be improvised each time differently. We wanted children to understand this particular way of interacting in music, of holding a dialogue in the language of music. As a pedagogical strategy, modelling is based on the principle of observation and imitation: in simple terms, the teacher shows, and the learner replicates. However, given the creative nature of this particular task, the purpose of modelling could not have been, so to say, senseless mimicry. Indeed, we did not want them to reproduce a given musical object, but to learn how to organise extemporaneously a musical structure, respecting a specific musical syntax. In sum, the goal of this initial phase of the learning process was to foster their deep understanding of the activity as a whole, including the underlying thought processes and procedural strategies, prior to actually tackling it in practice. Coaching and scaffolding In the subsequent phases of the teaching process, coaching and scaffolding, pupils receive assistance and support, wherever necessary, in their practical attempts to cope with the task. The teacher's role is to structure the task – in terms of arranging the successive steps to be taken as well as organising possible materials to be used – and to monitor the pupils' activity, offering suggestions and feedback, and pointing out specific problems or issues. The concept of scaffolding clarifies the role of the teacher in accompanying the child in his movement within his zone of proximal development, that is the distance between the actual learner's ability to solve a problem independently and the learner's potential level of achievement when Andrea Sangiorgio, Sarah Hennessy - Fostering children's rhythm skills through creative interactions 5 given guidance by an adult or in collaboration with more expert peers (Vygotsky, 1978). Scaffolding entails a highly receptive and interactive, rather than directive attitude on the part of the teacher: given a specific task that the child is learning to solve, the teacher has to fit the level of support and guidance to the child's potential ability to perform at first only some of the component cognitive or practical operations involved in the task, up to the point in which she becomes able to master the whole problem solving process on her own. In this sense, scaffolding is a "learner-centred strategy", which has to be "directed appropriately at the learner's current ability level. In other words, it must occur within the learner's ZPD" (Dennen, 2004, p. 815).

The relevance of the teacher's cognitive skills and experience in interpreting the learner's position at each moment has to be underscored: It is the teacher's awareness of the cognitive functioning of the learner that eventually makes the interchange fruitful. This ability on part of the teacher – as Wood, Bruner, and Ross (1976) claim – is "crucial to the transactional nature of tutoring" (p. 97), because the sensitivity to where the learner is at constitutes the premise for a productive interaction within the relationship. At the same time, in a sociocultural perspective the idea of an expert assisting the novice does not imply a passive role of the latter: On the contrary, both participants contribute to the learning process and manage the interaction, actively engaging in what has to be considered as a dialogue and a mutual collaboration (Rogoff, 1990). After having observed a model of what the musical rule was like, each child practiced it interacting individually with one of us teachers: sitting on the drums in front of each other, first the child played the pulse while the teacher improvised some rhythms on it, then they swapped roles, and it was the child who had to invent a series of rhythm patterns on the instrument. Such an improvisation would last no longer than 60-90 seconds. Meanwhile the others were watching attentively. By repeating these kinds of dialogues over a few sessions and also by observing what the others were doing when it was their turn to improvise, the children fully grasped the sense of the activity and appeared to be motivated by the challenges involved in it. The video recordings show some moments of intense concentration between the playing partners. At the end of each improvisation we tried to elicit children's own comments as a form of self-assessment, and in some cases provided some verbal feedback about what had happened – though at their age too much talking is often just useless and, beyond that, given that "music making is essentially a matter of procedural knowledge" (Elliott, 1995, p. 53), words and conceptualisations are no more than means to an end, that is enhancing musical thinking and performing. Thus, in order to support this understanding-in-action, the teacher's scaffolding function was working much more at a nonverbal level during the interaction itself, as a kind of embodied-musical communication: for example, we saw that it was convenient for the teacher to play on the child's pulse a sufficient variety of rhythms at the right level of difficulty, so as to give an accessible model for the child's subsequent invention. Or at times the teacher was almost instinctively adjusting his own pulse to the child's still unstable rhythms in order to keep the improvisation on track. Nonverbal cues – nodding with the head, maintaining eye-contact, lightly swinging with the body to visually emphasise the beat, smiling – were also essential in creating attunement and musical intersubjectivity with the child. As can be abstracted from this experience, the notion of scaffolding in music education refers to a 'multimodal' instructional strategy which can take many different forms, extending from purely musical, to nonverbal, up to verbal communication. I have to make a short digression at this point, introducing a promising perspective from which to look at the kinds of rhythm interaction illustrated here, that of 'entrainment'. In broad terms, the concept of entrainment refers to the phenomenon in which two or more independent rhythmic processes synchronize with each other (Clayton, Sager, & Will, 2004). In a biomusicological sense, entrainment can be defined as "spatiotemporal coordination resulting from rhythmic responsiveness" and is based upon "the abilities to connect the detection and production of rhythmic information" (Phillips-Silver, Aktipis, & Bryant, 2010, p. 7). Analysing the embodied-cognitive processes that the children of this study were going through, their entrainment to an external rhythm, that of the teacher or of their classmates, involved 1) perceiving regularities in the flow of the temporal events, i.e. forming expectations and anticipations with regard to an inferred pulse or meter, 2) synchronising their bodily movements to the perceived auditory stimulus in order to produce a coherent set of sounds on the instrument, and 3) recursively adjusting and correcting their own motor output to the incoming rhythmic information, including micro- or macro-deviations, perturbations, or ambiguities in the music. Phillips-Silver et al. (2010, p. 4)

suggest that this ability to perceive and synchronise to rhythmic music rests on the integration of different sensory modalities, namely the auditory, the motor, and the vestibular systems (the latter being activated, for example, while rocking, walking, or Andrea Sangiorgio, Sarah Hennessy - Fostering children's rhythm skills through creative interactions 6 dancing to the music). To these, in my experience, I would add the visual system as an essential component of this crossmodal integration of beat-related perceptions – at least with children, it is easier to keep time together if we look at each other. Much of the preparatory activities that we had done with the children, as well as the improvisations described here, included in various ways the combination of more than one sensory modality, as a strategy to reinforce through redundancy the exchange of rhythmic information. Based on the perspective only briefly hinted at here, the learning goal 'fostering–rhythm-skills' mentioned in the title of this chapter could just as well be phrased as 'enhancing-entrainment-skills'. As a last remark, entrainment is deeply related to social interaction – it has had an important role in our evolutionary history as human beings who have learnt to coordinate their actions (Merker, Madison, & Eckerdal, 2009). Rhythm seems to be much more an interpersonal/group experience than an individual property. The concept of entrainment, thus, indirectly supports the advantage of an educational approach that is centred on the social, interactive aspects of 'musicking'. Towards independent practice: the group pulse The next step with the children was to let them try out the same rule in pairs. Having acquired through the interaction with the teacher sufficient understanding of how to play the rule, they were ready to improvise with another child. In cognitive apprenticeship terms, this strategy is called 'fading', in that the teacher gradually steps back and removes the scaffolding action in order to give space to the children's autonomous performance. In the first attempts they were not yet able to adjust their rather unstable pulse and improvisatory actions to each other. Adequate motoric skills and auto-regulatory mechanisms were still lacking. Over a relatively short time, however, they became increasingly expert, up to the point where they could assume full responsibility for the task. They were "internalising the rule", in Vygotskyan terms. The subsequent move was then to let all four children play together. The culmination of this process was a long and successful improvisation (5 minutes!), which I called "free rhythm on pulse". The rule is that the teacher (light grey circle in the scheme below) keeps a supportive pulse on the djembe; one soloist (dark circle) at a time around the circle improvises free rhythms on it loudly, while the others (white circles) accompany softly, playing the pulse or also improvising on it. The rule is about the beginning fundamental coordination of deep structures (macro- and micro-beats) and surface structures (rhythms/groupings, protophrases) within a creative group process. Tonio and Sandro were playing darbukkas, Silvia a headless tambourine, and Anna a metallophone. Figure 3: A graphical representation of the improvisational rule "free rhythm on pulse" Here the scaffolding role of the teacher reduced itself to playing a delicate meter on the drum which served as a common orientation for the children, providing the minimum necessary connective tissue to enable them to maintain the rhythmic alignment. The striking feature of this improvisation was the alternating going out from and coming back to the common metrical structure. In spite of the fact that there were often individual deviations from the pulse – there was also a lot of exploration and free risk-taking – the children were sufficiently synchronising to each other and succeeded in co-constructing for the first time here a dynamic group pulse, that they were able to maintain throughout the improvisation. Having learnt what strategies to use thanks to the previous phases of work, they could now regularly check and recognise whether they were out of phase, and whenever necessary they could stop, listen to and watch the others (or me, as a distant co-player), reconnect to the pulse, and start again improvising. As long as there was 'enough' group pulse in the interaction among them, it was possible to go on playing and freely develop further ideas. And they enjoyed it. Andrea Sangiorgio, Sarah Hennessy - Fostering children's

rhythm skills through creative interactions 7 The dynamic character of the group pulse in this improvisation, in other words the unstable regularity of the beat emerging from the group interaction, has to do with the fact that in reality synchronisation occurs up to a certain degree, and is never absolute in mathematical terms. Quantitatively speaking, time series analysis of expert musicians' rhythms shows that precision in time keeping is a relative concept, and that the tempo of the pulse tends to fluctuate. In fact, what is perceived as evenly paced is within certain limits slightly irregular, so much so that Allgayer-Kaufmann (In Clayton et al., 2004, p. 46) talks about a "synchronisation bandwidth", a sort of acceptability threshold within which we consider the music as in time. In this improvisation the synchronisation bandwidth was at moments rather large, I would judge, even resulting in apparently chaotic phases. Nonetheless it was sufficiently defined for the purpose, which was in turns to invent rhythms on a common pulse. And given the children's ability to turn back to the collective meter and resume their playing, it would seem right to say that they were well entraining and synchronising to each other. As Clayton et al. (2004) claim: "In order to identify entrainment one needs to examine perturbations or transitions of the synchronization process; only if synchronization is re-established after these disturbances [...] does it seem justified to describe the interaction between the oscillators [here the improvising children] as entrainment" (p. 27). So, the point was not so much the discrepancies or the mistakes (we did not use the word), but the ability to dive back into the flow of the group rhythms. This improvisation was a moment of flow for me personally and, I think, for the children as well: in Csikszentmihaly's terms (1996), there was a good balance between the challenge posed by the task and the children's emerging skills at that point in time. Their bodily involvement, the quality of the concentration, the mutual listening, their overall engagement and their expressions of satisfaction at the end of the improvisation denoted that they had lived and perceived it as a meaningful experience. From the free improvisation to a piece: tackling issues of form and structure Later on we started to work on some possibilities to structure this musical material. I am not reporting here in detail some intermediate steps that we took. The final form was A (loud), B (soft, a-metrical), A (loud), diminuendo, and a last stroke all together. Using a simple graphical notation was helpful in making clear to the children what macro-structures they were playing at each moment. The interesting point was that, given this basic architecture of the piece, the musical ideas inside the boxes could be improvised differently each time. However, by repeatedly playing this piece over two-three sessions the children had to a certain extent selected some preferred ways to play. Thus, the resulting impro-composed piece – Germans would say Gestaltung – rested on an ideal ratio between freedom/openness and constraint/closure, allowing children to go on experimenting up to the ultimate performance, but at the same time giving them enough structure to exactly know what they were doing and where they were situated in relation to the shared plan of the piece. As a concluding consideration about the overall learning pathway described here, it must be said that this, rather than a linear, sequential process, resembled much more a spiral or zigzag progression, with each phase being proposed at different levels over a series of sessions. The children themselves were, so to say, often unpredictable – sometimes they were making sudden leaps forward, and in other moments they seemed to regress to previous learning phases that they had apparently not yet fully mastered. Values From a wider perspective, the cultural and ethical values associated with this kind of creative learning are: respect for everybody's ideas, inclusion, cooperation, democracy, equity, freedom, and responsibility. As Burnard (2002, p. 168) rightly claims: "The value of social bonding and affirmation of individual identity, where every child can participate in immediate creation and take risks within a group, is what uniquely characterises the experience of group improvisation". Fostering these children's creative skills entailed looking at them as active members of a community of inquiry, where knowledge was a set of cognitive tools and shared practices

which were negotiated and co-constructed through collaborative interactions and collective problem solving. These children were developing their skills as legitimate participants in a community of practice (Lave & Wenger, 1991), that of a small group of pupils in a private music school in a middle-class area of Rome. In cognitive apprenticeship terms, their learning was situated in the real-world context of coherent and purposeful, i.e. authentic activities: not (only) doing technical Andrea Sangiorgio, Sarah Hennessy - Fostering children's rhythm skills through creative interactions 8 exercises, or practicing solfege, or reproducing pre-conceived pieces, but shaping their own musical ideas and performing their own pieces of music. What they experienced here, alongside and beyond learning as transmission/acquisition, was learning as participation/transformation/participatory appropriation (Rogoff, 1994 and, 2008; Sfard, 1998). Creative learning has much to do with authenticity and identity, as well as with empowerment and autonomy. The particular emphasis that the cognitive apprenticeship model places on learning how to learn and on the learner himself as the main protagonist of his own process of growth makes it particularly suitable for applying it to group creativity in music, not only as a pedagogical technique, but much more as a mindset and an ethical stance in education. Concluding In this presentation I have examined a model of creative pathway, aiming to foster children's rhythm skills through group improvisation. The central idea that I have explored is that musical functions – the logic of thinking rhythmically in music – can be represented as social, interactive roles. The experience reported here shows how the coordination of pulse and superimposed rhythms can be experienced and internalised through the interaction with other players within an improvisational process. A second idea is that such a teaching/learning pathway can effectively be structured according to the cognitive apprenticeship model, which can offer both theoretical orientations and valuable pedagogical guidelines for nurturing children's creative learning in music. References Burnard, P. (2002). Investigating children's meaning-making and the emergence of musical interaction in group improvisation. In British Journal of Music Education, 19 (2). pp. 157-172. Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. In Educational Researcher, 18 (1). pp. 32-42. Clayton, M., Sager, R., & Will, U. (2004). In time with the music: The concept of entrainment and its significance for ethnomusicology. In ESEM Counterpoint, 1. pp. 1-45. Collins, A., Brown, J. S., & Holum, A. (1991). Cognitive apprenticeship: Making thinking visible. In American Educator, 15 (3). pp. 6-11. Collins, A., Brown, J. S., & Newman, S. E. (1987). Cognitive apprenticeship: Teaching the craft of reading, writing and mathematics (Technical Report No. 403). BBN Laboratories, Cambridge, MA. Centre for the Study of Reading, University of Illinois. Csikszentmihalyi, M. (1996). Creativity: Flow and the psychology of discovery and invention. NewYork: Harper Collins. Dennen, V. P. (2004). Cognitive apprenticeship in educational practice: Research on scaffolding, modelling, mentoring, and coaching as instructional strategies. In Handbook of research on educational communications and technology, 2. pp. 813-828. Elliott, D. J. (1995). Music Matters: A New Philosophy of Music Education. New York: Oxford University Press. Fleer, M. & Robbins, J. (2004). "Yeah that's what they teach you at Uni, it's just rubbish": The participatory appropriation of new cultural tools as early childhood student teachers move from a developmental to a sociocultural framework for observing and planning'. In Journal of Australian Research in Early Childhood Education, 11 (1). pp. 47–62. Gordon, E. E. (1997). Learning sequences in music. Skill, content, and patterns. (5th ed.). Chicago: GIA. Haselbach, B. (1990). Orff-Schulwerk: Elementare Musik- und Bewegungserziehung. In Bannmüller, E. & Röthig, P. (Eds.), Grundlagen und Perspektiven ästhetischer und rhythmischer Bewegungserziehung. Stuttgart: Klett. pp. 183-208. Hennessy, S. (1998). Teaching composing in the music curriculum. In Littledyke, M., & Huxford, L., Teaching the primary curriculum for constructive learning. London: David Fulton Publishers. pp. 163-72

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Instrumental tuition has predominantly been conceptualized in terms of a master–apprentice model that facilitates the transmission of skills, knowledge and cultural intellect through teaching and learning. Research suggests the one-to-one tuition model needs to evolve and adapt to meet the demands of the 21st century musician. Within the jazz/improvisation lesson, the learning and teaching of improvisory ability is a complex activity where developing improvisers hone motor-specific skills, audiative ability, imaginative and creative impulses that connect and respond to strategic individual and collaborative catalysts. Observing the negotiation of learning and teaching in three lessons in improvisation between expert practitioner-educators and their students, this study reveals a cognitive apprenticeship model that can provide a framework for teachers to develop students' cognitive and meta-cognitive

abilities, and understandings of expert practice. Case studies of three teacher-practitioners and their advanced students explore the “in the moment” teacher–student interactions and teaching techniques that expert improviser-educators utilize in developing mastery and expertise in their students. Teaching to an advanced improvisation student is a dynamic, fluid and reflexive interplay of pedagogical applications of modelling, scaffolding, coaching, and reflective processes. The holistic imparting of knowledge can be understood as a cognitive apprenticeship. Careful guidance by a teacher/mentor can offer the student an immersive environment that brings thinking, action and reflection to the forefront of learning. Implications are identified for more effective, collaborative and inventive ways of assisting learning and inculcating deeper understandings of factual, conceptual and problem-solving concepts that draw students into a culture of expert practice.

LEARNING THEORIES: WHY SHOULD THEY BE IMPORTANT TO ARTIST-TEACHERS AND APPLIED PIANO STUDIO TEACHERS by Nicha Stapanukul Submitted to the faculty of the Jacobs School of Music in partial fulfillment of the requirements for the degree, Doctor of Music Indiana University July 2023 LEARNING THEORIES IN STUDIO SETTING ii Accepted by the faculty of the Indiana University Jacobs School of Music, in partial fulfillment of the requirements for the degree Doctor of Music Doctoral Committee _____ Norman Krieger, Research Director _____ David Owen Cartledge _____ Emile Naoumoff May 26, 2023 LEARNING THEORIES IN STUDIO SETTING iii LEARNING THEORIES IN STUDIO SETTING iv Abstract Teachers are molding human minds and even though weekly lessons seem minuscule in comparison to a class that meets multiple times a week, studio teachers possess a massive responsibility and influence in their students learning. Through an advocacy for the cognitive apprenticeship approach, this document discusses constructivism and its various elements as it relates to one-on-one music learning setting such as problem-based learning, information processing, and modeling. By embodying the cognitive apprenticeship approach, teachers allow students to construct their sense of identity through lessons and subsequently, produce selfregulated and motivated musicians post-schooling. This document serves as a reflective tool for teachers of all levels to challenge their definition of “good teaching,” as we investigate how teachers can serve as better models for the future generations. LEARNING THEORIES IN STUDIO SETTING v Table of Contents

LEARNING THEORIES IN STUDIO SETTING 1 Chapter 1: WHY? What makes a “good” teacher? – a long pondered-upon question that every teacher has asked themselves at least once. Although every student, every teacher, and every “expert” will have an opinion on this question, there is yet to be a unanimous conclusive answer, even with decades of research. That is because teaching is subjective, as is learning. Nevertheless, every person who has taught or thought about teaching has been engrained with a definite set of beliefs about teaching and learning based on their own personal experiences, experiences in school, and formal knowledge (Thompson, 2007, p. 32). Reflecting upon the emergence of piano pedagogy in the latter half of the 19th century, European pianists who were trained in newly formed conservatories increasingly became advocates of the art of piano performance in America. (Crappell, 2019, p. 13) They have yet to establish a standard method of training for piano teachers and most performing artists who taught were often trained by other performing artists. As the literature on teaching expanded, the terms “master” and “apprentice” were often used to describe the relationship between teacher and student, or more commonly referred to as the master-apprenticeship relationship. (Burwell, 2013, p. 277) When teaching with this perspective, “the dominant mode of student learning is imitation,” where the “master” or “master-teacher” provides a demonstration of a skill while the “apprentice” or the student observes and replicate. (Jorgensen, 2000, p. 68) The model where the student is passively copying their teacher presents several limitations in maximizing the students’ potential. It is important to acknowledge that students may possess the capabilities to recognize what the teacher is demonstrating and imitation them without understanding why they are playing it one way rather than another, how they played it differently, or how to transfer the skill learned in this situation to another. (Crappell, 2019, p. 17) Another aspect to consider is the power dynamic between a teacher and a student when teaching with an emphasis on the “imitation” LEARNING THEORIES IN STUDIO SETTING 2 model where typically, the teacher holds the dominant authoritarian role. (Burwell, 2013, p. 279) In this “coaching”-type model, the acquisition of skill is the focus of the students’ learning. Most students enter higher education performance programs with the purpose of studying with a specific teacher – to learn from the master artist who has made a name for themselves in the world, to follow in their footsteps of success. It is idealistic since we boast over our training lineage (Crappell, 2019, p. 17). However, when we look at the great pianists we idolize, like András Schiff, Nikolai Lugansky, Emanuel Ax, or Martha Argerich, we look to them as great

performing artists, and while they are figures to idolize, does that automatically equate them the ability to effectively teach, especially to a student who is not as technically skilled and capable at the piano as they are? As tempting as it is to simply teach how we were taught, it is an outdated viewpoint to assume that our students would learn the same way we did. We engage students who are being raised in a different time than we are, have different world views, and have different goals they want to achieve. Simply put, every student is going to learn differently, need different types of support, have different goals, and the teaching approach we choose must be malleable enough to adapt to all of that. (Schmidt, 1998, p. 38) When we think about a great teacher, that teacher is more than just a transmitter of knowledge, but an influential figure of character who learns alongside the student – a "life-time learner," if you will. In order to make a shift from teacher as transmitter to teacher as collaborator, we must ask ourselves what we must do differently to ensure this outcome and break the pattern of us reverting to teaching as we were taught. (Thompson, 2007, p. 30). Humans all form their own understanding of the world, including music. According to Wiggins (2007), knowledge is not something to be passed on or transferred, but it is something that one constructs with the help and support of others. In other words, one cannot make another person learn. As Crappell states, "instead of thinking about teaching as the act of forcing knowledge and skills into students, teachers must focus on guiding knowledge and skills out of students." (Crappell, 2019, p. 1) With LEARNING THEORIES IN STUDIO SETTING 3 an understanding of the constructivist view of learning and teaching, we can explore the cognitive apprenticeship model where teachers assume the responsibility of providing an environment and designing experiences for their students to actively engage with the music and authentically construct their understanding of music. (Wiggins, 2007, p. 39) "Not every student will be able to nor should be expected to demonstrate understanding in a generically prescribed way." (Barron, 2007, p. 19) A large component of the cognitive apprenticeship approach that we will be diving into is the use of modeling. Numerous research has been conducted on the positive effects of modeling instruction within the constructivist perspective of teaching and learning, championed by Schunk (1989; 1993; 2020). Though we do not know precisely when music history began, throughout the 14th century, the majority of folk music and chants survived through the use of oral models before notations were created. (Miller & Cockrell, 1972, p. 7) The use of modeling has proved itself to be a valuable tool in lessons. However, the percentage of time spent with verbal instruction in a studio setting far outweighs the time spent on effective modeling practices. (Dickey, 1991, p. 133) Verbal instruction is crucial to explore the use of imagery, analogies, and other descriptive stories we know and love that allows us to be imaginative. However, its limitations are detrimental to students who were not trained to think beyond the box, students who are English language learners, and students with aphantasia who are incapable of visualizing or audiating. As the student population we teach expands, the role of the teacher has also shifted over time. We must look at how each of our students learn now and how we can best facilitate transformational learning. (Crappell, 2019, p. 20) To understand the cognitive apprenticeship approach, we will explore the ideals of constructivism and its sub-categories including problem-based learning, social learning, information processing, effective modeling, and self-regulation strategies. Several concepts discussed in this document have been researched extensively in music education and piano pedagogy literature. However, minimal research has been done with direct implications in the LEARNING THEORIES IN STUDIO SETTING 4 studio setting. Constructivism and its sub-categories are complex learning theories where most research papers contain jargon that performing artists most likely need time to invest in exploring and practice them. This document intends to serve as a resource for emerging and established artist-teachers, providing a starting point towards a reflective teaching path of the cognitive apprenticeship

approach by breaking down concepts into digestible amounts with applicable techniques. Regardless of the age of students we are teaching, we must remember that we are creating the next generation of teaching artists – we serve as their influence on what “good” teaching might look like. Every teacher’s goal is for their student to achieve certain levels of self-sufficiency, be able to maintain their skills, and have the tools to expand their knowledge beyond the walls of weekly lessons. As mentors who spend time with them weekly, even once or twice a week, we have some power to help them achieve those skills. Understandably, preservice teachers are drawn to the idea of following in their teachers' footsteps because they are an example of success in the field. However, knowing that there are different types of teachers that exists, this document serves as a reflective tool for us to determine what we define as 'good teaching,' what can be adapted from our personal experiences and research, how can we add to our teaching toolbox, and how can we serve as better models to our students? In order to do that, we "must be willing to discard familiar practices, search for new processes and consider implications of new information. In other words, we must be brave enough to continue to alter, expand, and refine our personal teaching schema." (Thompson, 2007, p. 35) Using the cognitive apprenticeship approach, practical implications will be demonstrated with realistic examples drawn from personal experience and research for ease of adaptation. We are molding human minds, and therefore, we must first understand how our students learn and what they know and assess the best method to help each of them to the best of their ability. LEARNING THEORIES IN STUDIO SETTING 5 Chapter 2: CONSTRUCTIVISM To start the discussion on cognitive apprenticeship, we must dive into the world of constructivism that serves as the foundation of this practice. A learning theory evolved from the research of John Dewey (2004), Jean Piaget (1954; 1979), and Lev Vygotsky (1980), constructivism is a complex theory that has been developed in countless psychological, epistemological, sociological, and historical directions seen in the research of Ernst von Glasersfeld, Immanuel Kant, Thomas Kuhn, and Linda Alcoff, among others. Therefore, an allencompassing definition will be used for the purpose of this paper. Constructivism is an active process where learners construct and build their own understanding and knowledge upon existing or prior experiences that involve the personal construction of understanding through cognitive procedures such as questioning, problem-solving, as well as social and shared collaborative interactions. (Burrows & Brown, 2019, p. 34). Everything we know and learn is influenced by our personal cognitive lens, shaped by a million different aspects unique to each person, such as age, personality, culture, beliefs, experiences, prior knowledge, etc. "Most constructivists believe that we each experience the world from our own perspective, which means that we each experience life a bit differently." (Wiggins, 2007, p. 38) So, where does the teacher fit in this deeply personal journey of learning? The degree to which we, as teachers, think about how our students' understanding is formed or constructed varies enormously. It is important that we do not assume that learning happens simply because we are “teaching” and we see outcomes measured in performances or juries. Studio lessons should serve as the main resource where students can immerse themselves in constructing deeper and lasting levels of musical understanding. (Webster, 2011, p. 35) Cognitive apprenticeship, rooted in ideals associated with constructivism, is a socially-based model of learning that presents a different perspective on the relationship of power, authority, and LEARNING THEORIES IN STUDIO SETTING 6 responsibility between teacher and student, proven to be more equitable and democratic. Because knowledge is formed from a learner's active interaction with the world, learning is a social activity between the teacher, student, and environment – hence creating a type of relationship represented in Figure 2.1. Figure 2.1. A graphic description of a model of applied music instruction (Kang, 2003, p. 256) A constructivist view of learning is an ongoing organic process involving both parties' active participation. In simple terms, the student is

gaining skills and knowledge through active learning, and the teacher or the “expert” is adjusting their instruction based on the needs and perspective of the learner. (Kang, 2003) This will most likely and should look different for every student we are working with. Learning is not a passive activity, but rather, an active one where LEARNING THEORIES IN STUDIO SETTING 7 students are constantly applying prior experiences to new understandings, noting similarities between their experiences, and modifying their knowledge base. What implications does this have for music learning? It affects everything about how we teach the musical experiences, from the pieces we choose to explore and why we choose them to how students interact with the music. Understanding that our thought process is an ever-changing process, there are some questions that worth coming back to periodically for re-evaluation, suggested by Webster (2011, p. 43). § How is musical meaning constructed? § How do we honor the experiences that students themselves bring into the classroom? § How do I know that such an approach is effective? § How do I blend the need to prepare my students for musical performance while working to achieve some measure of constructivist learning? § Can I trust students to accept responsibility for their own learning? In the constructivist approach, the teacher shares control of the lesson with students who are allowed and given opportunities to discover on their own and be involved in decisions made about their learning from the pieces studied to strategies used. Numerous qualitative research has found that this approach provides students ownership of their knowledge, promotes stronger intrinsic motivation, and the feeling of being valued and respected in their field of study. The primary role of teachers is to generally observe what the student is doing and their interests, guide their construction of knowledge through coaching, modeling, and scaffolding, and feed their curiosity through reflective questioning. (Hmelo-Silver, 2004, p. 246) Teachers also serve as models of the thinking processes and the tools needed as a musician while designing experiences in which students are invited to engage. While it seems like the teacher is still taking on a lot of responsibility, the student's role is equally as active in participating through doing, questioning, exploring, and reflecting on the knowledge they are constructing and the process that got them there. Similarly to other fields of study, students do not learn simply within lessons, masterclasses, or recitals but also through interacting with the community, culture, and across disciplines of art. (Kang, 2003, p. 246) Students learn valuable collaboration skills in building LEARNING THEORIES IN STUDIO SETTING 8 rapport with their colleagues and community, as well as gaining motivation and even natural competition. They also build a sense of purpose for their practice outside lessons and graded performances. Outside the classroom, teachers still greatly influence students by providing support in creating opportunities, guiding their reflection, and leading by example. Another aspect of constructivist teaching and learning to consider is how students process new information. It must first be presented in ways that is comprehensible to the students’ preferred learning style; otherwise, constructing knowledge cannot happen. Students may prefer to watch and observe (visual learners), listen (aural learners), feel and do (kinesthetic/ tactile learners), or read and write about new information. (Burrows & Brown, 2019, p. 35) Students may need to learn what their preferred learning styles are or it may not be apparent in lessons, and as the teacher, our role is also to help them figure it out. I will use a lesson with a former undergraduate piano student as an example. John (real student and lesson, name changed) has yet to encounter rapid movements between two hands, used in Debussy's Jardins sous la pluie. His playing the first time around was laborious and lacked variety in articulations and the crispiness required for the piece. After asking him to identify what could be improved, I verbally concurred and further elaborated the issue of why the articulation needed clarity and variety of touch and asked him to play the beginning again. The same problem persisted, so I asked him what we could do with the articulation and asked him to describe how we could achieve it. By doing this, I am gauging his prior knowledge. He said

“the left-hand needs to move quicker, and all the notes need to sound more crisp. I can play it more staccato… let me try.” He replayed the opening without changing his technique but tried to play the notes a little shorter. The same problem remained audible, letting me know he understood what needed to happen but did not quite know which tool in his technique toolbox to use. He tried a couple more times before I hinted that perhaps we should consider how we are playing those staccatos and that we have encountered this type of sound before. I demonstrated what the passage should sound like, instructing him to look at my hands in hopes of jogging his memory about the technique LEARNING THEORIES IN STUDIO SETTING 9 used. He exclaimed in realization, “OH! You're pulling away from the keys… oh, I did that in a piece a couple of months ago.” Within minutes, we were able to transfer what he had learned before to a new context and combine it with new information in regards to the repeated notes between the two hands. From this brief snippet of the lesson, it was also apparent that the question prompts for reflection were not enough to jog his memory – they needed to be combined with a modeling strategy. This process made me realize that he was not a kinesthetic learner as much as a visual learner because seeing a technique demonstrated was more effective than having him play and figure out through previous sensations. I could have easily told him what technique to use from the beginning of the diagnosis. However, John probably would not have remembered that he had done this before and would have just fixed the problem because I told him to. Involving him in the process of criticism and critical thinking was crucial for learning to occur. From that lesson onwards, I was able to communicate more effectively, whether it was a combination of explanation and modeling or listening and modeling when it came to something we have learned before and needed reviewing. Some research has argued that if teachers used modeling or imitation to teach, it is incompatible with the constructivist approach of learning. However, if students are able to link it to prior knowledge to construct new understanding of the concept, then the student is learning organically and actively. (Burrows & Brown, 2019, p. 36) We will look more closely at effective modeling techniques in Chapter 5 and how it feeds into student motivation and self-regulation. An important aspect of the constructivist approach is that, as teachers, we must listen to our students and show them the same respect they do for us, meaning valuing their opinions, ideas, and interests. With the reciprocity, we will be able to clarify where our students are musically versus where we would like them to be. With that, we can work within their “zone of proximal development”, a term coined by Lev Vygotsky, referring to the place between what students can do on their own right now and what they can do with the support of others. As LEARNING THEORIES IN STUDIO SETTING 10 Barron (2007) states, students need to discover why something is worth learning, and per a saying I once heard and never forgot: "students do not care what you know until they know that you care." By being receptive to their interests and ideas, students become intrinsically motivated to learn, leaving both the teacher and them with less frustration. In studio teaching, it is natural to have teacher-directed instruction, whether that be about significant figures, historical context that has contributed to the evolution of music history, or personal experience stories. However, how do we make teacher-directed instruction authentic and meaningful rather than just “dropping information?” (Barron, 2007, p. 19) Unfortunately, the constructivist approach has several limitations in the 21st-century structure of lessons and systems of higher education, with the most significant limitation being that studio lessons throughout the country are measured in 50 to 60-minute increments, not leaving much room for elaboration or a fully immersive experience in the lessons. When I listened to my teacher, Norman Krieger, talk about his lessons with legendary pianist and pedagogue Adele Marcus, it seemed as if the lessons lasted for hours. There were numerous times when I wished to continue the conversation so I could fully understand and connect the idea or concept we were discussing to what I was working on right then and there. However, because of the

structure and the time constraint, we had to carry on. The constructivist view "suggests that [a] developing musician is more likely to learn at an efficient pace and with [a] depth of understanding when interacting with more knowledgeable performers – older musicians and more experienced peers – and by participating in authentic musical experiences." (Barron, 2007, p. 18) If student A has been working on Liszt Waldesrauschen and student B, who is student A's senior, has played it, it would be to both their benefit for the teacher to initiate a conversation for them to discuss how best to approach practicing the piece. Student A will receive advice from someone who has just gone through the process and may learn tips on how to best approach a passage for greater efficiency. In turn, student B will be able to practice their mentoring skills, verbalizing their thought and practice LEARNING THEORIES IN STUDIO SETTING 11 processes, and helping their peer develop the craft they are both dedicated to pursuing. A similar approach can be applied to teachers ourselves. Initiating a conversation among colleagues on how to approach teaching certain pieces to students who are struggling with particular issues such as internalizing rhythm changes, understanding the overall structure, or executing a technique, can be extremely eye-opening. By building a culture of support, we are also setting an example for our students that striving for success does not have to be isolating. The constantly evolving theory of constructivism certainly does not conform to the traditional "coaching" model. The teacher's role is to foster curiosity and to guide students to continue learning why they are learning a piece of music, why a passage should be played a certain way, why one interpretation works better than another, and all the other different why's that contribute to great music making. (Barron, 2007, p. 21) Contrary to what many may think, this does not mean the teacher is explaining and talking for the majority of the lesson. It may mean leaving students with a set of questions to reflect upon and check in at the beginning of the next lesson. The following chapters will deal with selected aspects of constructivism relevant to understanding the cognitive apprenticeship model, how it applies to the studio setting, and overcome its limitations. LEARNING THEORIES IN STUDIO SETTING 12 Chapter 3: PROBLEM-BASED LEARNING The first strategy we can utilize in a constructivist teaching approach is problem-based learning (PBL). PBL is an inquiry-based pedagogical practice that emphasizes active and transferable learning that allows students to connect with new information learned in the classroom through real-world problems. This teaching approach has been utilized for over 40 years in various disciplines like medicine, engineering, and economics. (Strobel & van Barneveld, 2009, p. 44) By solving problems, students are able to learn both content knowledge as well as thinking strategies in order to apply them to future scenarios. Through PBL, students learn to engage in self-directed learning both inside and outside the classroom, reflecting on what they have learned and the effectiveness of the strategies. (Hmelo-Silver, 2004, p. 235) Problem-based learning can be adapted to fit a wide variety of learning environments and goals. This chapter will explore how we can apply problem-based learning in the studio setting and how it fits into our understanding of cognitive apprenticeship. The types of problems we present may vary based on the students' experience with this particular cognitive skill. Problem-solving objectives can range from lower-order learning, like mastering facts and analytical techniques, such as being able to identify a chord or recognizing a pattern, to higher-order skills, like transferring knowledge application and critical thinking, such as how passage A is similar to passage B in terms of practice techniques that can be used or how to phrase specific passages. (Laprise, 2018, p. 49) Higher-order skills are generally more challenging to solve because it does not necessarily resolve with one correct answer. Students must be able to learn incrementally to build the cognitive skills to problem solve. Take Bach's Prelude in E major BWV 878, for example. If a student is shy and reserved, it might not be productive to ask open-ended questions like "what emotions or images come to mind when you hear this passage?" to initiate a conversation

about character and mood. Seemingly a simple question, students who are not used to speaking their thoughts or thinking about musical LEARNING THEORIES IN STUDIO SETTING 13 characters generally do not have the words to express them. Therefore, we might consider starting with a more definite A or B-type question such as “does this passage make you feel ecstatic or content?” They are quite similar, but in the context of music, there is a clear answer. By consistently asking questions that are viewed as understandable and clear-cut, we pave the way for students to achieve more complex critical thinking skills by asking themselves these questions. As students build this skill, we can eventually utilize open-ended questions knowing that they have the tools to think critically and respond. Effective PBL occurs when a problem or puzzle is intriguing for the learner to solve. The “problems” in music learning usually involve questions that would challenge students to gain a deeper understanding of the piece they are playing and view the problem through different perspectives. (Laprise, 2018, p. 49) We can also use PBL to encourage collaborations across disciplines. It is a commonly known fact that the music discipline is entangled with other art forms. While we typically see classes labeled “music history” being offered separated from “art history,” studio lessons or studio classes are some settings where we can incorporate interdisciplinary critical thinking into our teaching. By looking at how a piece of music served a purpose at the time it was written, and the historic events that transpired, students will be able to deeper understand the music they are studying and retain the information for longer. (Albanese & Mitchell, 1993, p.78) For example, when looking at Debussy, we might ask students to examine how they would play a particular note notated as staccato. Would this note have the same length or bite on the attack as a note written the same way in Beethoven, Schumann, or Prokofiev? How are they different, and what makes them different? Does the context in history or piano development make the notation have a different interpretation in Debussy? Choosing an easily digestible example is the key to allowing students to make connections to music they have encountered before, thinking of Debussy in the context of impressionistic art as well as historical context, and then figuring out what that means to this particular note or series of notes in the problem we are trying to solve. Students engage in problem-solving skills by drawing from LEARNING THEORIES IN STUDIO SETTING 14 multiple sources of knowledge beyond the lesson to find a solution, making them active participants in the learning process. (Laprise, 2018, p. 50) In order to create a straightforward PBL approach, teachers must identify primary objectives in a given problem and ensure that each skill learned will contribute to figuring out a solution. Students should not only wrestle with learning new content but also learn the necessary steps to solve future problems successfully. (Hmelo-Silver, 2004, p. 250) The time needed to implement PBL is naturally a concern when implementing it in a studio setting with a mere 50 minutes available. I suggest that methods of PBL be introduced in a studio class setting where all the students you teach one-on-one are gathered in one room. Therefore, they acquire a basic understanding of expectations and the objectives of PBL when they utilize it in the one-on-one setting when it is later used. For example, have the group debate the tempo choice for the beginning of Beethoven's Sonata in F minor Op. 2 No. 1, written in cut time. What elements of the music do we have to consider? Is it simply that it is written in cut time? What does Allegro mean in cut time? Is it different than Allegro in 4/4? By working through these prompted questions in a group setting, you allow students to naturally absorb the initial PBL approach among their classmates and, in return, will feel more confident to weigh in at their own lesson. In a collaborative PBL setting, the cognitive load tends to be evenly distributed among the group, allowing students to take advantage and lean on each other's expertise and prior knowledge. (Hmelo-Silver, 2004; Webster, 2011). The presentation of the problem will also affect how engaged your students are in this PBL approach. Instead of saying a statement like “examine the time signature and tempo marking in this piece and consider

what tempo you would choose," we can try playing a passage outrageously out of character of tempo and pulse. Students will be shocked yet intrigued by why we did that. From there, we can ease into a conversation about why it was shocking and present the problem for them to solve. (Laprise, 2018, p. 49) For more complex problems, a good start for students would be using Laprise's "The Know, Need to Know, LEARNING THEORIES IN STUDIO SETTING 15 and Need to Do" chart in Figure 3.1. With some guidance from the teacher, this allows students to see the steps they need to take to solve the problem. (Laprise 2018, p. 51) Figure 3.1. The Know, Need to Know, and Need to Do Chart (Laprise, 2018, p. 51) Because the PBL approach requires serious reflection, it can be incorporated incrementally throughout the semester, amongst other teaching methods. As we put the PBL approach in the context of the cognitive apprenticeship model, the teacher's role is far from the "expert" but rather a facilitator as well as a learning buddy. Our responsibility is to guide students in their learning cycle, shown in Figure 3.2: present the problem, analyze the problem, identify possible solutions based on current knowledge, apply new knowledge, and reflect on the arrived solution. (Hmelo-Silver, 2004, p. 237) This cycle also allows teachers to reflect on and deeply refine their beliefs as they walk alongside their students through problem-based learning. I would argue that the last step should be reflecting as well as evaluating productive and effective steps that students took to solve specific problems. Referring back to the Beethoven Sonata problem, students would reflect on why tempo choice was the presented problem, why that was important in the context of the music, and how they came to their conclusion. The more students are LEARNING THEORIES IN STUDIO SETTING 16 familiar with the PBL approach, the more empowered they will feel to become self-directed learners. (Laprise, 2018, p. 50) Figure 3.2. The Problem-Based Learning Cycle (Hmelo-Silver, 2004, p. 237) Assisting students in the reflection process is crucial for students to learn how to transfer this cycle of critical thinking to other problems they may face. Guiding students with reflective questions like "what steps did you take to figure out the solution?" or "what sources did you draw your knowledge from?" can guide them to eventually be self-sufficient. Conversations about reflection with students are essential to allow them to understand that it is okay not to reach a solution as soon as they identify the problem and that it does not happen overnight. Teachers are simply serving as good models on using effective strategies for learning and critical thinking through guidance with questions rather than being the expert in the content themselves. (HmeloSilver, 2004, p. 245) LEARNING THEORIES IN STUDIO SETTING 17 Chapter 4: INFORMATION PROCESSING Have you ever wondered why some students can follow rapid multi-part instructions like "play this phrase again but think about the character of the piece we are trying to convey and correct the articulations and dynamics," whereas other students cannot? That is because each person has varied information processing capacities, precisely the cognitive load function. In order to discuss how information processing is related to cognitive apprenticeship, we must understand its function and how they affect our students. The following is a brief discussion of memory functions and cognitive load theory (CLT). Both are complex and can be explored further via references. To understand how cognitive load theory plays a role in music learning, the function of memory within the human cognitive architecture must be briefly discussed. Atkinson and Shiffrin (1968) divide the structure of memory into three primary functions: the sensory register, the short-term memory, and the long-term memory, as seen in Figure 4.1. Each of these functions differ in the way information has been encoded, its storage capacity, and the duration of that storage. The sensory register's capacity is minimal and rapidly decays. According to studies by Sperling (1960) and Darwin et al. (1972), the visual sensory store capacity lasts approximately 0.5 seconds, and the auditory sensory store lasts approximately 2 seconds. Attention is the first step in remembering and later retrieving that information. Therefore, if a person's attention is directed to a sensory store, the

information gets transferred to the short-term memory function. The short-term memory's duration varies depending on the type of information that has been encoded. According to Baddeley (1990), auditory information may be held in the phonological store for about 2 seconds. Without rehearsing, information held in the short-term memory is easily displaced and lost. (Berz, 1995, p. 354) Various rehearsal functions, such as maintenance and continual rehearsal, occur in this short-term memory function. Maintenance LEARNING THEORIES IN STUDIO SETTING 18 rehearsal involves repeating information without adding meaning, such as repeating a series of numbers long enough to make a phone call. On the other hand, continual rehearsal, a function of working memory, involves associating meaning and connection to other information, allowing the memory trace to be prolonged and renewed, transferring information to the long-term memory function. (Owens, 2005, p. 27) It is vital that an understanding between short-term memory and working memory is established. Both functions hold information temporarily, but while short-term memory stores information, working memory refers to manipulating said information. Its capacity and retention depend on how the student processes and rehearses the information (Owens, 2005, p. 8). The working memory can be understood as a place where we use conscious mental activity (Jonassen & Sweller, 2007, p. 372) to actively process information and store it. Figure 4.1. Structure of the Memory System (Atkinson & Shiffrin, 1968, p. 93) LEARNING THEORIES IN STUDIO SETTING 19 Research related to cognitive load theory and its implication for instructional design has been conducted since the early 1990s, which is relatively recent compared to other learning theories. Early studies, including those of Paas and van Merriënboer (1994) and Sweller & Chandler (1991), were conducted in the mathematics, engineering, and computer science fields. To this day, there is minimal research on its effects on music learning. However, by examining various studies in other fields, we can make some assumptions and connections on its implications in music learning. Cognitive load can be thought of as the "mental energy level" (Cooper, 1990, p. 108) required to process a certain amount of information; the more information needed to be processed, the higher the cognitive load. Cognitive load extremes, whether excessively low loads (underload) or excessively high loads (overload), can cause detrimental effects on students' ability to learn and process information. It can play a domino effect on their ability to remember their lesson concepts, transfer knowledge, and self-regulate. In both extreme conditions, teachers must be vigilant and proactive to adjust learning situations and teaching approaches for optimal learning conditions. (Paas et al., 2004, p. 1) A brief overview of the types of cognitive load commonly described and referred to in research (intrinsic, extraneous, germane) is necessary to understand the overall effect of CLT. Intrinsic load results from the amount of information that has to actively be processed in the working memory and the particular level of interactivity between the sources. It refers to the inherent difficulty of a task, translated to the number of mental demands needed to process the task. (Owens, 2005, p.99) The processing of irrelevant information causes extraneous load and will increase the load when information sources are not necessary for comprehension. The extraneous load is referred to as "ineffective" where learners' information process is being interrupted and misdirected by irrelevant information that does not contribute to their schema construction and automation. When an extraneous load is reduced, the working memory capacity is maximized for effective information processing. (Owens, 2005, p. 103) Lastly, the germane load results from processing useful information directly relevant to schema construction, proving LEARNING THEORIES IN STUDIO SETTING 20 to be the most efficient learning process. From this brief outline, it is apparent that ideal teaching approaches and learning methods should combine a decrease in extraneous cognitive load while increasing in germane cognitive load. Based on Berends and Lieshout's (2009) study on the effects of visual context and arithmetic word problems, we can draw a few conclusions related to music studies. In the

2009 study, illustrations for the math problems were categorized according to the cognitive load type used shown in Figure 4.2. Figure 4.2. Examples of the four types of illustrations (Berends & Lieshout, 2009, p. 347) The “bare” type illustration included an abstract representation of the content increasing germane load (most efficient), resulting in the fastest performance and greater accuracy in results, LEARNING THEORIES IN STUDIO SETTING 21 whereas the “useless” type illustration included graphics that did not add relevant information to the problem and not necessary for comprehension, causing a higher extraneous load (ineffective). So how might this study look like in a studio lesson setting? Illustrations can be translated to any visuals that students can see, whether that be marking on the page, or a teacher’s movement and their demonstrations. In our case, a “bare” type illustration might be a teacher’s modeling of a passage or writing a note on the score to directly help that student understand a concept. On the other hand, a “useless” type illustration may be the teacher poorly singing asynchronously while the student is playing, creating a confusing and split-attention effect. The “useless” type of demonstration in teaching does not add helpful information for students to process the information they are learning, therefore, it should be avoided when possible. Another type of illustration to note is the “essential” type, where the visual information needs to be integrated with another source of information to gain complete comprehension. We see this in lessons where, for example, reference to another piece is made in passing to explain how the phrasing is similar. However, the reference is made without knowing whether our students can actually comprehend the context. When teachers play along with students or make a reference, students are actively trying their best to do their part in playing the piece in front of them and listening to the teacher, all while trying to comprehend what the teacher is referring to. While this may be possible for some students, depending on their cognitive abilities, the “essential” type demonstration tends to lower efficiency, leads students into a split-attention effect, and hinder their learning ability. Owens (2005) and Owens & Sweller (2008) greatly inform the current nature of music instructional design. They explore the various alternatives to conventional music instruction that facilitate learning, such as spatial integration between visual text and musical notation, the dualmodal delivery of auditory text and musical notation, and even the order of presentation of materials, whether they are presented simultaneously or successively. Their findings were that the integrated and dual-modality conditions of learning showed significantly superior levels of LEARNING THEORIES IN STUDIO SETTING 22 performance in comparison to the split-attention condition, even more so when presented simultaneously. These conclusions have been shown before with Miller's (1956) and Bower & Springston's (1970) revolutionary research on “chunking.” In this process, a collection of elements make strong associations with one another and provide a foundation for the learning process. When processing integrated information, learners can avoid the extraneous cognitive load that would otherwise be imposed upon them when they are required to hold one or two elements of information in the working memory while searching for the remaining relevant element. As a result, they can utilize chunking and direct the leftover working memory resources to construct a schema in the long-term memory. (Owens, 2005, p. 18) In order to understand how to adjust our teaching approaches, we must briefly understand how expertise is acquired and what components are critical to its development in music performance. In the performance field, we deal with the theoretical framework of deliberate practice that gives us insight into the necessary principles to excel. Expert performers in any specific domain develop skills needed for excellent performance through constructing complex schemas, a result of combining lower-level schemas into higher-level schemas. (Paas et al., 2004, p. 4) Schema automation is then formed to allow skills to be processed subconsciously, freeing up learners’ working memory capacity and even bypass its limitations. (Gog et al., 2005, p. 75) Cognitive load theory suggests that

teaching approaches and instructional design should explicitly take into consideration the human cognitive architecture and its limitations in order to be effective. In addition, being aware of the student's level of expertise is crucial to determine the appropriate tasks or activities based on the cognitive load incurred and to predict learning outcomes. For example, a germane load for novices may appear to be an extraneous load for students at a higher level, presenting information necessary for basic-level schema construction but not for advanced learners. Cognitive load theory suggests that learning within problem-based learning relies heavily on worked examples rather than conventional problem-solving. Conventional problem-solving LEARNING THEORIES IN STUDIO SETTING 23 engages students in the search for a strategy for the problem through application. More often than not, novices who still need to acquire skill automation will rely on trial-and-error or means-ends analysis. This type of problem-solving is effective in obtaining a solution. However, it imposes a high cognitive load and leaves students with limited cognitive resources available for learning and processing information. Worked examples, on the other hand, provide an expert model laid out as a step-by-step procedure for solving specific problems. (Owens, 2005, p. 118) By utilizing worked examples, we allow students to dedicate their cognitive resources to recognizing and remembering problem structures and applications as they are demonstrated by the examples, reducing unnecessary cognitive load, and redirecting working memory resources to the acquisition and automation of schemas. (Cooper, 1990, p. 111) As discussed in the previous chapter, problem-based learning suggests that the teacher's role is to provide a model for effective learning and critical thinking. (Hmelo-Silver, 2004, p. 239) By applying CLT to the cognitive apprenticeship model, we can guide students through lessons without taking away the ownership of their learning. We will use the same Beethoven Sonata in F minor Op. 2, No. 1 example from the last chapter for consistency. Without taking CLT into account, I could pose questions as mentioned, assuming that all my students possess a similar level of critical thinking and prior problem-solving skills. However, a worked example would be a more effective instructional design for problem-based learning. Using Beethoven's Piano Concerto in C major Op. 15, No. 1, I could verbally explain and demonstrate the steps to determine a suitable tempo for the first two movements. The steps could include thinking about how a conductor would conduct the orchestra in 4/4 versus 2/2, the tempo markings, the character, the different sections of the movement, etc. By providing a clear understanding of what steps need to be taken and the objective of the exercise, problem-based learning becomes much easier to grasp, and students, in turn, will utilize less extraneous cognitive load in trying to simultaneously question the objective of the exercise and understand the steps needed to be taken to solve the problem. Although this is just one example, by understanding human cognitive LEARNING THEORIES IN STUDIO SETTING 24 functions and how students would process certain information, we can avoid detrimental effects on their learning progress and dramatically increase the effectiveness of our teaching. LEARNING THEORIES IN STUDIO SETTING 25 Chapter 5: SOCIAL COGNITIVE THEORY AND MODELING Music practicing has been discussed extensively in deliberate practice research pioneered by Ericsson (2019). People learn and are influenced by observing others in every aspect of life, from how we dress to thinking about specific topics. Young children mimic cartoon characters or adults around them by developing similar expressions, interests, and beliefs. In the classroom, much of what students learn is through watching and imitating what teachers demonstrate, such as reading, math, and writing. Is modeling a productive means to teaching when it comes to music lessons? And how can we utilize it effectively? Models can also provide students with a concrete representation of what they wish to achieve and later can self-evaluate themselves against. (Hewitt, 2001, p. 309) Social cognitive theory is based on learning by observation and modeling, pioneered by Albert Bandura in his numerous research (1977; 1986; 2006). Social cognitive theory evolved from

early realizations of social learning theory, where learning involves watching and interacting with other people. (Ormrod, 2016, p. 114) Sub-topics such as modeling, building student self-efficacy, and acquiring self-regulation skills are often stem from social cognitive theory. Research in the 1900s surrounding the idea of learning by observation was primarily based on behaviorist principles and tested on laboratory animals via a trial-and-error approach. (Ormrod, 2016, p. 115) Social cognitive theory primarily focuses on human beings and how people can learn by observing both desirable and unproductive actions as well as the consequences following those actions. Unlike early studies where learning was defined by a visible behavioral change, social cognitive theory suggests that learning can occur when it has not yet been reflected in behavior right away, at a later point in time, or even at all. S. S. Jones (2007) and Nielsen & Tomaselli (2010) suggest that all human beings have the ability and often gravitate towards imitating the behavior of others. According to Bandura's research, modeling can teach new behaviors, enforce new habits, influence the frequency of previously learned behaviors, LEARNING THEORIES IN STUDIO SETTING 26 encourage negative behaviors, or increase the frequency of similar behaviors. (Ormrod, 2004, p. 122) In a private lesson setting, this means that modeling can allow us to teach students new techniques, new habits such as how to approach a new piece efficiently, influence how often they reference a recording or reinforce negative behaviors like being coming to lessons unprepared or choosing poor fingering. The key difference between imitation in the behavioristic approach and modeling in social cognitive theory is the involvement of the cognitive function. Social cognitive theory asserts that learning involves a mental change rather than a behavioral one. (Ormrod, 2004, p. 118) We often have students who can describe what they have observed, but they themselves cannot quite yet imitate. This typically means they have learned something new even though they have yet to learn the skill to apply the observed action. For modeling to be effective, students must utilize certain cognitive functions previously discussed in our human cognitive architecture. For example, when you demonstrate something in a lesson, students must be able to pay attention to what the model is demonstrating, mentally rehearse aspects of the model's performance, and work to form schemas of what the model has done. Otherwise, they may be looking at us but not actually processing any information. As we have discussed, cognitive functions vary from student to student. As cognitive load theory suggests, teachers are responsible for guiding students in acquiring specific knowledge, including how to process information. However, there has not been extensive research on the teacher's role in students' acquisition of knowledge via the use of modeling. What makes a good model? Students are more likely to want to imitate individuals they view as knowledgeable and worthy of imitation. (Bandura, 1986; Schunk, 1987) For example, a pianist who wants to enter the Cliburn competition is more inclined to review videos and search for teachers of Cliburn winners than their immediate studio classmates who are not preparing for major competitions. It is human nature that we seek to imitate models who produce the results we desire. Sang (1986) outlines several essential skills you must possess to serve as an effective LEARNING THEORIES IN STUDIO SETTING 27 model; the following examples have been slightly modified to apply to studio teaching. First, teachers must demonstrate accurate basic musical performance behaviors such as tone production and quality, articulation, or dynamics. In addition to fundamental musical aspects, teachers must be able to demonstrate more subtle aspects, such as phrasing, and various musically related performance aspects, such as posture, arm positioning, or weight shifting. Lastly, teachers must be able to demonstrate a wide variety of brief melodic and rhythmic sequences by ear in order to imitate incorrect student performances and provide a correct model. Dickey (1992) heavily advocates for more use of modeling strategies in all music pedagogy and that they should play a more prominent role in musical instruction than verbal instruction. Through Dickey's research review, results

suggested that the use of models and providing students opportunities to utilize models facilitated a rapid growth in students' music discrimination abilities. (Dickey, 1992, p. 37) By teaching discrimination skills through modeling, students gain musical independence, which is the ultimate goal of teaching. According to Bandura's research (1977; 1986), four functions are necessary before a student can successfully imitate a teacher's behavior through modeling; attention, retention, motor reproduction, and motivation. As discussed in the information processing chapter, attention is the first step to transferring a sensory input into the working memory. To point out the obvious, students must pay attention to relevant parts of the demonstration. For example, suppose I was demonstrating a wrist movement utilized when playing octaves, but student A was paying attention to a new hair tie I have on my wrist. In that case, that attention is certainly not directed to the correct aspect. By reinforcing what they should be focusing on prior to the start of the demonstration, I can help the student redirect their attention to a specific part of the demonstration I would like them to observe. Once they have paid attention to how my wrist was moving, student A must remember what they have observed. A simple way to test that knowledge is through rehearsal, repeating the observation verbally before physically applying the motions. Returning to the octaves example, student A could easily describe my wrist as "bouncing a ball", LEARNING THEORIES IN STUDIO SETTING 28 "relaxed wrist", or "down-up motion." By repeating the motions verbally, just like one would recite a dance routine like "step, turn, jump, slide back, and pause," student A is using their working memory resources to acquire schemas around playing octaves, allowing them to retrieve that information again in the future if needed. Students often learn quickly and more efficiently when there is someone to guide them on how to direct their attention and retain certain information utilizing rehearsal techniques. (R. L. Cohen, 1989; Vintere et al., 2004) Simply rehearsing the observation does not immediately translate to the student being able to replicate the skill demonstrated. Teachers must model skills that are within the students' current or adjacent skill ability. Students who can barely reach an octave without struggling cannot be expected to replicate or learn to master octave scales while relaxing their wrists. The most effective form of modeling should have students observe and perform the skill themselves consecutively, as immediate reproduction of an observation facilitates the encoding of behaviors in a motoric form in addition to verbal and visual forms. (Ormrod, 2016, p. 128) By following up observation with performing the skill, you also have the opportunity to provide corrective feedback on how to improve their performance. (Schunk, 1981; Shute, 2008) For example, student A observed that I was playing the octaves like bouncing a ball and will now try it out with simple octave scales. However, student A is not used to moving their wrist or knowing what a relaxed wrist feels like when playing. I can facilitate the exercise by moving away from the keys and practicing wrist exercises that mimic the motions when playing the octaves. Then, you can try it on the piano lid to mimic the motions as if we are playing the octaves on the keys without worrying about tone production or quality. Lastly, we can bring it back to the keys and try again. By walking students through these steps when they need to be reminded of the technique, active learning is occurring, and student A will be able to create the automation of the schema needed. The natural outcome of utilizing modeling is motivation, because students want to demonstrate what they have learned when it comes to tangible skills that can enhance their performance. We must remember that students only want to show off some of the behaviors they LEARNING THEORIES IN STUDIO SETTING 29 observe, just the ones they have reason or motive to do so. (Ormrod, 2004, p. 129) Once they are motivated, the cycle of attention, retention, reproduction, and motivation occurs all over again. Because they are now motivated to acquire the skill and be able to reproduce it correctly, they will pay better attention the next time we demonstrate the same skill. It is not only essential to serve as a good model for our students through

demonstrations, but we must also describe the consequence of certain behaviors or habits to encourage and increase appropriate ones. In the same example, it is important to note to the student that locking their wrist could lead to longterm injuries that would take more time to recover from than to spend some time practicing the proper technique. The most obvious outcome of modeling use is that students are able to learn a wide variety of psychomotor skills, from simple actions like pushing down the pedal, and more complex and specialized techniques like playing octaves, thirds, or trills. Aside from physical skills that can be visibly observed, we can also utilize cognitive modeling. (Schunk, 1998; Zimmerman, 2004) In cognitive modeling, we are not only demonstrating how to execute a skill physically but also how to think about specific steps. Cognitive modeling applies to teaching in the problem-based approach. A simple example is asking students the same set of essential questions about how to self-correct. Take my now 7-year-old student, for example. When she first plays through a piece, there generally are a few minor mistakes or issues to fix. I typically stick to a couple of questions to encourage self-correcting when she is practicing at home. I start with questions like "What did you think of your performance? Were you able to achieve everything you practiced?" Her answers vary from "It was okay except measures x and y" or "No, I messed up. I can do better." I follow up with, "What are some things we can fix or want to do better right now? And "Is there anything you need to ask for help on before we try again?" This is where she can identify elements she did not pay enough attention to, such as articulation or dynamics. Then we follow up with, "How are you going to practice it? Can you describe it or show me?" By repeatedly going through this set of questions, varied in wording from week to week, she is able LEARNING THEORIES IN STUDIO SETTING 30 to model her own practice off of our weekly lessons. I can say this confidently because she has walked herself through these steps verbally in the lesson before I could say anything, and her parents have confirmed that she also asks these questions out loud at home. It should be noted that several studies, including Hewitt (2001), have concluded that students could not focus on other areas needing improvement. It is important to be conscious of the behavioristic approach to modeling where we evaluate whether students are learning by observing change in their immediate response. When models are utilized without instruction on how to utilize them productively, they become a means to imitate rather than an example for expert practice. From the constructivist approach, modeling should be considered a long-term tool where both physical and cognitive actions are demonstrated accompanied by reciprocal conversations to ensure understanding from the student. Exposure to a variety of other models can further facilitate student growth and learning potential as well. (Ormrod, 2004, p. 141) Students learn a great deal in masterclasses and benefit from taking lessons with other teachers if they were taught in their lessons and know what to listen or look for in effective instruction. The value of modeling is evident not only in studies of student development but also in teacher preparation. Despite the extensive historical research and empirical evidence that suggests modeling as a vital resource in teaching, an increasing number of teachers spend class time verbalizing about behaviors rather than demonstrating them. (Sang, 1987) Teachers must be sure to model appropriate behaviors and not one they do not wish to see in their students when spending time around them. Because teachers possess characteristics such as competence and prestige, they are influential models for students of all ages. Therefore, students will look up to teachers, not only with respect to how they can improve their piano skills but also in on other respects, including career development, attitudes, responsibility, motivation, and work ethic. If we are inherently serving as models of not only how to perform well at the piano but also how to be a good teacher, we must also practice what we preach. (Ormrod, 2004, p. 141) If we believe that effective teaching involves well-organized lessons, two-way conversations, and an immersive LEARNING THEORIES IN STUDIO SETTING 31 learning experience, students must experience that in their lesson

before they can one day believe that those are components of effective teaching. Teachers should proactively spend more time developing and applying modeling skills, as modeling is not a singular skill that teachers possess but rather a group of related skills that are honed over time. LEARNING THEORIES IN STUDIO SETTING 32 Chapter 6: SELF-REGULATED LEARNING AND MOTIVATION There is no doubt that all teachers believe that practicing is essential and that we all convey it to our students. However, do we truly know what our students do and achieve during their practice sessions? After all, we only get to judge the effectiveness of their practice solely based on the performance they exhibit in their weekly lesson. It is a common belief that practicing is an activity that musicians or students must learn to do independently. (Pike, 2017, p. 399) According to various research, students in undergraduate and graduate programs report that practice plans and strategies are not discussed during lessons even though it was expected of them. (Kostka, 2002; Barry, 2007) According to Hallam et al. (2012), beginner music students tend to lack the automation of schema that allows them to identify problems, determine appropriate practice techniques, self-evaluate, and adapt strategies, resulting in most beginner music students opting to simply play through their pieces in their practice sessions, from lack of knowing any better. Intermediate students start learning self-regulation skills but only utilizing limited techniques. (Miksza, 2007; Pike, 2017) If students spend years practicing ineffectively and without proper self-regulation, learning to appropriately self-regulate is crucial in their time in higher education. Self-regulation and motivation are often discussed together as they influence each other fundamentally. The discussion around self-regulation and motivation is deeply ingrained in the concept of metacognition. Students' metacognition varies significantly from one to another, and it affects their ability to self-regulate and develop intrinsic motivation. Ormrod (2004) defines metacognition as "people's awareness and understanding of their own thinking and learning processes, as well as their regulation of those processes to enhance their learning and memory." Not many students or even adults actively think about how they come to understand certain concepts or the learning strategies that work for them. Metacognition is directly linked to the central executive function of the memory as it guides and manages your ability to process new information and the LEARNING THEORIES IN STUDIO SETTING 33 effectiveness of different learning strategies. (Ormrod, 2016, p. 348) In music learning, possessing the appropriate metacognition could mean recognizing that it is not realistic to learn and memorize an entire concerto in one practice session, realizing that you can memorize music easier when you understand the chordal structure of the left hand, or determining whether you truly have the exposition of this sonata learned, or you just want to be done practicing and go have dinner with your friends. Metacognitive processes in social cognitive theory are often referred to as self-regulation, or specifically, the "mechanisms through which people begin to regulate one important aspect of their lives – their own learning." (Ormrod, 2016, p. 350) Although metacognition or self-regulation is not explicitly taught in school, it can be fostered in the lesson setting. Self-regulated learning refers to a wide range of concepts, including goal setting and planning, self-motivation, self-discipline, attention control, practical strategies, self-monitoring, appropriate help-seeking, and self-reflection. (Ormrod, 2016, p. 351) Various research dives deeper into each of these specific aspects of self-regulated learning. However, we typically want students to be able to set a goal for themselves when they enter a practice room, be able to plan and use their time effectively, and continuously self-reflect on their performance and practice. We expect them to know that learning pop music accompaniments for a one-time gig and learning a Brahms trio for a chamber music performance will demand different practicing strategies. So how do we go about assisting our students in acquiring these skills? In the late 1900s, Bandura (1986) suggested that self-regulation consisted of three main activities: selfobservation, self-judgment, and self-reaction. Self-observation refers to students observing the frequency and

intensity of their practice and quality of their practice, determining whether they are making adequate progress. Self-judgment could mean comparing their current performance levels to their desired goal. Self-reaction is the behavioral, cognitive, and emotional response to self-judgment, anticipating satisfaction or disappointment, which can lead to self-efficacy. LEARNING THEORIES IN STUDIO SETTING 34 More recently, the cyclical process has been updated by Zimmerman (2000), where the three processes included forethought, performance, and self-reflection, as seen in Figure 6.1, a model from Zimmerman and Moylan (2009). Figure 6.1. Phases and Processes of Self-Regulation (Zimmerman & Moyland, 2009, p. 300) This revised model offered a more nuanced and in-depth view of how teachers and students can play their roles in self-regulation. Forethought typically includes the analysis of tasks and determining appropriate goals and strategies to be used. Performance did not simply refer to practicing but also self-observation, in-the-moment problem solving, and balancing between being flexible with what is needed at the moment and directing attention towards immediate goals without overwhelming the working memory capacity. (Duke et al., 2011, p. 48) Self-reflection includes self-evaluating and developing attributes for success and failure in learning. The cyclical nature of these three processes allows for interaction between personal, behavioral, and LEARNING THEORIES IN STUDIO SETTING 35 environmental factors that continuously change during the learning process and needs to be monitored. (Bandura, 1997; Schunk & Zimmerman, 2003) Schön (1987) suggests that a practical approach for implementation is the reflective practitioner model, where teachers engage as coaches in the constructivist approach to assist students in identifying their strengths and weaknesses and guide them through self-discovery. Methods used involve questioning, listening, observing, demonstrating, and imitating in a twoway street manner. Teachers should engage in reflection-in-action as the lesson is happening and reflection-on-action after the lesson to gain mindfulness to increase self-efficacy and control of their practice. (Pike, 2017, p. 399) Reflection-in-action can be easily incorporated into lessons. For example, teachers can encourage a culture of verbalizing internal dialogues in private lessons, such as “Is this technique working, or do you think it is time to try using a different approach?” or “What is the root of the problem here that is not allowing you to play this passage at tempo?” An example of reflection-on-action is reflecting on methods used with guided reflection questions such as “Which technique did you think works best and why?” or “Why did you have to understand the overall structure to figure out the phrasing in this recapitulation?” Through talking, instructing, and guided reflection, students can contribute to their learning process, deeper understand their learning tendencies, and create meaningful schemas. Pike’s (2017) study also explores the effectiveness of utilizing verbal and written journals in students' practice as a form of reflection. The reflective journal method is one of many strategies that align with Schön’s (1987) reflective practitioner model approach and utilizes Zimmerman’s (2000) three cyclical processes of self-regulation: forethought, performance, and self-reflection. The journals serve as a way for students to report on their goals, how they tried to meet them, and what strategies they plan to use to achieve them. Journaling also allows them to reflect on their perceived success, try different strategies, revise goals, and note any concerns that need to be discussed during the lesson. For example, upon reflecting, students may realize that they spend most of their practice time thinking about what to practice rather than practicing or LEARNING THEORIES IN STUDIO SETTING 36 realizing that they are distracted from their goal. The reflective journal allows students to gain accountability with themselves, learn how to prioritize and gain clarity on their learning processes. (Pike, 2017, p. 403) Most students can identify what they need to work on at the beginning of their practice but do not know how to achieve them or adapt those goals when they are unattainable, leading to lower self-efficacy and lowered motivation. Sometimes, students’ practice becomes mindless with repetitive practice, and

teachers are unaware of it. As a result, students may be distracted by too many details on the page, derailing them from the actual goal, causing a lack of confidence in their abilities, or unrealistic goals they have set for themselves. Reflective journals allow teachers to gain insights into what students think and feel in their practice and for students to gain insights and more autonomy in their learning. When teachers are aware of what students think in their practice, it creates space for conversation to jointly assess and work on their self-regulation skills. Self-regulated learning typically leads to intrinsic motivation, increasing students' selfefficacy, self-worth, autonomy, and other perceptions of their ability. (Ormrod, 2016, p. 352) Some behaviors that are initially motivated extrinsically can eventually be internalized over time if students see the value of the task and learning specific skills. Interest is the number one factor that contributes to students' motivation. If students find that a topic or activity is intriguing or worth exploring, they will, in turn, put more time and effort into mastering it, forming intrinsic motivation. Two types of interest apply in this situation: personal and situational. Understandably, teachers want students to study diverse repertoires, such as pieces from different eras, pieces with different forms or structures, and pieces written by specific composers. However, if we give students a choice to pick a piece to study between two to three options, students can determine their interest in those options. They will, in turn, be more likely to want to work on the piece instead if the piece was determined by the teacher from the beginning. Situational interests are evoked by something new, unusual, or surprising presented in the environment. (Ormrod, 2004, p. 461) For example, while you demonstrate something, students LEARNING THEORIES IN STUDIO SETTING 37 may notice something new and think, "Wow! I want to be able to do that. How did she do that?" Interest promotes more effective information processing as students tend to devote more attention to the material being learned, become more cognitively engaged, and as a result, process information more elaborately and form deeper connections. Students' self-efficacy, or beliefs about their capabilities, are strongly related to their motivation levels. (Schunk & Zimmerman, 2007, p. 9) We can assess motivation by looking at students' choice of tasks, effort, persistence, and achievement results. Considering the expectancy-value theory, which is the cognitive perspective on motivation, we can assess the beliefs that students construct in achievement contexts. Two crucial theories to consider in this perspective are Lewin's level of aspiration and Atkinson's theory of achievement motivation. Lewin's level of aspiration refers to the standards that students set for a task, typically driven by past experiences or their familiarity with the task. (Schunk et al., 2002, p. 48) For example, two students could be given the same task of learning a short piece in one week. Student A is upset and unhappy at the lesson after one week because they expected to play it with well-executed phrasing, accurate notes, and well-nuanced dynamics. In contrast, student B is satisfied with their performance. After all, they just expected themselves to be able to get through the piece without falling apart. Depending on students' individual expectations, which teachers can help realistically adjust, their successes will inevitably increase their level of aspirations. Atkinson's theory of achievement explores students' motives, the probability of success, and the incentive value of success. Students may be motivated to carry out specific tasks to achieve them successfully or avoid failure. This motive can be seen clearly in group motivation, where students may want to achieve specific tasks, not because they want to, but in fear of failure and hurting their pride in front of classmates. "Your students are so motivated! I wish mine were too." Yes, students should be intrinsically motivated by the music they are studying. However, beyond that, teachers need to cultivate an environment in their lessons where students increase their self-efficacy, leading to LEARNING THEORIES IN STUDIO SETTING 38 more motivation and self-regulation outside the classroom. Focusing on criticism like "You're not phrasing this right" or "This passage is tough; you need to practice it" without following up on how students can work on it may feel defeated

and lost in their practice sessions. Again, they know what they need to practice (the phrasing and this specific passage) but not how. By scaffolding complex techniques into more manageable chunks and practicing with the student in the lesson, students can imagine what it would be like to do it themselves in the practice room. We must also encourage students to become comfortable with the struggle of practicing, framing the expectancy and attainment values to find ways of working with their intrinsic motivation. (Pike, 2011, p. 22) The most underrated way you can increase motivation in your students is to help them set attainable short-term goals, assist in monitoring them and celebrate with them when they succeed. Self-regulated learning develops from giving students opportunities to engage in independent, self-directed learning and exposure to self-regulating models, such as others who set high standards for their performance and effectively keep themselves on track. (Zimmerman, 2000, p. 16) By helping students set goals, monitor their learning progress, and reflect, students eventually assume more responsibility for their learning. Self-regulating not only promotes learning but also the perception of greater competence that drives students' motivation toward new goals. (Schunk & Zimmerman, 2007, p. 16) For further exploration, Schunk et al. (2002) suggests that six aspects contribute to the self-regulation dimensions seen in Figure 6.2, developed further from Zimmerman (1994, 1998). LEARNING THEORIES IN STUDIO SETTING 39 Figure 6.2. Dimensions of Self-Regulation (Schunk et al., 2002, p. 158) Lastly, self-regulation should not be confused with motivation, although the two concepts share similar elements. Motivation leaves no room for choice because students are either motivated by personal interest or external demands. (Schunk, Meech, & Pintrich 2002, p. 6) On the other hand, self-regulation requires certain degrees of choice because if all six aspects mentioned above are controlled, students are no longer self-regulating and are externally regulated. Students must be able to contribute to why, how, when, what, where, and with whom to complete the task. (Schunk, Meece & Pintrich 2002, p. 159) LEARNING THEORIES IN STUDIO SETTING 40 Chapter 7: CONCLUSION Compared to teachers in other subject areas, studio music teachers often leave a more prolonged and intense impression on their students as they serve as influential figures for an extended period of time. (Burwell, 2013, p. 282) Because teachers hold such influence, it is crucial that time during lessons, studio classes, and ensemble coaching are productive and effective for student growth. Numerous research has shown that most studio music instruction is spent on performance, followed closely by teacher verbalization occupying 42% of lesson time. (Kostka, 1984; Colprit, 2002; Creech, 2012) Sang's (1987) research showed that 40% of lessons were spent talking, whereas only 26% was spent on modeling and 34% on students playing their instrument. Regardless of the specific percentage, it is consistent among studies that not enough time is spent in lessons on effective teaching methods. Although the research study conducted by Duke and Simmons (2006) suggests that teachers in university-level studio music instruction spend their lessons equally on identifying goals and expectations, effecting change, and conveying information, it is not to assume that all teachers conduct their lessons this way. Along the same lines, research has also found that teachers teaching pre-university students need more guidance and mentorship to develop independence. (Duke & Chapman, 2011; Blackwell et al., 2020) It is not to assume that all students who enter university-level music degrees already possess the appropriate critical thinking, problem-solving, or self-regulation skills needed to succeed. We have all been there, repeatedly pointing out student mistakes and complaining that they are not fixing them, thinking to ourselves, "Shouldn't they know this already?" or "Could they not hear what is wrong with this phrasing?" Teachers must be able to adapt to student needs based on their performance and cognitive skills. (Sang, 1987, p. 155) Often times than not, when we ask students to do something without proper explanation, they will likely be able to do it, given that the skill is within their ability. However, they would LEARNING THEORIES IN STUDIO SETTING

41 have yet to learn why they did it, why it sounded better, or how to replicate the performance in the future. Instead of teaching them to be music-makers, we implicitly teach them to be musicfollowers, where they depend on you, as the teacher, to provide feedback. (Weidner, 2018, p. 26) In turn, students have learned that their responsibility is to show up and play music, counting on your critiques, suggestions, and guidance. Completely embodying the cognitive apprenticeship model will allow students to experience authentic learning while gaining full autonomy of their knowledge and learning skills. When looking at other subject areas, the goal of instruction is for students to independently and critically engage with the subject matter on their own, even after the class ends. For example, we want students to be able to calculate percentages or perform multiplication tasks outside of their regular math classes. Why should we want anything different for our music students? Cognitive apprenticeship provides a student-centered approach to teaching, allowing students to fully develop skills of musical independence, such as critical thinking and problemsolving while performing at a high level. Teachers must shift their perspective from "teacher as transmitter" to "teacher as collaborator" (or facilitator), providing frequent and meaningful opportunities for students to engage in making decisions about their learning. Musical independence is usually seen and demonstrated by students when they are able to make meaningful decisions, justify them with a concrete understanding of musical concepts, selfobservations from their performance, and an overall awareness. (Weidner, 2018, p. 27) The cognitive apprenticeship model emphasizes making thought processes visible and transparent. For clarity, Weidner (2018) divides the cognitive apprenticeship model into three functions: modeling, coaching, and fading, where with each function, the student's responsibility for their learning, while shifting the teacher's role from facilitator to observer, shown in Figure 7.1. With these three functions, students still practice pieces, learn musical concepts, and engage in other learning tasks. At the same time, they are developing their cognitive skills in thinking critically LEARNING THEORIES IN STUDIO SETTING 42 about their musical practice, learning how to effectively problem solve, and immersing themselves in self-regulated learning. Figure 7.1. Teacher and Student Roles in Cognitive Apprenticeship (Weidner, 2018, p. 28) The modeling phase of cognitive apprenticeship not only focuses on using models and demonstrations as a tool for student growth but also emphasizes the demonstration of cognitive processes and strategies for thinking critically about music. The coaching phase serves to interrupt the typical power dynamic of the traditional "imitation" model, encouraging students to not only understand how to perform well but also understand why specific strategies work more effectively than others. An example of ideal coaching is asking students questions like "Why did we stop there?" or "What can be better here?" Students may say general observations such as "My articulation was not good" or "The phrasing can be better." Teachers can then use students' observations to provide recommendations and suggestions on how to work on certain skills, shaping the lessons based on their critical assessment of their performance. Further research can be done on group learning methods such as think-pair-share. Fading removes teacher interference, allowing independent student engagement. Depending on whether LEARNING THEORIES IN STUDIO SETTING 43 you teach private lessons, conduct studio classes, or coach chamber ensembles, this may look different. The essential component is for teachers to not immediately intervene, providing a safe space for students to make mistakes, struggle to figure out solutions, talk through different strategies, and build their critical thinking and problem-solving skills. Teachers can note what was left unaddressed and restart the cycle of modeling and coaching on those skills. If students learn to self-regulate, constructing their understanding of their own tendencies, motivations, and learning processes, the changes they make during their practice are more likely to stay in their routine long-term and continue to develop. (Pike, 2017, p. 399) While the cognitive apprenticeship approach may require time

for the teacher to reflect, plan, and rethink their approach to teaching, the impact this approach has on students is worth investing the time and energy. The intentional instruction will allow students to develop and experience self-autonomy while in your care. Too often, we assume that because we teach, or more likely tell or preach, students good strategies to practice and think about music in lessons, students would eventually implicitly learn the cognitive skills behind those strategies. However, if they do not receive the chance to learn, experience, and develop those skills, transfer of learning will not occur. (Weidner, 2018, p. 30) In considering the cognitive apprenticeship approach's elements, teachers will find time to reflect on the teaching approach we choose and how we are energizing and inspiring our students on their musical journey. LEARNING THEORIES IN STUDIO SETTING 44 References Albanese, M.A. & Mitchell, S. (1993). Problem-based Learning: A Review of Literature on Its Outcomes and Implementation Issues. Academic Medicine, 68(1), 52-81. https://doi.org/10.1097/00001888-199301000-00012 Asmus, E. P., & Harrison, C. S. (1990). Characteristics of Motivation for Music and Musical Aptitude of Undergraduate Nonmusic Majors. Journal of Research in Music Education, 38(4), 258–268. https://doi.org/10.2307/3345223 Atkinson, R.C. & Shiffrin, R.M. (1968). Human memory: A proposed system and its control processes (Vol. 2). Academic Press. Baddeley, A.D. & Hitch, G. (1974). Working memory. Psychology of Learning and Motivation, 8, 47-89. https://doi.org/10.1016/s0079-7421(08)60452-1 Barron, J. (2007). Lessons from the Bandstand: Using Jazz as a Model for a Constructivist Approach to Music Education. Music Educators Journal, 94(2), 18–21. https://doi.org/10.1177/002743210709400205 Berends, I.E. & van Lieshout, E.C.D.M. (2009). The effect of illustrations in arithmetic problemsolving: Effects of increased cognitive load. Learning and Instruction, 19(4), 345–353. https://doi.org/10.1016/j.learninstruc.2008.06.012 Berz, W. L. (1995). Working memory in music: A theoretical model. Music Perception, 12(3), 353–364. https://doi.org/10.2307/40286188 Blackwell, J., Miksza, P., Evans, P., & McPherson, G. E. (2020). Student vitality, teacher engagement, and rapport in studio music instruction. Frontiers in Psychology, 11. https://doi.org/10.3389/fpsyg.2020.01007 Burrows, J. & Brown, J. (2019). Creating a tool to evaluate teaching materials for older beginner piano students through the lens of constructivism. Australian Journal of Music Education, 52(2), 33–45. LEARNING THEORIES IN STUDIO SETTING 45 Burwell, K. (2012). Apprenticeship in music: A contextual study for instrumental teaching and learning. International Journal of Music Education, 31(3), 276–291. https://doi.org/10.1177/0255761411434501 Chandler, P. & Sweller, J. (1991). Cognitive load theory and the format of instruction. Cognition and Instruction, 8(4), 293–332. https://doi.org/10.1207/s1532690xci0804_2 Clinton, G. & Rieber, L.P. (2010). The Studio experience at the University of Georgia: an example of constructionist learning for adults. Educational Technology Research and Development, 58(6), 755–780. http://www.jstor.org/stable/40929476 Cooper, G. (1990). Cognitive load theory as an aid for instructional design. Australasian Journal of Educational Technology, 6(2). https://doi.org/10.14742/ajet.2322 Crappell, C. (2019). Teaching piano pedagogy: A guidebook for training effective teachers. Oxford University Press. Darwin, C.J., Turvey, M.T., & Crowder, R.G. (1972). An auditory analogue of the Sperling partial report procedure: Evidence for brief auditory storage. Cognitive Psychology, 3(2), 255–267. https://doi.org/10.1016/0010-0285(72)90007-2 Dickey, M.R. (1991). A comparison of verbal instruction and nonverbal teacher-student modeling in instrumental ensembles. Journal of Research in Music Education, 39(2), 132–142. https://doi.org/10.2307/3344693 Dickey, M. R. (1992). A Review of Research on Modeling in Music Teaching and Learning. Bulletin of the Council for Research in Music Education, 113, 27–40. http://www.jstor.org/stable/40318509 Duke, R. A., Prickett, C. A., & Jellison, J. A. (1998). Empirical description of the pace of music instruction. Journal of Research in Music Education, 46(2), 265–280. https://doi.org/10.2307/3345628 LEARNING

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