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Problem Based Learning as a Shared Musical Journey – Group Dynamics, Communication and Creativity

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ABSTRACT

The focus of this paper is how we can facilitate problem based learning (PBL) more creatively. We take a closer look upon the connection between creative processes and social communication in the PBL group including how difficulties in the social interplay may hinder creativity. The paper draws on group dynamic theory, and points out the importance of building a reflexive milieu in the group. Musical concepts are used to illustrate the communicative and creative aspects of PBL and the paper uses the analogy between improvising together and do a project work together. We also discuss the role of the supervisor in a PBL group process. Further we argue that creativity is rooted deep in our consciousness and connected to our ability to work with a flexible mind. In order to enhance the cohesion as well as the creativity of the group a model of music listening as a concrete intervention tool in PBL processes is proposed.

Keywords: Music listening, emotion, consciousness, energy regulation, group cohesion, resonance, conductor, improvisation, learning, reflexivity, communicative musicality

INTRODUCTION

In this paper we are going to elaborate on the problem based learning process as a journey. A journey implies movement, and the concept illustrates that project work is always in

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transition. Further we describe it as a musical journey to acknowledge the qualities and vitality dynamics of the process: sometimes the travel is intense and dramatic, sometimes lyrical and flowing, sometimes stationary for a while. PBL is not only a journey where you experience new landscapes and learn new skills, it is also a process of common creation and composing. Furthermore musical dimensions of expression is intrinsic in human communication and interaction (Trevarthen and Malloch, 2000), and therefore we find it appropriate to call it a musical journey. We also find inspiration in the literature where musical terms have been used to describe group processes (Foulkes, 1983), and thereby we highlight PBL as a social and shared musical journey where dialogues and interplay are necessary to reach a common goal.

The intention of PBL is learning on a high level, through which the students understand the world in a new way, a new light or new perspective – it is a kind of learning that necessitates creative thinking. As we will pinpoint in this article creative processes occur when the students are ready to break with the well-known melodies, the fundamentals of their prior knowledge, and are able to go beyond their repertoire in order to create a new composition. Sometimes the group members have to move to unknown places, where they did not plan to go from the beginning. Therefore creative group work requires openness to experience and a willingness to engage in new ways of listening and playing together.

In addition to our focus on describing the PBL process as an analogy to a music group that improvises together, the other main contribution in this paper is a concrete intervention tool of music listening that can be used to encourage creativity in a PBL group.

Throughout the article we will continue to use musical terminology as metaphor for the processes and dynamics of PBL group work. Thus the music-poetic text will be mixed with academic writing in an attempt to take on the task of embracing the complexity of creativity in PBL. Drawing upon our knowledge and experiences from the music therapy milieu, we hope to inspire educators and students across disciplines, who are embarking on PBL and creativity.

INITIAL THOUGHTS ABOUT PBL IN HIGHER EDUCATION

In this article we focus on PBL in groups. In PBL one of the cornerstones is that each group defines its own learning objectives, identifies one or more problems connected to real world practice and creates its own problem formulation (Savery, 2006). Further the fundamental principles of PBL project work are based on learning through collaborative problem solving and writing up a project together. “The team learning aspect underpins the learning process as a social act, where learning takes place through dialogue and communication” (Kolmos, Du, Holmgaard, & Jensen, 2008). This is a learning process concerning communicative and

relational skills that go beyond the participant's technical expertise (Baden & Major, 2004 p. 4). This specific kind of learning, that emphasizes cooperative learning rather than competitive learning, is needed as an important competence in future teamwork (Krogh & Rasmussen, 2004). Beside the collaborative tasks, one of the main purposes of PBL is to create new knowledge on an academic level. In the Aalborg PBL model the idea is to provide students with an active role in the acquisition and creation of knowledge, to give them better opportunity to locate what they need to know and become self-directed, self-regulated and responsible learners (Kolmos, Fink and Krogh, 2004). Before elaborating further on group aspects in PBL we need to take a closer look at the concepts of knowledge and creativity.

LEVELS OF KNOWLEDGE IN PBL

In his book from 2004 Lars Qvortrup presents a theory of knowledge that was influenced by Gregory Bateson, where knowledge can be categorized into four forms: 1st, 2nd, 3rd and 4th order knowledge. The four categories of knowledge are defined as follows: 1) First order knowledge is factual knowledge - simple knowledge about something, on this level knowledge can be accumulated. 2) Second order knowledge is reflexive knowledge - it is knowledge about knowledge, on this level we can choose adequate methods and use our factual knowledge to solve concrete problems. 3) Third order knowledge is a creative form of knowledge where we see things in a new way; we rise above the concrete situation and see things from the outside, raise new questions and go beyond the taken-for-granted assumptions. 4) Fourth order knowledge is also called 'world knowledge' and represents the social evolution of knowledge. This form of knowledge implies that we are conscious about our knowledge as a part of a common knowledge culture. Following Bateson this particular form of knowledge cannot be contained by one person - it resides within the social community (Qvortrup, 2004; 2006).

In PBL the students work on the levels of first and second order knowledge and learning; they build upon factual knowledge, which in musical terms resembles a stable pulse or rhythm, repetitions and recognizability. On the second level the group members use their situated understanding and reflexivity to discuss and find adequate solutions. In musical terms the group develop dialogues between their different instruments and maybe they try out new instruments and extemporize on well-known material. In order to facilitate creativity in a PBL process the students need to move to the third level of knowledge. In musical terms the group work is then characterized by breaks and surprises, variations or development of new themes or even new styles. On the third level the group might reach a higher understanding of their own functioning: the group can 'hear their own music as they play it' and develop consciousness that exceeds their former understanding of themselves as learners and as a group.

One of the commonalities in creative processes is that new ideas and new thoughts always emerge in an unplanned and non-governing way. Thus, the characteristics are not order but rather chaos (Kupferberg, 2006, p. 17). This way of thinking about creativity can also be used to understand aspects of creativity in a group. To be able to move to the third level of knowledge (Qvortrup, 2004) the group needs to cope with a certain amount of chaos. When the group travels into unknown places they do not control every aspect of the progress and they may momentarily lose overview and direction. At a point in time, a new form of order, insight or knowledge will appear – still with the sense or quality of being created rather than imitated, which would have been 1st order learning (Lindvang, 2010).

GROUP PSYCHODYNAMICS IN PBL GROUP WORK

How can groups be made strong enough to embrace creative chaos, and what is the social learning of such a process? In this paper we are oriented towards the possibility of establishing a space for the joint creative process of the group, and the inherent social learning of such a process. Integrating the concept of Communities of Practice (Wenger, 1998) into the process of creative learning, Krill (2013) argues that creativity neither can be learned as a skill nor technically trained but can be experienced under the right circumstances: "When it comes to developing creativity as a dialogic ability, however, learning depends on the possibility to learn through experience and participation in creative, dialogic and open-minded communities of learning practices" (Krill, 2013, p. 5).

As adults we take part in many different groups and we may have different roles in those groups. Often our participation and experiences are relatively unconscious, but nevertheless the groups form us and nourish us as humans (Nielsen & Sørensen, 2013). When the students form a group to work with PBL, they not only set out to learn about relevant topics and find adequate solutions to real-life problems - they also begin a group process, and their possibilities of creating new knowledge and experience transformative learning are connected to the dynamics and the process of the group. Foulkes (1948), who is well-known within group-analytic psychotherapy, pointed out that we cannot separate the individual from the group - they go together, like a figure-and-ground constellation: "each individual - itself an artificial, though plausible, abstraction - is basically and centrally determined, inevitably, by the world in which he lives, by the community, the group, of which he forms part" (Foulkes, 1948/1983, p. 10). Foulkes created the concept 'group matrix' as related to the origin or maternal forces of the group and described it as a psychological network in which all the individual and collective processes meet and interact. He also used several musical terms to describe the group processes, i.e. the role of the therapist as a 'conductor', and the 'resonance' of the group (Foulkes, 1977). Resonance phenomena occur with all types of vibrations or waves, and they occur when a system is met or affected by a frequency that matches one of its own natural frequencies. Thus the concept of resonance implies two systems relating to each

other. Resonance is also a social phenomenon, as for example most people have tried to sense an emotional atmosphere from another person or in a specific social context (Lindvang, 2010; Thygesen, 2005). This kind of nonverbal feeling of or attunement to each other is probably rooted in the so called mirror neurons, which are cells in the brain that gets activated when we see other peoples' actions as if we did the action ourselves or when we feel the same feeling as the other person feels (Gallese & Goldman 1998; Rizzolatti & Arbib 1998 in Stern, 2004).
Frustration and tensions may, as well as positive feelings, be vehicles that initiate new reflections raising the learning to a creative level. In musical terms the interaction between harmonic and dissonant phrases may build a more interesting, moving and engaging soundscape than harmonious chords with no tension would do alone. But it is crucial that the group develops a reflexive milieu. Following Helenius (1990) such a milieu must contain several elements: 1) A wish to be a part of a group and undergo a shared development through a mentalizing dialogue where each member views his or her own approach in the light of others' 2) A wish to present and share one's own thinking and knowledge and be ready to discuss it. 3) A wish to see things in their complexity and from new perspectives and to exceed habits (Olsen & Pedersen 2009, p. 73). Building a reflexive milieu demands the participants in the group to put themselves at risk and that each one is respectful and responsive to what their peers contribute. This is not always the case and sometimes it is a real challenge to build up enough trust and bring together the differences in the group.

EMOTIONAL ASPECTS OF LEARNING AND PBL PROCESSES

The increased interest in the importance of the emotions in psychology and learning areas has been supported by research within neuroscience. The work of the neurologist Damasio has had a big influence on our understanding of the relationship between the cognitive and the emotional part of the human being. Damasio has in his book 'Descartes' error' (Damasio, 1994) challenged the persistent idea that rationality and emotionality should be separated as independent processes. Descartes famous sentence: cogito ergo sum (I think therefore I am) suggests that our thinking constitutes our being, but Damasio argues the opposite; that we only think because we are, since thinking is caused by and connected to our existence. Damasio found that reason is 'embodied' - based in the human being's physical self and he claims that we need to include the whole organism and the surrounding physical as well as social milieu in order to understand what happens in the brain. Further Damasio holds that personally beneficial decision requires emotion as well as reason (Damasio, 1994; 2000). Generally feelings and knowledge about our feelings can be used constructively in the interaction with people and the world around us. Moreover, the emotional memory is very comprehensive and far reaching which means that learning is facilitated and promoted when emotions and feelings are present in the learning situation. Therefore it is an advantage when the presence of emotions and feelings can be integrated in a balanced way in the PBL group work. During the process the group needs to take many decisions that are complicated

because of the many options and things that need to be taken into consideration and in this process the group needs to listen to their somatic markers - their bodily and emotional signals and reactions. In PBL it is important to be aware about how thinking and feeling are intertwined and that the balance between thinking and feeling influences the communication and the process. For example it may lead to a non-functioning group who misses the qualities of thinking if emotions and feelings dominate excessively as well as reduction and repression of feelings may result in the lack of motivation, vitality and warmth and various social as well as cognitive problems.

Emotional knowledge of each others' lived experience is an intrinsic part of 'learning-in-relationship' (Yorks & Kasl, 2002). It is found that positive emotions extend both social and cognitive functioning and therefore support our ability to learn. Thus it is meaningful to focus on the social aspects of the process and to develop an emotional atmosphere in the PBL group where disagreements and conflicts can be overcome. If a PBL group collaborates successfully it will most likely result in positive emotions such as joy, excitement, love and pride that will strengthen the group and promote self-efficacy, reciprocity and understanding (Rowe, Fitness and Wood, 2015). Later we will point out that music listening can be a possible way to generate positive emotions in the PBL group.

MUSIC, COMMUNICATION AND CREATIVITY

From our background in music therapy the strength of our work as clinicians as well as educators is intimately associated with emotional and creative developmental processes. We draw upon many years of teaching our students through experiential learning and facilitating the students' personal energies, mindfulness, emotions, relationships and group coherence in a bottom-up process of learning.

We would like to introduce one of our main methods: music improvisation, as a way to further elaborate on the creative processes in PBL. In line with what we mentioned earlier, creative processes can be described as third order knowledge, characterized by dedication and absence of control. In the music improvisation the participants do not control what will happen, they open up their mind and they follow the music as it appears. There are many different methods of music improvisation, but generally it can be defined as "the art of spontaneous creating music… while playing, rather than performing a composition already written" (Bruscia, 1987, p. 5). A general rule in music therapy improvisation is that the music is heard as an analogy of the internal state of the player, and/or the intersubjective relationship in the dyad or the group (Smeijsters, 2005). In a musical improvisation, as in a PBL project, an interplay takes place between the past (culture, skills, preferences, past events) and the present (mood, interest, life situation). When improvising or playing together musically in music therapy, all sounds are regarded as musical and communicative, and there is no

preferred style or genre (Bonde, 2015). A 'playing space' is formed as a space of action, also called a "multilayered and many-roomed container" (Wigram, 2004, p. 43), where one can work with a wide range of feelings, conflicts and psychological patterns. Comparing a music improvisation with the meeting in a PBL group, the discussion can display a very slow tempo with low pitched voices, or it can be a quick and frantic discussion where everybody is talking at the same time. There can be a free flowing inspiration or blocked energy, both will be audible in the musical language of the voices. The PBL group may ask itself; how do we play together or how is our music today - to create self-awareness and self-reflectivity - that are important components in the creative third order level of learning.

In a group of musical improvisers different instruments and different roles can be tried out. To avoid that the same group member always plays the same instrument, and has the same position and task in the group, it can be agreed to change instrument, position and task. In a PBL group work the analogy would be that the group agrees to circulate the different roles and tasks. For example the roles of being the moderator or the secretary in the group discussion, the one who is structuring today's agenda or keeping the time structure in group discussions etc. may be changed in order to create movement and flexibility in the group.
The depth of listening to each other predetermines the spontaneous flow of new thoughts in the group dialogues. Both in the improvising and in the group discussion it is through the act of listening that we can open up to the yet unknown, and to the inner realities and creative thinking of other human beings. After an improvisation it often happens that the participants are surprised about the others' inner experiences. In a PBL discussion it is conducive to create space for curiosity, wonder and surprise as well.

When working with group dynamics through music improvisation, the group-leader or 'conductor' may suggest that the group follows the "playrule": 'tutti, duo, tutti', which means that first the whole group improvises, then only two participants improvise, and in the end everyone goes together again. The playrule enhances concentration and listening. This playrule may very well function in a PBL group as well: in the first phase the whole group enters a discussion, followed by a phase with discussion between only two members while the others are listening, and then in the end the discussion is opened up to the whole group again. In principle there are numerous variations of this playrule, which corresponds to different models of reflective teams. A playrule gives a structure or form that is momentarily guiding the group work and it may help to keep the group cooperating in a constructive way. A 'playrule' can also be used to create changes in the way the group members communicate with each other or to solve a crisis in the group. If the members tend to speak all at once it may be helpful to introduce a playrule about turn taking, e.g.; that each member speak for a certain amount of minutes while the others are listening carefully or that each contribution must be followed by a short moment of silence.

Sometimes the music improvisation does not work well: Even if we define that any form of musical expression is accepted, the participants are not really present and they are not truly listening to themselves or the others, and the music is fragmented or disconnected and falls apart. This is also what may happen in a PBL group; the members do not concentrate, they do not listen or express what they think and they do not find a meeting point. If the members seem to be on different wavelengths in a PBL group, it can be an idea to ask the group members to mirror (repeat) each other to check if they have listened well enough and understood each other correctly. Sometimes a PBL group will need a supervisor to facilitate these communicative experiments or to start a reflection about the group members' state of mind, since the members may be too involved to see the patterns at first. We will return to the role of the supervisor in the next section.

It is important to be aware that the interactions between group members have both verbal and nonverbal elements. According to analyses of early interaction and proto-dialogues between newborn infants and their mothers/fathers we are born with an inherent musicality, enabling us to communicate intentions and vitality forms through sound and movements and joyfully share intense moments in what has been called "communicative musicality" (Malloch & Trevarthen, 2009; Stern, 2004). The early musical dialogues consisting of synchronization, turn-taking, and imitation of sounds and facial expressions both serve to regulate stressful feelings in the child, and also to enrich and strengthen the relationship. Communicative musicality has also been called the 'language before language' (Hart, 2006) and underlies later development of spoken language, creativity and social engagement through our whole life. All verbal and nonverbal communication in life has a musical side to it:

> *...the capacity to generate and participate in communicative musicality gives us our ability to be with another person in one texture of time, regardless of age, and allows this time to be shaped into mutually satisfying narratives of interaction through the inflection of vocal and bodily gesture (Trevarthen & Malloch, 2000, p. 6).*

Students carry each their own patterns of communicative musicality into the project group. We argue that this can have a profound significance for the atmosphere, the reflexive milieu and progress of the learning experience. The group can also be a place to train and develop new patterns of interaction along with the project work especially if the supervisor encourages and supports this kind of learning.

THE 'MUSICAL' SUPERVISOR

According to qualitative evaluation of students' satisfaction with supervisors Steinert (2004) found that students highly emphasize group atmosphere and facilitation skills, and Kassab et al. (2006) showed that students value those who establish good communications with

students, understand their feelings and advise students on how to learn. This shows that even though PBL is a learner-centered approach, the supervisor still has an important role to play (Savery, 2006). Both experienced and new learners may need sensitive communication and empathy when struggling with insecurity and vulnerability that accompany many truly creative and groundbreaking projects. This can be linked to the early regulation as described in communicative musicality, where the task is to contain and regulate the stress level, to motivate and empower the students by interacting with them in a sensitive and supportive way and by helping them in difficult situations. The supervisor is also a kind of role model: if the supervisor acts with respect and sensitivity there is a chance that the group will take over this kind of attitude. If he or she is a good listener the students will probably develop the sense of listening to each other during the process.

If we use Foulkes' concept of 'conductor', the group supervisor is a person who listens to the group from the outside. The conducting supervisor intervenes without becoming a group leader who takes over and does all the work. He or she facilitates safety as well as curiosity in the group, if necessary points out possible directions to go, safeguards that each person (or instrument of the orchestra) takes part and is heard, and supports that the group as a whole dares to follow its own ideas and visions and share the responsibilities of the work. Further the concept of the supervisor as a conductor implies that he or she is less needed when the group works well on the tasks, in musical terms when the group has found its own style and the music plays with its own rhythm and melody. The use of the metaphor of 'conductor' may also have its limits in this context - unless we talk about a conductor who tolerates chaos and unpolished or unfinished sound making along the process.

According to Olsen and Pedersen (2009) a well-functioning group will use the supervisor as a 'resonance box'. He or she focuses on the process, discusses, asks questions and facilitates reflection, but leaves the choices and the responsibility of the final result to the group. Following our terminology in the present paper this means that the supervisor grasps the sounds of the group and understands them well enough to be able to amplify, enhance or deepen the sound, in order to facilitate that the group's work will be as nuanced, clear and creative as possible.

Olsen and Pedersen (2009) point out that it is a part of PBL to be able as a group to handle conflicts with the supervisor. Often the problem will be that the roles and the mutual expectations between the supervisor and the group are not attuned. According to neuroaffective research conflicts and misattunement are possibilities to learn and grow from but only when the misunderstandings are repaired (Hart, 2006; 2008). In the task of supporting the group to embark on the creative journey it would be easy for the supervisor to ask the students to follow a well-known route, related to his or her own ideas, experiences, theoretical stances etc. - but the supervisor needs continuous self-awareness in order to be an open minded facilitator of creativity in each group. The process demands courage, trust,

playfulness and the ability to run a risk, not only on the part of the learner but also on the part of the supervisor.

CREATIVITY AND MUSIC LISTENING

Now we will turn to the last part of the paper and focus on music listening as a concrete intervention in the PBL process. To substantiate the reason for suggesting music listening we will elaborate a bit more on the concept of creativity and the connection to neurobiological theory, and further we present a few relevant research results that support the benefits of music listening in a PBL group.

The Hungarian philosopher Arthur Koestler (1964) stated that we are creative when we create a new whole from something that was not related until then. We become 'bisociative', which means that we combine different ways of thinking from different levels of consciousness. Our normal state of consciousness contains restricted amount of information and the transport of information is slow, and therefore we benefit from expansion of our consciousness (Vedfelt, 2000; 2007). According to Koestler, creativity will often appear where language stops – the source of creativity lies outside our everyday state of consciousness: "Creativity emerges when we allow ourselves to change space and see the world from this new space. A visit in an unaccustomed space makes our horizon change character and width" (Olsen, J.B., 1999, p. 42, our translation). Listening to music may open to a state of consciousness that is different from our everyday state, it is another kind of space where our minds can meet in a new way.
The oscillation between different levels of consciousness has been described and measured by research in brain waves: Cognitive processing, emotional engagement and attention in daily life have been related to beta rhythm (14-60 Hz) whereas alpha rhythm (8-13 Hz) corresponds to rest with closed eyes and might be related to daydreaming and light meditative states (Hart, 2008). Prolonged beta states correspond to stress, and different kinds of relaxation exercises and music listening help to tone down beta states and go into alpha states (Bonde, 2009). Following Hermansen (2006) it is wise to pause and let the mind have a 'mental field walk' now and then, corresponding to a momentary day dream (alpha waves), if you want to keep the 'window of opportunity' open and learn new things. And for a team it is very important to agree on how to move into a lower gear when it is needed, or else people will lose the feeling of themselves as well as of the others (Hermansen, 2006). Thus the search for movement between different levels of consciousness will support creativity as well as social cohesion.
The PBL group needs to enhance the social engagement, the ability to concentrate, the creativity and the ability to manage stress. The following research results about music listening seem to give answer to the many challenges of the PBL group work: Listening to music often brings people together in the here and now (Bonde, 2009), regulates emotions and relieves stress (Beck, 2012; Helsing, 2012; Juslin & Sloboda, 2010). Music listening in work settings has enhanced concentration and creative problem solving (Lesiuk, 2005). New

research has shown that music activates pathways in the whole brain. Furthermore, activating the auditory system music also engages almost all other neural systems and cognitive functions such as memory, motoric, multi-sensory, attentional and emotional pathways (Altenmüller & Schlaug, 2012; Kraus, Strait & Zatorre, 2014). A recent review of 400 studies of the effect of music on the brain concluded that music improves well-being and health by activating four systems of neurochemicals related to reward and pleasure, stress reduction, enhanced function of immune system and social attachment (Chanda & Levitin, 2013). Music listening combined with guided or spontaneous imagery further increases access to creativity, coping with stress and improved quality of life (Beck, 2012; Grocke & Wigram, 2007). It is also found that there is a correlation between psychophysical health and the ability to manage loneliness and aggression among students who listen to music (Thoma, Scholz, Ehlert, & Nater, 2012).

MUSIC LISTENING INTERVENTION IN PBL

We would like to contribute to the efforts of developing the PBL work in a creative direction with our model of 'music listening intervention' to be used by any group or supervisor for whom these suggestions matches. Basically we think of the listening intervention as a self-helping tool for the group. In PBL it is important that the group takes responsibility and learn how it can optimize the group creativity by its own power. But as mentioned above, sometimes groups need a supervisor to help the group in the right direction, to inspire and find resources.

In the following we present selected music listening methods related to the three areas which we have touched on in the present paper: 'energy regulation', 'group cohesion' and 'flexible consciousness' with a short description of aims and practical use in the PBL group and illustrated by selected vignettes created from our PBL experiences and students' portfolios as well as from our experiences with music listening in other contexts. This section will also serve as a summing up some of our points from earlier sections.

Music is an accessible tool - today most young people carry their music with them every day on their mobile phone or I-pod, and they can easily download new pieces and share their music. It is important to notice that music can affect us in quite different ways, and it will be a creative process in itself that the group and/or the supervisor tries to collect the usable music and stay open to each group member's experiences.

MUSIC LISTENING AND REGULATION OF ENERGY

When: The music listening is used to either support relaxation and thereby reduce the level of stress and tension in a group or to lift up the energy in a group who has difficulties in progressing, is tired or works too slowly.

Why: Most people have experience in listening to music in their everyday life. A very basic capacity of music is to regulate our energy; music affects our nervous system, which generally means that we get either more awake, energized, aware or even alert when the sympathetic part is activated, or we slow down and get more calm, relaxed and reassured when the parasympathetic part of the nervous system is activated (MacDonald, Kreutz & Mitchell, 2013).

How: The group members agree that they need either to lower the level of stress and calm down or they need to lift up their energy. In the first case the group members place themselves comfortably, possibly lie down, and before the chosen music begins they spend a few minutes on focusing on their own breath. The music should be characterized by a slow tempo, and be harmonious, tranquil and predictable.

Case vignette:
A group of four young female students in a PBL group all had difficulties of changing from their well-known way of writing projects to a problem based focus, and they experienced doubt and insecurity. The supervisor suggested that the group used music to reduce their stress level and focus inwards to find some strength, and all of the four listened to Hoppé: "Lavender shadows" sitting on the chairs. Afterwards the students felt they could breathe deeper, and that their minds were clearer. Other music pieces for this purpose could be Bach: "Concert for 2 violins, largo", or Secret Garden: "Dreamcatcher".

In case the group uses music for increasing the energy the students may need to stand up and start by stretching the body before the music begins. And then they can have a group dance and jump to the music! It is also a possibility to lie down with closed eyes and just imagine the dance while experiencing the music in the body. The music should be characterized by stable pulse and rhythmic clarity, and a dynamic structure with both tension and release.

Case vignette:
A project group with a high degree of diversity regarding age and academic level used music to keep up their energy and unite the group (Brown: "I feel good", Ásgeir: "Torrent", Beatles: "With a little help", Larsen: "Tarzan Mamma Mia", Afrocelt Sound System: Whirly-reel-1" and Bond: "Victory"). In the last phase where they had to pull together the threads and unite the different text parts, the group kept up the courage and motivation by dancing

and doing physical exercises together in the breaks. In their portfolio they wrote: "In our work together we have kept a good tone, but our different working strategies and ways of expressing ourselves obviously have triggered some frustrations. We are very satisfied with the way we have gone through it enabling everybody to learn something each from their own perspective".

Case vignette:
Another project group ended up in a very stressful situation before delivering their project, and they kept awake all night to finish their work before deadline. They were extremely tired and also upset because of worries and they had to keep the spirits up as well as they needed to stay awake. They sat with each their own headphones but they decided to listen to the same music, found the suggested piece of music, and counted down; 3,2,1 - in order to start the music at the same time. Now as they sat by their computers working with different parts of the text, they could see each other moving with the music and the music helped them to overcome the pressure and to stay together in spite of threatening emotions. They listened to Seinabo Sey: "Younger (Kygo Remix)" and Kyla La Grange: "Cut your teeth".

MUSIC LISTENING AND GROUP COHESION

When: If the group acknowledges the potential power of community and group collaboration and wants to empower this inherent capacity in order to strengthen the group cohesion and the creative processes. Or if the group of people find themselves in a situation where each of them feels more or less alone and the communication have partly broken down between them.

Why: Music has the ability to bring peoples' minds and hearts together. Sharing a piece of music may exceed the problems of understanding each other`s way of expression. Music is closely connected to our identity, and specific music can indicate the individual as well as the group identity. Or the music may for a while move the attention away from problems in the group work and open up to new qualities within the group.

How: Each of the group members shares his/her own favorite music with the whole group. The group members listen with respect. After listening to the music the person who selected the piece can explain what he or she likes about it, where it comes from, when he/she listens to it etc., and after that the group can share their experiences in listening but without judging the music as good or bad. A further elaboration could be that the group finds 'the group's favorite music'; music that they all like and hear as fitting the group, and develops one or more group playlists to accompany the group through the journey of PBL.

Case-vignette:

A project group with quite young students coming from different cultural backgrounds was experiencing troublesome phases in their group work due to difficulties in understanding each other's way of thinking. The supervisor noticed that several of the group members often worked with headphones on and she curiously asked what the persons listened to, and if they each would like to share a piece of music that represented themselves and could give some energy to the group. The students chose Iglesias': "One day at a time", Morrison's "Wonderful world", Arctic monkeys: "Snap out of it", van Morrison's "Brown eyed girl" and a song that was presented as the "silly one": "The colours of the wind" from the Disney movie Pocahontas. The group felt good about the music sharing, and thought about using the songs when "waves were a little high" or "it all felt awful" to get into a more happy mood.

Case vignette:
In the midst of a project a group had spare time to meet and discuss and take important decisions because of ongoing health issues regarding two of the group members. The level of frustration was growing. There were at least three major directions for the project to take according to the student´s different interests. In a supervision the idea to take a break and listen to a piece of music emerged (two of the students were musicians). The group members listened to Pachelbel´s:" Canon in D", a classical piece with a firm ground but with some development in the melody. Several of the students felt more at ease and more able to listen to the others after the music break, however, one of the students started to cry and revealed her fear of not being able to make it. The group discussion took a new direction where the care of each of the students became part of the final decision of what direction their project should take.

MUSIC LISTENING TO SUPPORT A FLEXIBILITY OF CONSCIOUSNESS

When: If the group is stuck and seems worn out, if the members have been running in the same groove for too long and are in need of new ideas. Or simply when the well functioning group would like support from the music to get access to their inner creativity for example in order to do an open brainstorm afterwards.

Why: The music listening is used to move the focus of attention and give space, for an oscillation of mind - between fantasizing/reflection and academic work and spaces in between and thereby enhance intuition and innovation in the PBL process. It is a kind of 'timeout' or 'mental field walk' where the consciousness of the individual and of the group gets a chance to expand and go beyond the well-known everyday level. The listener may feel stimulated and new pathways are activated in the brain. Probably the brain waves change from beta to alpha and subconsciously the mind will work with a larger amount of data and thoughts.

How: The group take a break from verbal discussion, sit or lie in a relaxed position and listen to a lyrical piece of music with a fairly slow tempo. The music listening can induce spontaneous inner imagery; visual, emotional, bodily or cognitive. After listening, the students share their inner imagery and how it might reflect the group's working process and ideas.

Case vignette:

During supervision the group was stuck with the problem formulating, where too many perspectives had been raised, and no synthesis had appeared. The supervisor proposed that the group listened to a piece of music (Williams: "Romanza for cello and orchestra") with eyes closed, focusing on inner imagery and body sensations. The symphonic music has a light tone and a lot of movement leading up to a climax. After listening the group members shared their imagery. Two group members had felt the music affect their bodies, and one group member had seen an inner imagery of a big blossoming tree with many branches. The fourth group member thought about going to the beach and playing in the waves. The group chose the blossoming tree as a metaphor for an integration of their many perspectives. After that they were able to write down a problem formulation that everybody agreed on.

Case vignette:

In a PBL group of three students with a high level of reflection and ideas, the group used music to enhance the creativity of their work. In a group meeting, after having discussed their work since last meeting and some of their ideas, they felt a little stuck. They decided to listen to a piece of music to let the mind get a break and try to open up for new inspiration. Lying on the floor they listened to Enya: "Carribean blue, remastered 2009". The group members had worked with the creation of a new model, and during the music listening one of the students saw an image of himself moving up a curving road that lead him to see the model in three dimensions, allowing more aspects to be integrated. The other group members were happy about the breakthrough, and the work continued with lots of ambiance.

DISCUSSION

In this paper we have presented PBL as a social musical journey by using the analogy between the music group who improvises and the PBL group in their progressing work. We found inspiration in the analogy in terms of thinking creatively about the project work and the resources as well as challenges that lie in the group work. The limit of this analogy is, that the improvising group usually does not have to work towards an end product - the group can dwell in music making; the listening and in the interacting in the here-and-now. The PBL group needs to balance process and product, and it is important that the devotion to the creative aspects of the process does not overrule the common goal of delivering a high-level product. Secondly we have pointed out the possibility of using music listening in order to

change and develop the way a PBL group is working together. It is our experience that listening to the same music together fosters relationship and opens a door to shared emotions and creativity. But music is not a miracle cure for a bad functioning group with a lack of engagement. When the group members are engaged and willing to experiment, listening to music together can regulate energy, develop listening skills and group cohesion as well as open up to new thoughts and ideas, and the participants will become better 'PBL-players'. But too much music listening without a clear focus or task connected to it, may lead the group away from the track; it is a question of timing and of hold and release in the right proportions. It is also a remaining question if a supervisor with no specific experience in group dynamics or music listening will be able to use the model of music listening. It should be mentioned that we are in an early stage of our research in this area. With more research and feedback from students and supervisors we will develop the model.

CONCLUSION

Creativity, defined as a dialogic ability, is related to a high reflexive level and open-mindedness in the PBL group. To enhance the creativity in project based learning processes, we suggest an increased focus on the musicality of the group; the group dynamics, emotional containment and sharing of emotions as well as the attuned communication between group members. We suggest that the supervisor balances the academic training and theorizing with a supportive attitude towards the social development of the group. Music listening as an aesthetic supplement could serve as a way to stimulate the creativity, develop group cohesion and facilitate energy regulation. Music and musicality plays a vital role in creating and sustaining human social relationships and the relational and potential becoming of the human being as a whole is an opportunity in problem based learning in groups. We hope that musical and social competencies together with the ability to participate in innovative problem solving obtained in PBL work can be transferred to a sustainable and social way of participation in the working communities in our society.

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