CHAPTER 1

Quality in Norwegian Early Childhood Music Education – An Ecological Perspective on Structural and Processual Aspects of Music Practice

Ørjan B. Kines
Nord University, Norway

Tone Rove Nilsen
Norwegian Centre for Learning Environment and Behavioral Research in Education, University of Stavanger and Nord University, Norway

Abstract: This article discusses the quality criteria of musical practice in Norwegian early childhood education and care (ECEC). Much of the current discussion on quality has been shaped by the increased policy demand for evidence-based quality measurements. Demand has led to multiple large-scale quantitative studies on quality that include music as an area of study. Using the Early Childhood Environment Rating Scale-Revised, the research project Better Provision for Norway's Children found that many children have limited access to music materials in ECEC. According to the ECERS-R, this indicates low-quality musical practice. Using an ecological framework, including the theory of affordances and of musical and teacher agency, we analyse findings from ECERS-R and discuss the complex relations between teachers, children, and the environment and the materials they share. Our findings indicate how facilitating high-quality environments for musical practice in Norwegian ECEC are shaped not only by structural aspects, such as access to music materials, but also processual aspects for quality, such as interactions between children and adults and facilitating playful activities that foster musicality. This study has implications for how high-quality musical environments for children can be understood.

Keywords: quality, early childhood education and care, music, music materials, affordances, ECERS-R

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> *'But, Pippi', said Tommy, 'you can't play the piano!' 'How should I know when I've never tried?' said Pippi. 'I've never had a piano to practice on, and I tell you, Tommy, to play the piano without having a piano needs a lot of practice'.*
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> —Lindgren, 2020/1946

Pippi's quote from Swedish children's book author Astrid Lindgren reveals aspects of the practical know-how required to play an instrument. To know, you must try, and this requires access to the instrument. The Framework Plan—the guiding policy document for early childhood education and care (ECEC, or kindergartens) in Norway—makes explicit that music and arts are important, mandating children's access to materials that promote and support musical behaviour (Ministry of Education and Research, 2017). Contrarily, recent studies on the quality of ECEC in Norway reveal that many centres lack accessible music materials for children's play and activities (Bjørnestad, 2019; Vist & Os, 2019). This includes studies on children aged 1–3 and 3–5 in the Norwegian ECEC structure. Commonly, these age groups are combined in the same ECEC centres accounting for 93.4% of Norwegian children of those ages (Statistics Norway, 2022). If the findings from these studies are taken into account, children in ECEC are experiencing Pippi's dilemma in everyday practice. Music materials are an important *structural* condition for both teachers' planned music activities and the facilitation of children's musical exploration and play. Thus, the quality of music practice may arguably rely on these materials. The present article aims to show how music materials and *processual* aspects like activities, interactions and environmental facilitation are intertwined in practice; therefore, the quality of music practice is not reducible to either. Because perspectives on what constitutes practice quality are important on all levels, from policymakers to researchers, teacher-educators, teachers and parents, perceptions of quality may differ. Therefore, the conception of ECEC music practice can vary considerably. We aim to delineate some of these conceptions for anyone with a stake in early childhood music education by asking the following: *How might an ecological perspective on structural and processual aspects*

of music practice influence understandings of quality as measured by ECERS-R?

By investigating this research question, we engage with the larger discussion of general quality in ECEC environments. Much of the current discussion on ECEC quality in Norway has been shaped by increased policy demand for evidence-based quality measurements (Alvestad et al., 2019; Tuastad et al., 2020). This demand has led to multiple large-scale quantitative studies that include music as an area of quality. From 2012–2019, the research project Better Provision for Norway's Children (BePro) investigated quality in ECEC. Using established methodological tools for quality measurements in ECEC, such as the Infant Toddler Environment Rating Scale-revised (ITERS-R) and the Early Childhood Environment Rating Scale-Revised (ECERS-R), the results of the project indicate 'inadequate' quality in Norwegian ECEC environments for musical practice. The original results were made public at the project's end presentation in 2019 (Bjørnestad, 2019), and the present study began after gaining access to the data materials in 2020. Through affiliation with the BePro research project, the current study uses quantitative data materials concerning music practice collected by structured observations and interviews for the mentioned ECERS-R study. Considering that we have specialised backgrounds in a few of the vast numbers of different subject fields implicated in the study, we represent a different perspective when analysing the data. Although the reported lack of materials has quality implications, we question the extent to which they can stand for causal claims about the general quality of music practice in ECEC.

To explore understandings of quality in ECEC music practice and environments, the present article starts by contextualising the *structural and processual aspects of quality* with previous research on both the general quality of ECEC environments and early childhood music education. A section on the theoretical framework for our analysis follows, focusing on an *ecological perspective* for understanding music practice and materials. The *methods* section includes a short description of the larger ECERS-R study but emphasises the music-relevant aspects to be analysed and reported in the *results*. The last section *discusses* different ways of interpreting the results before ending with a conclusion and implications.

Structural and processual aspects of quality

Layzer and Goodson (2006) described the quality of ECEC settings as aspects of the environment and children's experiences that nurture child development. A commonly accepted method for investigating quality is to explore structural and processual aspects of the ECEC environment (Howes et al., 2008; Slot et al., 2015). The NICHD Study of Early Child Care and Youth Development (2002), OECD (2006), Norwegian governance documents (Ministry of Children and Families, 2005) and researchers in Norway (Lekhal et al., 2016; Sommersel et al., 2013) use these aspects. Structural quality characteristics are regulable aspects, such as child–staff ratio, group size, teachers' education, room size and the selection and availability of play materials (Gulbrandsen & Eliassen, 2013; Nilsen, 2021; Slot, 2018). In ECEC, process quality concerns children's everyday experiences and their possibilities for interaction with peers and teachers in play, activities and routines (Howes et al., 2008; Slot, 2018; Slot et al., 2015). Structural features are essential preconditions for process quality and are strongly related to child development, well-being and learning (Vandell et al., 2010). According to Slot's (2018) literature review, the research focus has been primarily on improving aspects of structural quality, making it essential to understand structural features as preconditions for process quality. The expectation is that higher structure and process quality contribute to increased competence and development in children (Ishimine et al., 2010).

Previous research on quality and music in ECEC

Searching databases such as ERIC, SCOPUS and the Web of Science, we have found no international publications looking in depth at *music and movement* in the ECERS-R. This is curious because the reported results from other countries using the ECERS-R for quality measurements, such as Germany and Greece, have comparably low results either in music or the overarching activities subscale (Botsoglou et al., 2019; Gregoriadis et al., 2016; Mayer & Beckh, 2016). The only publication found on music in Environment Rating Scales studies is the highly relevant ITERS-R study

by Vist and Os (2019), which also comes from the BePro project. A study called The European Quality Seal investigated teachers' and parents' perspectives on several aspects of quality in the Norwegian context in 2018–2019; the study found that both educators and parents value music and movement in ECEC highly; for instance, educators score music and movement 5.62/7 and parents 5.82/7 when weighing its importance in ECEC (Tietze et al., 2021).

Susan Young's (2016, 2018) overviews suggest that materials and structural aspects are underrepresented in studies on ECEC music practices compared with singing, social and musical development, and general practices. While Nordic studies follow the same pattern, some include perspectives on music materials or their use in practice (Ehrilin & Tivenius, 2018; Hietanen et al., 2020; Holgersen, 2002; Holmberg, 2012; Ruismäki & Tereska, 2006; Ruokonen et al., 2021). *Musical activities* are traditionally defined as singing, playing, dancing and listening (Holmberg, 2012; Nielsen, 1997). These activities produce aspects of sound, music and movement but may be characterised by different forms of engagement with music. Holmberg (2012) discussed the difference between reproduction and improvisation in different activities, finding that in ECEC singing is characterized by reproduction while instruments are used for exploration or improvisation. Outside the Nordic countries, although the research selection is wider, studies explicitly aiming at music materials or their practices in ECEC are few. Examples (Koutsoupidou, 2010; Stramkale, 2018) showed a lack of accessible music materials, which echoes the Norwegian findings in the BePro-project (Bjørnestad, 2019; Vist & Os, 2019). Bergee et al. (2020) showed how instrumental and vocal-based specialist music teachers have differing understandings of what teaching music is about. Stolic (2015) reported how in-service ECEC teachers prioritise singing activities over instruments and musical play.

The ECEC environment is also a space where children should have opportunities for informal and exploratory music activities. The seminal work of ethnomusicologist Bjørkvold (1989) established children's spontaneous musical utterances as deeply affective connections with caregivers. Internationally, Trevarthen and Malloch (2009) emphasised musicality as a source of prelinguistic communication necessary for affective

connection between infants and caregivers. The abovementioned works, along with research from music psychology as described in i.e. McPherson & Hallam (2016) and Hallam (2017), establish that children are universally born musical. To understand the importance of music materials, we look to the terms *protomusicality* and *teleomusicality* (Schiavio et al., 2017; van der Schyff et al., 2022). *Protomusicality* distinguishes sound production as not motivated by the sounds themselves but rather by emotionally relevant interactions; *teleomusicality* is 'the goal-directed actions infants adopt to interact with the sound properties of their environment' (Schiavio et al., 2017, p. 2). This presumes differing motivational aspects as triggering children's musical behaviours when they interact with materials. van der Schyff et al. (2022) reanalysed Delalande's work on children's sonic explorations and contributed to the argument that musical development involves a 'continuous employment and development of exploratory, expressive and organisational dynamics throughout one's musical life' (p. 164). Delalande and Cornara (2010) can be seen as a rare example of studies on young children's explorations and interactions with musical instruments. Together, these perspectives make obvious the importance of children's sonic explorations of their environments, both solitary and together with peers and caregivers.

Musical agency is a resource for facilitating musical environments; it is a capacity for music-making and sharing musical ideas (Wiggins, 2016), hence enabling educators to facilitate music practice. It is connected to music-as-process in the capacity to *act* musically (Small, 1998), but also musical identity (MacDonald et al., 2002), perceptions of one's own musical abilities or musical self-efficacy (Burak, 2019), and the linking of musical skills and abilities or musicality (Hallam, 2016; Holgersen, 2002). Musical agency is relevant for discussing children's agentive music-making and ECEC teachers' agency as educators/facilitators (Barrett et al., 2019a, 2019b, 2020; Chua & Welch, 2021; Torgersen & Sæther, 2021). Holgersen (2008) pointed to 'conspicuous differences in music teaching practice' (p. 51), describing different educational content for generalist and specialist music teachers, presenting a 'derouting' of music as a subject in teacher training leading to a deficit in music teaching practice. Sæther (2016) explicitly pointed to policymakers' and mass media's focus

on basic skills devaluing informal learning situations. Norwegian teacher educators have reported difficulties maintaining their disciplinary musical identity, pointing to interdisciplinary tensions (Børhaug et al., 2018).

Ecological perspective on music practice

Music is constituted by endless variations of verbal and instrumental traditions throughout historical cultures. Conceptions of music, music psychology and music education have been revised in the past few decades following developments in cognitive science as argued by e.g. Clarke (2005), Elliott & Silverman (2015), Reybrouck (2021), Small (1998) and van der Schyff et al. (2022). These researchers, Elliot in particular, argue for a praxial conception of music as something people *do* in a social praxis, refuting the idea of music as contemplative and passive. Instead, music is never passive; the sense-making (cognition) of music is achieved actively by embodied agents negotiating their social and material environments.

Ecological perspectives on music make interactions and relationships between teachers, children and their material environment understandable; these perspectives are compatible with a praxial conception of music and connect the structural aspects of music materials to their value for musical actions. The ecological theory of affordances has been used within ECEC research internationally (Fathirezaie et al., 2021; Katsiada & Roufidou, 2020; van Liempd, 2020) and in Norway (Sandseter & Storli, 2021; Sando, 2021), as well as in music education (Huovinen & Rautanen, 2020). By affordances we mean understanding the ECEC environment as offering action possibilities (for good or ill) for a capable agent (Gibson, 2015/1979). It is important to note that this means a reciprocal relationship between the agent and their environment and is thus not reducible to either. This worldview implies our 'way of being in the world […as…] characterized primarily in terms of practical action' (Gallagher & Zahavi, 2021, p. 177) and that such practical action is guided by the pick-up (directly) of environmental information through perception, which an embodied agent can use to identify what action(s) are afforded. While Gibson worked with visual perception in mind, the theory of affordances is useful beyond vision and perception. Several theories have expanded on

affordances to include social and cultural affordances (Heft, 2008; Newen et al., 2018). Other examples include research applicable frameworks, such as the 'skilled intentionality' (Rietveld et al., 2018; van Dijk & Rietveld, 2017) and 'environment child friendly' frameworks (Horelli, 2007; Kyttä, 2003). Such frameworks might balance anthropocentric perspectives on learning environments, but an adequate ECEC environment–specific framework still appears to be lacking.

For music educators, an important distinction should be made between agency as *innate* or *emergent* (Priestly et al., 2015). Emergent has temporal and ecological dimensions to agency as being *achieved* '… by individuals, through the interplay of personal capacities and the resources, affordances and constraints of the environment' (Priestly et al., 2015, p. 20). So, in order for musical materials to matter when understanding the relationship between agent and instrument, we must consider the agent's capabilities and intentions and the instrument's physical and cultural properties. And if an instrument is to have affordances for music-making for an agent, it must fit reciprocal criteria such as physicality—which matches motor skills and size, complexity—which matches musical comprehension, and technique requirements and cultural conventions, both of which align with intentions of use. The list of conditions is endless and limits or allows for music-making. Antithetically, musical agency may allow for making music with any object: for instance, a cardboard box as a drum, a set of plastic tubes as melodic percussion and bottles with liquid all make various types of pitches and timbres. If a physical object can produce sound and be bodily manipulated to do so, it can afford music-making. This adaptive exploration of a) acoustical properties of natural materials, and b) the action potential of human bodies, can be argued as the basis for what created music instruments in the first place (Clarke, 2005); this historical exploration is what separates tools from artefacts, or boxes from drums, giving instruments an increased potential for music making. However, this ambiguity is reciprocal: a cardboard box is usable as a drum, and a drum can be a chair or can be rolled as a wheel; indeed, any number of actions fit its physical properties and the intention and capabilities of an agent. Still, the structural aspects of music practice *are* limited by instruments' social and cultural conventions in use and physical properties aside; the children

must experience these values for themselves to share in conventions. It is valuable to educate on these conventions, even if it is great fun to 'drum' on cardboard boxes. In contrast, a proper drum affords a greater range of musical expressions and cultural belonging than boxes. However, it cannot be taken for granted that conventional use is obvious in the material essence for a child. Instead, children need access and social guidance to make teleomusical explorations of the musical actions that instruments afford (van Der Schyff et al., 2022).

Methods

Several quality assessment tools have been designed to assess global quality in ECEC (Ishimine & Tayler, 2014). In the wake of the increased pressure for quality measurements in Norwegian ECEC, multiple large-scale quantitative studies have been conducted (Tuastad et al., 2020). One of these is the ECERS-R study done by the research project Better Provision for Norway's Children (BePro). Through our affiliation with this research project, we present materials from the ECERS-R concerning music activities and explore and analyse the results in depth. The data have been accessed with approval from the project owners, and we follow their guidelines concerning the data's treatment and use. In Norway, 205 child groups with children aged three to five years were assessed using the ECERS-R in 2015–2016 (Bjørnestad et al., 2013). In the ECERS-R study, certified researchers systematically observed each child group for three to four hours, followed by interviews with educators, if necessary, to attain sufficient information. The ECERS-R measures quality divided into 7 subscales consisting of 43 items and containing a total of 397 binary indicators (Harms et al., 2005). To explore music practice, we have focused on item 21, *Music and Movement* from the activities subscale. In the present study, we use a limited number of indicators and results from the ECERS-R study and, thus, present the methods and perspectives we use in our data analysis. We direct anyone with an interest in the broader implications of the study to explore respective reports or other BePro publications (goban.no).

Item 21, *Music and Movement*, contains 10 indicators, as shown in Table 1. We can identify separated structural and processual indicators,

such as materials, variation and activities. Further, the structural indicators may particularly benefit from further definitions. According to the creators of the ECERS-R method instructions, *music materials* 'are anything that children can use to create or listen to music' (Harms et al., 2005, p. 213). *Accessible* means the children should be able to reach and use them by themselves, and *some/many* means more than one/enough for at least half of the child group simultaneously and for at least one hour a day.

Table 1. ECERS-R, item 21 Music and Movement (structural aspects highlighted)

Level 1 (inadequate)	Level 3 (minimal)	Level 5 (good)	Level 7 (excellent)
1.1. No music/ movement experiences for children	3.1. Some music materials accessible for children's use	5.1. Many music materials accessible for children's use	7.1. Music available as both a free choice and group activity daily
1.2. Loud background music is on much of the day and interferes with ongoing activities	3.2. Staff initiate at least one music activity daily	5.2. Various types of music are used with the children	7.2. Music activities that extend children's understanding of music are offered occasionally
	3.3. Some movement/ dance activity done at least weekly		7.3. Creativity is encouraged with music activities

Original scoring for items is done in hierarchical levels. The score requires all lower-level indicators to be positive (or negative for level 1), as well as all indicators on any given level. For example, to score 3, you need all indicators on levels 1 and 3 to be positive, and if one indicator on level 3 is negative, the maximum score is 2. Scores are deemed to range from 'inadequate' to 'excellent' based on their level. Usually, observers end the registration when an indicator has failed; however, for the Norwegian study, the project owners employed an alternative scoring method that scored every indicator regardless of its conclusion. This provides opportunities for an alternative analysis of the collected data.

Analysis

Exploring the results from the ECERS-R study with regard to item 21, *Music and Movement*, we apply a descriptive analysis of the data (Cohen et al., 2018). We do this with an understanding that our own horizons for interpreting the data are different from those who conducted the original studies and that our own presuppositions and experiences are reflected in the results (Kivunja & Kuyini, 2017). We pragmatically consider the data materials to represent aspects of everyday life, or phenomenologically speaking, the lifeworld, even though they are represented through numbers and binaries, which in turn represent fragments of everyday life in ECEC music practice. A qualitative strategy laid out by Brinkmann 'towards the social and personal worlds in which we live' (2012, p. 38) lends two approaches that we have employed: first, 'making the obvious obvious', in that the observations made by the ECERS-R researchers are representative of *a* truth about the lifeworld that we wish to make obvious and, second, 'making the obvious dubious' by questioning the meaning of music materials, here by using ecological perspectives to show how 'endlessly ambiguous' they can be (Brinkmann, 2012, p. 24).

Because our interest was explicitly in the music and movement item, we aimed to dig deeper into those specific materials found in the ECERS-R study. First, we looked for other quality indicators in the data materials than the ones given by the original scoring schemes; that is, we looked at supposedly higher tier indicators in the ECERS-R study without following the scoring hierarchy. Second, we looked for discrepancies within the material across indicators that included child groups, observers and child age. The data materials were opened and analysed digitally using statistical software SPSS and the Excel spreadsheet programme. Some comparisons between indicators were possible to make automatically using analytical tools in SPSS, while others needed manual sorting and coding, which were easier to do in Excel.

Results

The results from the ECERS-R study, as originally reported by the BePro Project, are important for our analysis of the quality of early childhood

music education. Because of this, we also implicate the original results in our analysis, briefly presenting the original results of relevance to music before proceeding into our analysis of the data material and discussing some methodological considerations. From the original analysis of the results from the ECERS-R, the scoring scheme puts item 21 *Music and Movement* at a 2.6 average out of 7 (Bjørnestad, 2019). This gives an *inadequate* score on quality and does not reach the minimal level of 3.0.

In the spread shown in Figure 1, we can see that 55.6 % of the participating ECEC departments get a score of 2, and less than 5 % get a score ranging from good (5) to excellent (7). These scores put music/movement at the lowest 3 of all 37 items studied. As can be seen in Figure 1, most of the child groups end up at either 2 (55.6 %) or 4 (20.5 %). Notably, in the Norwegian context, the subscale of activities (items 19–28 where music is number 21) have received the lowest scores for all subscales measured in the ECERS-R study; When comparing item 21 to other items within the activity subscale, we find that music receives one of the lowest scores of all items. With the exception of art (4.2), the mean scores are at the minimum or inadequate level for items such as fine motor materials (3.8), music/movements (2.6), blocks (2.3), dramatic play (3.7), nature/science (3), math/number (2.6) and materials promoting acceptance of diversity (3.6).

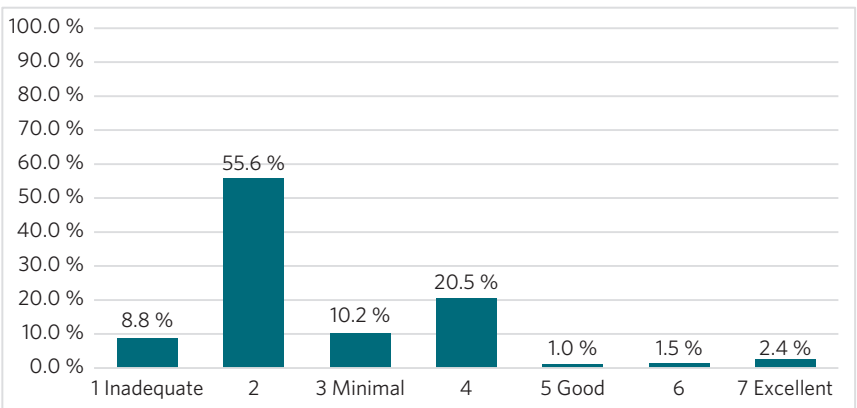

Figure 1. Original scores ECERS-R item 21 Music and Movement

For our analysis, we disregarded the restrictions of the original scoring scheme and looked at what the alternative data could tell us from an open perspective. From the spread on item 21 *Music and Movement* (Figure 2, highlighted), we can see that only 40 % of child groups fulfil the requirements for indicator 3.1. *some materials,* and only 6.3 % for indicator 5.1 *many materials*. Therefore, we can identify the cause of the inadequate scores as directly related to the results on these two indicators. Because 60 % fail on indicator 3.1, this explains why 55.6 % fail to score more than 2. The same goes for most of the remaining child groups, who score 3 and 4 because 93.7 % cannot get past indicator 5.1. The results show that the poor quality of music and movement is because of a lack of accessible materials for the children. This is the same cause for the original results for the ECERS-R study as reported in the project's main findings at the end presentation (Bjørnestad, 2019) and for the infants and toddlers study (Vist & Os, 2019). To put these results in more practical terms, in 60 % of the participating child groups, the ECERS-R researchers could not identify two different materials that were accessible for the children (visually for the 0–3-year-olds), including listening devices like a CD player or a portable speaker. In 93.7 % of child groups, there were not enough materials accessible to engage half of the group to play music together in a group setting. Regardless of the scoring, these results reveal a severe lack of access to music materials in the participating child groups.

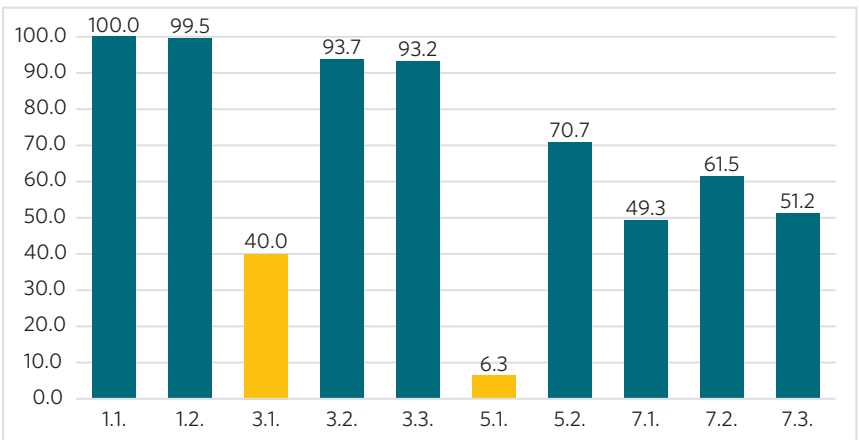

Figure 2. Alternative results spread item 21 Music and Movement, full indicator description in Table 1

Outside the structural indicators, we can, by looking at all indicators in the item, find qualities that the original scoring scheme does not reveal. For example, we find at level 3 that most of the child groups (93 %) offer music activities daily and dance/movement activities weekly. Also, in the higher levels, we find better results in 5.2. musical variation (70.7 %), 7.1. free choice and group activities (49.3 %), 7.2. extended musical experiences (61.5 %) and 7.3. creative music activities (51.2 %). In particular, the indicators at levels 5 and 7 are masked by the scoring scheme. If not for failing on the material indicators, it could have been possible for up to half of the groups to score at the top level. Most of the child groups do have music and movement activities on a daily and weekly basis (93 %). For almost three-quarters of the groups (70.7 %), these activities include a varied musical repertoire, and for around half of the groups, the activities also include free choice group activities where creativity is encouraged. Of course, this paints a different picture than the original scoring scheme's results. These alternative results tell us that there are music activities happening in the child groups, with varying attributable quality indicators, not as numerous or good as might be desired, but they are a lot better than what the original score of 2.6 suggests. Because the materials appear to be missing, we are left to assume that most of these observations are of activities other than playing instruments, such as singing, listening, and dancing.

Because we were looking for discrepancies within the data material, we have made comparisons between different child groups in the same ECEC centres. In fact, 70 of the 93 participating centres have more than one child group included in the data materials. This means that if we disregard for a moment the 23 centres that do not have more than one participating group, we can compare groups within the same centres. In the case of music and with respect to the few centres that originally score high (>5, n=10), nine have large discrepancies in the same centre that put the score difference between child groups at 3–5. Because of this occurrence, we can see that the child groups that have scored high (5–7) on item 21 music and movement have groups in the same centre that have scored low (2–3). This finding is interesting because it suggests that general structural aspects that are most likely similar within the same centre,

such as economy, leadership, child–adult ratio and facilities, are not what cause the quality results in music and movement. From what is shown in our alternative results indicating that poor quality is due to lack of accessible materials, this finding shows that the lack is most likely because of child group specific aspects. In other words, having a child group with a high score where materials are accessible is not a good predictor for that centre or other groups within that centre. We have also checked for discrepancies on item 21 between the different researchers who had made the observations in case some had somehow systematically over- or undervalued some of the indicators. We found no significant patterns of difference in how they had scored the relevant indicators across their observed child groups.

As for the methodological considerations of the ECERS-R method, our biggest concern is with the scoring scheme. Although the ECERS-R has separate indicators for processual and structural aspects, as we have shown, the scoring scheme's hierarchy tends to bottleneck between them. Extensive critique has already been put forth about the scoring scheme's tendency to eschew results by overemphasising material environments and undervaluing interaction (Gordon, 2015). Because of this—and because BePro has used an alternative scoring scheme—there is no need to dedicate much effort to furthering the critique here. The quality implications of the missing materials are contrarily necessary for discussing music practice.

Discussion

What can the ECERS-R tell us about the quality of Norwegian early childhood music education? And how might an ecological perspective on processual and structural aspects influence these understandings of quality? At the surface level, the original results from the ECERS-R contradict those from studies like EQS. Keeping in mind these are not the same participating child groups, EQS has shown that parents and educators highly value music (Tietze et al., 2021), but the ECERS-R does not reflect those values in its results. The results from the study of toddlers and infants by Vist and Os (2019) is similar. This indicates that the

perceived values of music by parents or educators are not what leads to missing materials. Our analysis of the ECERS-R shows large discrepancies between child groups in the same ECEC centres, indicating that the missing materials are not primarily caused by structural aspects of an external origin. External aspects like child–staff ratio, child group size, economy and centre leadership or policy would make for plausible explanations and be relevant for material facilitation. However, if external factors were the main cause for few observable instruments, such a wide variation between child groups in the same centres would be unexpected.

From the perspective of ecological and praxial music education, we find three contesting perspectives between processual and structural aspects in the ECERS-R results. These perspectives look at the missing music materials in light of music activities, music materials, and material facilitation. Neither are reducible to account for the quality of music practice individually, hence reflecting the complexities in an ecological perspective on music education. Although these perspectives can be claimed to represent false dichotomies, questioning assumptions about the music material concept effectively reveals how perspectives shape understandings of quality. Before expanding on these perspectives, we argue that the quality of musical practice cannot be defined on the singular grounds of music instrument presence in the environment; this claim is easily refuted by the existence of high-quality musical performative traditions that rely on no music materials but rather on embodied practices, techniques and/or natural materials. Instead, musical instruments must be understood as artefacts with cultural and social values and meanings that promote elevated or specialised affordances for music-making. This assertion makes instruments valuable, but not imperative, for music-making, pointing to the futility of separating the structural and processual aspects of music practice. Obvious flaws in this kind of separation include the risk of upholding a Eurocentric understanding of music as elitist, where only the initiated in a set of limited technical skills are included (Young, 2018), and running in direct contradiction to universal and praxial views on music and music education (Bjørkvold, 1989; Elliott & Silverman 2015).

Music activities

First, one perspective on understanding the relationship between processual and structural aspects in the present study is ECEC music practice being focused on different activities. The alternative results presented in this article show that most ECEC centres do have observed music activities; yet the reported lack of materials implies that these activities are centred around singing or dancing. Vist and Os discussed music activities in the Infant Toddler Environment Rating Scale, stating this perspective as '[b]luntly put, if music is defined as playing instruments in one culture and singing in another, the validity of the results is affected' (2019, p. 14). Musical cultures vary, and the role of vocal and instrumental music also varies. However, this is not a sound reason to blame a potential lack of validity in ECERS-R on cultural differences; rather, it depends entirely on the perspective on quality music practice that this validity is addressing: if addressing only educators as facilitators of an affordance-rich environment, where children opportunely explore on their own accord and interact with different music materials, then the results' validity is unaffected. In such a case more materials would indeed equal better quality. The main concern should be the connection with previous research showing how singing and playing instruments represent different pedagogical traditions (Holmberg, 2012), along with research showing the prevalence of singing activities over playing instruments (Ehrlin & Tivenius, 2018; Stolic, 2015). Holmberg asserts that singing activities are characterised by reproduction, and are separated from playing music or sound exploration with instruments; at the same time, they should not be seen as opposing, as, according to Nielsen (in Holmberg 2012, p. 3), the reproduction of music is foundational for musicality and musical skills development.

These separated practices would arguably fail to accommodate children's needs and rights for self-expression and participation. Also, it lacks a perspective that includes how children explore their sonic environments in teleomusical acts that foster 'more complex and cooperative musical activities' (van der Schyff et al., 2022, p. 166). There is no either/or: quality music practice must include as many forms of activity as possible, and maintaining aspects of both reproduction and more playful or explorative characteristics is required. Using other activities as an excuse

to not facilitate materials is certainly inadequate when the Norwegian Framework plan is clear: children should have access to these materials to promote and support musical behaviour. Accordingly, there is ample reason for arguing, with support from policymakers, that the poor original results from the ECERS-R caused by missing materials indeed constitutes poor quality.

Music materials

The second perspective is that because playing music can be done by playing on objects not specifically constructed for this purpose and/or with bodily capabilities, it makes for a shaky argument to assert that instruments are imperative for music-making. It could very well be that music materials would be reported as lacking in the ECERS-R results if music practices were based on music-making with materials not identified by researchers as being for this purpose. A hypothetical justification could be that 'we don't need instruments because we play music with our bodies and natural materials'. This is an approach to music practice that we applaud and would consider part of a rich and diverse practice; and yet, it is not as an excuse to neglect facilitation with proper instruments. As discussed earlier, instruments have specialised affordances for music-making, and to deny knowledge of this is effectively comparable with asking every child to reinvent the wheel. Also, we would argue that fulfilling a diverse and high-quality music practice based on natural materials is more demanding in terms of what it requires of a teacher's musical agency and competence. An ecological view on music-making entails that musical agency is an emergent capacity achieved in the environment (Priestley et al., 2015). In this case, it means that if an agent's intentions are directed at making music, perception is attuned to identify affordances in the environment to achieve this. Someone musically trained, with sufficient musical agency and with an openness to sounds and materials in the environment, would arguably be able to make music on a wide range of objects by manipulating them to produce sounds and further organise them into musical structures. Even though some musicians and music teachers have such skills and open perspectives on music-making

(perhaps drummers more than others), it is not a traditional emphasis in most generalist or specialist music teacher education programmes with which we are familiar. Also, research shows that pre-service and in-service ECEC teachers complain about a lack of music materials, not sticks and boxes (Koutsoupidou, 2010; Stramkale, 2018). If it were the case that the average teacher possessed the musical agency required to fulfil a quality musical practice with random objects, these reports, and the validity of studies measuring music materials like the ECERS-R, would be difficult to find.

Facilitation

Third, because music instruments offer cultural values and knowledge, facilitating them in children's environments can be considered ethical aspects of professional mandates given to ECEC teachers. This follows from the Norwegian FWP and children's opportunities for musical exploration on their own terms. However, following the causal line from the ECERS-R that lacking instruments equals poor quality, ECEC centre or child group leaders may be misled into thinking that acquiring materials instantly increases the quality of music practice. These interpretations are reasonable and acquiring music materials and making them accessible is praiseworthy. Also, a previous study suggests the following: 'Enriching existing activity areas, by adding materials that can trigger children's exploration can positively affect children's social and cognitive behaviour' (Van Liempd, 2020, p. 10). However, these materials by themselves can only doubtfully change practice or increase quality on their own: considering the 'inviting character' of music instruments—whether deterministically inviting behaviour or not—they are also ambiguous as to how they can be used. A child might use a ukulele as a hammer or a drum as a hat, which means to some degree that the formal conventions of use as an instrument for music-making must be learned in practice. This practice requires adults with knowledge of conventions to establish a formal framework within which children can operate freely.

This questioning of musical materials as a stable concept we have discussed might make it seem easy to conclude that the original results

from ECERS-R have no legitimacy because of the scoring mechanism's emphasis on materials. Instead, we should look pragmatically at what the results could represent: a good opportunity for revealing indications of potential troubles in practices. Therefore, our suggestion is to not take the original results at face value as causal relationships between practice and quality, but instead to look at them as an excellent opportunity to uncover where research effort should be put moving forward. If parents or educators highly value music and external aspects do not limit child group possibilities for making music materials accessible, why are they missing? The ECERS-R has not revealed this; it has only indicated that they probably are missing. And following these two indications, we would suggest that any answers would need to be found in individual child groups and their staff. Their mandate as facilitators of a musical environment for children is based on their own musical agency and subsequent conceptions of music and music materials. If there is a 'deficit' in music practice, to use Holgersen's (2008) term, as indicated by the reported lack of accessible music materials, this seems more likely to be caused by a lack of musical teacher agency than the materials themselves. However, if researchers cannot reliably recognise quality music practice or if we naïvely assume that we know what counts as such, our theoretical generalisations are unfounded and will, in turn, lead us astray.

Conclusion

Throughout the present article, we have shown through theory, empirical materials and discussion how the perspective on structural and processual aspects of music practice influence understandings of quality. There may be high quality practices with activities other than playing instruments, just as there may be good quality practices making music with the body or natural materials instead of instruments. However, to ensure children's rights to explore and express their musical worlds, a good quality ECEC environment must include accessible music materials. Considering such facilitation imperative, it is still not adequate to make claims about the general quality of music practice without also

knowing the extent, how and what the materials contribute to children's opportunities for music-making.

Implications

The ecological complexity that makes up quality music practice in ECEC is not easily captured in research. We agree with the sentiment of Vist and Os (2019) that 'there are no good arguments for not providing toddlers with instruments for their musical development, interaction, expression and play' (p. 11), and we make a case for well-founded reasons and methods for any interventions in provision. Because the ECERS-R reveals scant explicit information about why materials are missing in these ECEC centres, further exploration is needed to ensure music materials actually contribute to a higher quality musical practice for children. Further studies addressing the lack of knowledge about material music practices in ECEC and diving deeper into explaining the reasons why materials are missing are necessary; these studies must maintain a perspective that appreciates the complex nature of such practice environments.

Limitations

Although studies like the ECERS-R aim to measure quality globally across many categories, and separating an individual category for study contradicts the intended aims, we feel that the Norwegian study reveals important aspects of musical practice in ECEC that should be discussed when considering both practice development and future research. Studies like the ECERS-R have strengths and weaknesses because all quality measurement tools, and the adequacy of the measures involved, reflect the assessment's context and purpose. Still, we maintain through a pragmatist worldview that this perspective is important for attempting to understand practice and determine a useful direction for further exploration. To ensure scientific reliability, we have striven for transparency in how we have conducted these analyses and explained our reasoning behind them. We have actively chosen the theoretical and methodological tools at our disposal because we feel they address the problem in the most accurate way possible.

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