

Problem-based Learning, Composing and Assessment in Music Education: action-research in a portuguese school

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Aprendizagem Baseada em Problemas, Composição e Avaliação em Educação Musical: investigação-ação numa escola portuguesa

Resumo: Este artigo apresenta um estudo realizado numa escola portuguesa ao longo de um ano letivo, conduzido por uma professora-investigadora numa turma de música do oitavo ano (média de 13 anos de idade). O estudo também contou com a participação de dois outros professores para a implementação de uma atividade supervisionada. Problematisa-se se a interseção da Aprendizagem Baseada em Problemas com a composição e, numa abordagem de avaliação autêntica, configura-se uma via conceptual e pedagógica para o desenvolvimento do pensamento crítico, criativo e holístico, da cooperação, e da avaliação das aprendizagens. A investigadora realizou entrevistas com alunos e professores, seguindo uma abordagem de investigação-ação. Os resultados apontaram para possibilidades de ensino com foco na aprendizagem através da composição e do trabalho cooperativo, neste incluindo-se uma experiência de avaliação partilhada. As mais valias refletiram o desenvolvimento de competências musicais, criativas, sociais e de resolução de problemas, e os constrangimentos remeteram para a adaptação dos alunos às estratégias planeadas e à complexidade da avaliação. As implicações do estudo residem na possibilidade de ajustar a matriz conceptual/organizacional concebida a outros cenários pedagógicos e atender a critérios de avaliação complementares.

Palavras-chave: Aprendizagem Baseada em Problemas, Avaliação Autêntica, Composição, Educação Musical, Trabalho Cooperativo.

Problem-based Learning, Composing and Assessment in Music Education: action-research in a portuguese school

Abstract: This article presents a study conducted in a Portuguese school over the course of an academic year, led by a teacher-researcher in an eighth-grade music class (average of 13 years old). The study also involved the participation of two other schoolteachers for the implementation of a supervised activity. It is problematised whether the intersection of Problem-Based Learning and composition in an authentic assessment approach, constitutes a conceptual and pedagogical pathway for the development of critical, creative, and holistic thinking, as well as cooperation and the assessment of learning. The researcher conducted interviews with pupils and teachers, following an action-research approach. The results indicated possibilities for teaching focused on learning through composition and cooperative work, including a shared assessment within this framework. The benefits reflected the development of musical, creative, social, and problem-solving skills, while the constraints were linked to the pupils' adaptation to the planned strategies and the complexity of learning assessment. The implications of the study lie in the possibility of adapting the conceptual/organisational framework to other pedagogical contexts and addressing additional assessment criteria.

Keywords: Authentic Assessment, Composition, Cooperative Work, Music Education, Problem-based Learning.

Aprendizaje Basado en Problemas, Composición y Evaluación en la Educación Musical: investigación-acción en una escuela portuguesa

Resumen: Este artículo presenta un estudio realizado en una escuela portuguesa durante un año académico, liderado por un profesor-investigador en una clase de música de octavo curso, con la participación de otros dos profesores en una actividad supervisada. Se analiza si la intersección del Aprendizaje Basado en Problemas y la composición, dentro de un enfoque de evaluación auténtica, favorece el desarrollo del pensamiento crítico, creativo y holístico, así como la cooperación y la evaluación del aprendizaje. A través de entrevistas con alumnos y profesores en un enfoque de investigación-acción, los resultados indicaron que este enfoque permite el aprendizaje mediante la composición y el trabajo cooperativo, con una evaluación compartida. Los beneficios incluyen el desarrollo de habilidades musicales, creativas, sociales y de resolución de problemas, mientras que las limitaciones se relacionan con la adaptación de los alumnos a las estrategias y la complejidad de la evaluación. Las implicaciones del estudio residen en la posibilidad de adaptar el marco conceptual/organizativo a otros contextos pedagógicos y abordar criterios de evaluación adicionales.





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Palabras clave: Aprendizaje Basado en Problemas, Composición, Educación Musical, Evaluación Auténtica, Trabajo Cooperativo.

Introduction

Critical, creative and holistic thinking, cooperation, and self-regulated learning have, for several decades, been regarded as key educational ideals, discussed and advocated worldwide (OECD, 2017/2024). These principles are integrated into educational agendas and curriculum frameworks – including in Portugal and within the field of Music Education – which require models that prioritise pupils and the construction of knowledge.

The approach to music learning through composition (MLC) has contributed to the study of pathways that enable responses to these challenges, as supported by several authors (e.g. Rusinek, 2012). This is particularly evident in the benefits it offers for the development of opportunities grounded in the construction of learning, where the processes of discovery and musical signification stand out. In turn, these emerge from experiences of inquiry and imagination, resulting from direct engagement with sound rather than abstract concepts.

Such experiences are, in themselves, pathways for action and the search for solutions to specific problems, serving as opportunities for the mobilisation of musical understanding as well as critical and creative thinking. In a similar way to other educational contexts, Project-based Learning (PBL) is widely discussed in existing scientific literature as an alternative to content- and teacher-centred education. It provides a conceptual and methodological framework that is essential for guiding and planning teaching practices.

This article explores the development of MLC within PBL scenarios, integrating assessment strategies aligned with authentic evaluation frameworks. This paper presents an empirical study conducted during the 2014-2015 academic year¹ in an eighth-grade music class at a public school in Lisbon. Located in the central-eastern part of the city, the school was characterised by a multicultural and

¹ Although the field research proceeded without any interruption, the delay in writing the article is justified by constraints related to the health of Author 1.



socially diverse pupil population, with a significant number coming from low-qualification backgrounds. It was known for an educational approach that placed particular emphasis on the arts, with Music Education playing a key role through a range of subjects and projects, such as musical theatre and a school orchestra.

Led by a researcher-teacher (RT) and later involving two other schoolteachers, the study aimed to investigate teaching, learning, and assessment possibilities to enhance music education through composition and PBL. Using an action-research approach, it sought to design a structured framework for these processes and to identify the benefits and challenges from both pupil and teacher perspectives.

Theoretical Framework

Music learning through composition and Problem-based Learning

MLC in the field of music and PBL in broader educational contexts both seem to be linked in scientific literature to the potential they offer as pedagogical and methodological approaches for addressing the emerging challenges in education discussed here (Vasconcelos *et al.*, 2023). Findings from research in both areas suggest, philosophically and empirically, convergent and powerful contributions to the design and implementation of learning scenarios within the lower secondary music curriculum, further reinforcing their relevance as an evolving and expanding field of study (Wiggins, 2003).

Teaching, learning, and assessment practices centred on sound and music themselves – rather than on what is critically referred to as “labels” (Gordon, 2000; Wiggins, 2001) – encourage a deeper understanding of the musical phenomenon, which is achieved through reflective music-making, as inquiry, exploration, intuitive imagination, and critical reflection, instead of through strategies focused primarily on reproduction or theoretical and notational identification (Hickey, 2003; Mills; McPherson, 2006; Reimer, 2022; Webster, 2016).

MLC, while not presented as a theoretically organised epistemological model structured to pedagogically support and guide pupil-centred music teaching paths, nevertheless reflect and embody ways of conceiving and acting in education that identify and connect with the paradigm underlying PBL itself. In educational

literature, the specific process of composing is identified, albeit not specifically versed in PBL, as a mean of problem-solving (Berkley, 2004; Yang, 2014).

Examples of problems arising in the music curriculum context would be: researching sound solutions for graphic or pictorial representations or images; unveiling, classifying and interpreting them through musical instruments (including the ear, body and/or voice); allegorically associations or dichotomies (timbres, textures, combinations of durations, rhythms and pitches, forms, temporal structures); transform preexistent products or ways of performing or writting with unexpected ideas (different metric, scale, form of a song, non-conventional timbres from an instrument); give sound meaning to unusual notational representation; classifying and sonorizing stories, characters, poems or images through metaphorical imagination – achievements also capable of integrating specific artistic, interdisciplinary and cultural projects (e.g. performances, theater, movies) (Vasconcelos *et al.*, 2023).

These ideas closely resemble those commonly described as means or routes of musical creation, correspondingly favoring forms of knowledge discovery and application that use imagination, divergent thinking (coordinated with convergent thinking), critical thinking and evaluation – also related to creative thinking, as well as self-regulatory phenomena, and self- and peer assessment (Beineke, 2018; Blackwell; Roseth, 2018; Burnard; Younker, 2004).

There is also the interrelated realisation that self-regulatory processes also appear to arise from shared learning situations that emphasise cooperation (Luy-Montejo, 2019). This returns insights into the meaning of learning in a group context, especially as regards that which, iteratively, also translates into the mobilisation of creative and critical thinking in the field of music education and alongside the management of motivations applied to solving tasks challenges (Gardner, 2008).

In the Portuguese context, the most recent normative documents attribute relevance to experimentation/creation, deemed essential to the “development of meaningful learning” (ME, 2021, p. 3), as illustrated in Figure 3. Additionally, this constitutes a privileged domain for the experience of holistic musical practices, through the exploration of facets such as timbre, rhythm, pitch, expressive elements, form, genres and cultures of the world, perceived as “clarifiers,

facilitators and systematisers of pupils' listening, practice and creation" (ME, 2021, p. 4).

This allusion to holism as a natural and "real" (non-formal) way of living experiences of meaning construction, emerging from the principles of Gestalt theories (Dewey, 1997; Reimer, 2022), not only finds an echo in what was inferred from creative and compositional experiences by Bamberger (1977), Hickey (2003) and Wiggins (2003), as it constitutes another facet of contemporary pedagogical thought, exemplified by the recent Sound-based Pedagogy (Recharte, 2019; Veloso; Foletto, 2025) and approaches to music teaching and learning practices that go beyond the alternative offered by MLC (Green, 2012).

PBL is based on the principles of constructivism, rooted in the Socratic maieutic of classical Greece, particularly in the privilege given to dialogue and the pursuit of knowledge through inquiry, as well as in the ideals of the active school, that emphasises the value placed on the pupil as an agent in their own learning. "Problems are the heart of PBL" (Hung, 2006, p. 56). Their formulation in education may have complex contours as this focuses on competencies and/or content and often requires interdisciplinary, or even multidisciplinary solutions, with mobilization of holistic skills and frameworks of action (Hmelo-Silver, 2004). Nevertheless, the phenomenon of self-regulation (and critical thinking) underlies the entire process and experience of problem-solving. Perceived as one of the guiding principles of this model, it simultaneously emerges as an end and a learning competence.

While Hung (2006) maintains problems are at the heart of PBL, according to Mennin (2007), the same can be said about small-group learning. The reference to the school's cultural role and to its position in the social construction of knowledge contributes to supporting such concerns and to teaching visions driven by the co-construction of learning in the classroom, in accordance with the respective social reality of scientific and empirical thinking and acting (Verenikina, 2010).

This outlines the context that renders theoretical support to cooperative learning, often portrayed in literature and empirical research alongside the potential for ensuring the mobilisation of aspects such as communication, sharing and creativity; the same ingredients highlighted for managing and constructing motivational and self-regulatory processes (Gillies, 2014; Luy-Montejo, 2019). Thus,



we are talking here about the teacher as a guide for learning or as a “facilitator” (Hmelo-Silver, 2006; Williams, 2012). The promotion of environments favorable to community spirit, cooperation, and dialogue is therefore a crucial teacher competency (Johnson; Johnson, 2008; Weeb, 2009).

Assessment process within the context of problem-based learning and composing

Assessment in PBL poses challenges as it extends beyond factual knowledge, encompassing pupil-centred and self-directed learning (Moust *et al.*, 2005). To differentiate traditional assessment from approaches that support PBL, the concept of authentic assessment is widely used. This approach has become common in various educational contexts, including music education and teacher training, and is linked to the notion of the reflective teacher (Carvalho, 2017).

The movement towards authentic assessment began in the 1980s and focuses on pupil engagement in creating responses to questions or problems. It is based on the idea that knowledge has multiple meanings that cannot be measured objectively but are understood through the subjective and intersubjective perspectives of those who possess it (Savin-Baden; Major, 2004). This assessment involves an initial analysis of the learning objectives within the challenge and may consider factors such as content acquisition, reasoning processes, and pupil collaboration (Hung, 2006; Lambros, 2004).

In the context of PBL in music, assessment activities are designed to reflect real-world musical experiences, encouraging pupils to engage in tasks that have applicability beyond the classroom (Burrack; Parkes, 2020; Ruiz; Saorin, 2014). The concept of authentic assessment, understood as genuine and meaningful, aligns with this approach. Furthermore, self- and peer assessment play a crucial role in promoting self-regulation of learning.

These processes enable pupils to reflect on their own progress and assess their peers, thereby enhancing their understanding of learning objectives and fostering critical thinking. Such practices are essential for developing autonomy and responsibility in learning (Fautley; Colwell, 2018; Burrack; Parkes, 2020). In music education, peer assessment is commonly used for evaluating end products like group performances, but can also be applied to the work process, which is more visible to group members than the teacher (Odena, 2018; Philpott; Evans, 2016).



Although no specific studies on PBL music assessment have been found, research in other fields, particularly higher education, supports the effectiveness of self- and peer assessment. These studies highlight how students feel empowered in evaluating the educational process and their own participation and show the reliability of these strategies in non-summative contexts (Lenkauskaite *et al.*, 2021; Machado *et al.*, 2008; Segers; Dochy, 2010).

In PBL, the teacher provides formative feedback to guide pupils' learning. Feedback plays a crucial role in authentic assessment by offering constructive insights that help learners improve, rather than just evaluating final outcomes (Hmelo-Silver, 2006; Koç, 2018). Checklists are commonly used in PBL environments to assess competencies, using rating scales to identify achievements and their quality (Nierman, 2001). The validity and reliability of assessment tools are essential for ensuring quality, with their development focused on reducing errors in the assessment process (Hargreaves, 2007).

Rationale and Purpose of the Study

The study's problematic is based on two key aspects: (a) The first is author's 25 years of experience as a music teacher in Portuguese schools, alongside her accumulated practical knowledge. This aligns with recent research (Nascimento; Vieira, 2024) in which the authors carried out a systematic review of the literature focusing on studies published between 2018 and 2023 on pupils' perspectives on music education in Portugal.

Findings suggest that pupils (still) seek more motivating lessons, involving instrument playing, singing, composing, listening, movement, and musical games, where they can express themselves musically with high competence. However, despite efforts, music education continues to reflect a tendency towards content-based, teacher-centred approaches; (b) Two previous studies by the authors. The first (Vasconcelos *et al.*, 2016) showed that pupils better understand and engage with music when actively involved in knowledge construction, particularly through group composition activities and teacher-facilitated learning with formative feedback. The second (Vasconcelos *et al.*, 2023) explored international research on music education, supporting the potential connection between MLC and PBL in music classes.



Methodology of the Study

Action research (AR) has been a key methodological approach in qualitative educational studies for decades (Carr; Kemmis, 1986; Tripp, 2005), particularly in relation to teachers' professional development. AR serves a dual purpose: enhancing practice and generating knowledge while adhering to educational research quality standards (Coutinho, 2008; Guba; Lincoln, 1994). In educational settings, teachers take on the dual role of practitioner and researcher, often collaborating with colleagues and employing research techniques that meet academic standards of credibility, dependability and confirmability. Ensuring these requires strategies such as prolonged engagement, data and research triangulation, and participant validation. AR typically follows a cyclical process – planning, action, observation/evaluation, and reflection/theorization – where each cycle refines and improves upon the insights gained from previous ones.

The strength and robustness of the data analysis, results findings and their interpretations were guaranteed both by meeting standards of quality in educational research and by strategies followed during the research process (Coutinho, 2008, Guba; Lincoln, 1994). As the standards of quality of the research we refer to its: credibility, that is, the capacity of participants to confirm the data collected; transferability, that is, the ability of the study results to be applied in other contexts, not in terms of their statistical generalisation but to other similar contexts and to theory; dependability, that is, the ability of external researchers to follow the method used by the researcher; and confirmability, that is, the ability of other researchers to confirm the researcher's constructions.

To achieve those standards, strategies were implemented, such as: triangulation, that is the process of analysing the phenomena under study from multiple angles, data sources, or methods. Our research used mainly data and researcher triangulation. The first includes the use of several data sources, namely class audiovisual recording, pupils' evaluative checklists, teachers' interviews and the research diary. The second was guaranteed by: the continuous analysis and discussion of the work done by the first author of this article (the RT) and the two other (academic supervisors of the first author); peer debriefing, resulting from the author's option to publish the work developed in peer review journals; a prolonged engagement. In fact, the duration of the study described here lasted for a whole



school year; persistent observation, as said nine hours of music classes were recorded; and participants checking. As referred, the teacher interviews were fully transcribed, and the transcriptions were sent to them for validation.

The interview survey was conducted with pupils in the following academic year (2015-2016) and involved six participants selected according to criteria related to their performance in the previous year: two pupils were chosen for each final grade achieved – three, four, and five (none received a grade of one or two). Their availability and consent to be interviewed were also taken into consideration. Content analysis of these six interviews was carried out using webQDA software, highlighting response patterns that resulted in a set of categories. Regarding the teachers, the two interviews were conducted in 2020 with the aim of understanding the impact their experiences had on their educational practices at that time and in subsequent years.

Participants

The study involved 17 eighth-grade pupils, referred to as “Class A”, taught by the RT, with an average age of 13 (9 males, 8 females). The reduced class size, typically 25 pupils, was due to the inclusion of two students with learning difficulties, though no additional measures were needed for music. One pupil had irregular attendance and was excluded from the evaluative checklists. Later, two music teachers from the school also took part, facilitating the first activity in “Classes B and C”, which helped assess the study's impact on their future practice. Free and informed consent was obtained from the school principal and pupils' parents.

The students involved in the study reflected diverse socio-economic backgrounds. The three participating teachers had 10, 14 (RT), and 20 years of experience, respectively. Two held degrees in music education, including the RT, who also held a master's in music sciences and was pursuing a PhD in education. Following the experience, the other teacher also completed a master's and began a PhD in music arts. The most experienced teacher had a conservatory background and had obtained teaching qualifications through in-service training (see Table 10).

At the time of the study, music education in Portugal's lower secondary schools (grades seven to nine) was part of the institution's educational project, with

a weekly 50-minute timeframe. Although Curriculum Guidelines for the subject had been issued in 2001, the 1991 Music Education Programme was followed, as the former had meanwhile been revoked – despite continuing to influence teaching practices. New regulations were published in 2021, entitled Essential Learning, confirming the study's alignment with and relevance to current curricular demands. Pupils at the school where the study was conducted had an additional 50-minute weekly subject (Musical Arts) which operated independently of the national curriculum and reflected students' interests – particularly in pop-rock.

From 1991 to 2021, Portuguese music education programmes shifted towards a more student-centred and holistic approach. The 1991 curriculum focused on active music-making and classroom performance. In 2001, new guidelines introduced a modular structure that emphasised student autonomy and musical diversity. By 2021, the Essential Learning framework, aligned with OECD recommendations, outlined comprehensive learning outcomes, including, for example, critical and creative thinking. Despite these curricular reforms, traditional teacher-led methods rooted in conservatory models remain common, reducing opportunities for pupils' participation.

The educational activities of this study were carried out from September to July, across three academic terms, as shown in Table 1.

Table 1 – Educational procedures

Term 1
- Collection of free and informed consent. - Development of didactic plans. - Implementation of a preparatory activity (two lessons) by the RT, of a musical, creative, and cooperative nature, with Class A.
Term 2
- Implementation of Activity 1 by the RT with Class A. - Presentation of the Activity 1 plan to the two teachers and provision of feedback on its application in informal meetings.
Term 3
- Implementation of Activity 1 by the two teachers with Classes B and C. - Monitoring of Activity 1 by the RT in weekly meetings during the teachers' school hours. - Implementation of Activity 2 by the RT with Class A.

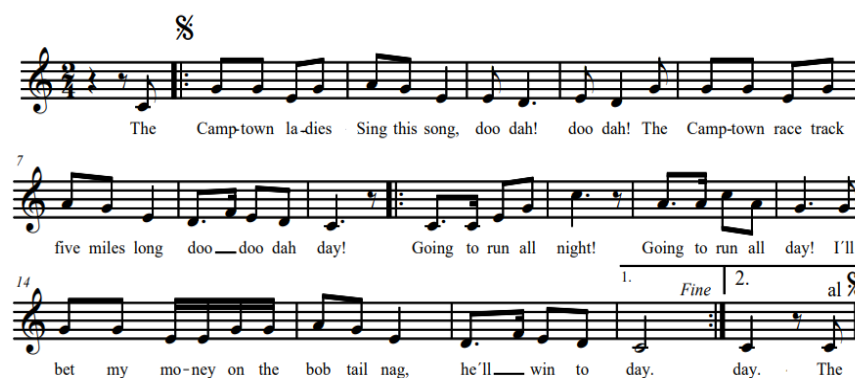
Source: Developed by the authors.

Didactic intervention

The activities focused on the theme of World Music, in accordance with the subject group's requirements, and included the selected musical pieces. The music teachers aimed to raise pupils' awareness of different musical cultures, encouraging

them to engage in real-world scenarios through role-playing as creative collaborators in musical groups. For their final presentation, pupils imagined they were part of a musical concert. The songs' context was established through a participatory dialogue between the pupils and the RT, focusing on American folk and Chinese music. This involved analysing the lyrics, actively listening to the melody, and identifying different parts of the music, with pupils using gestures to aid the process.

Figure 1 – Musical score of the song “The Camptown Races”, by Foster



Source: Carneiro *et al.* (2012, p. 27).

Figure 2 – From top to bottom: score of part A of the music “The Great Wall of China”; rhythmic base (line 1 – cymbal; line 2 – claves) for the melodic improvisation in parts B and C

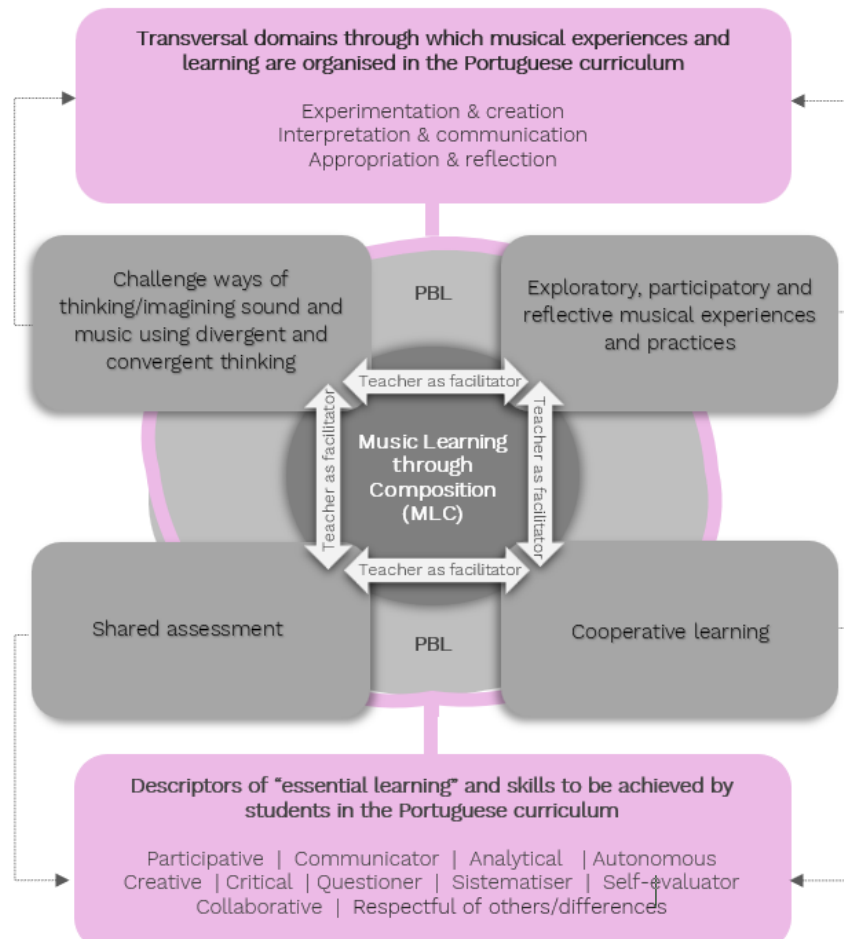


Source: Carneiro *et al.* (2012, p. 40-41).

Figure 3 illustrates the conceptual and organisational intersection between MLC and PBL, based on theoretical analyses and their connection to the Portuguese Music Education curriculum – Essencial Learning (2021). Figure 4 outlines the pedagogical-didactic process that was designed and implemented, considering this

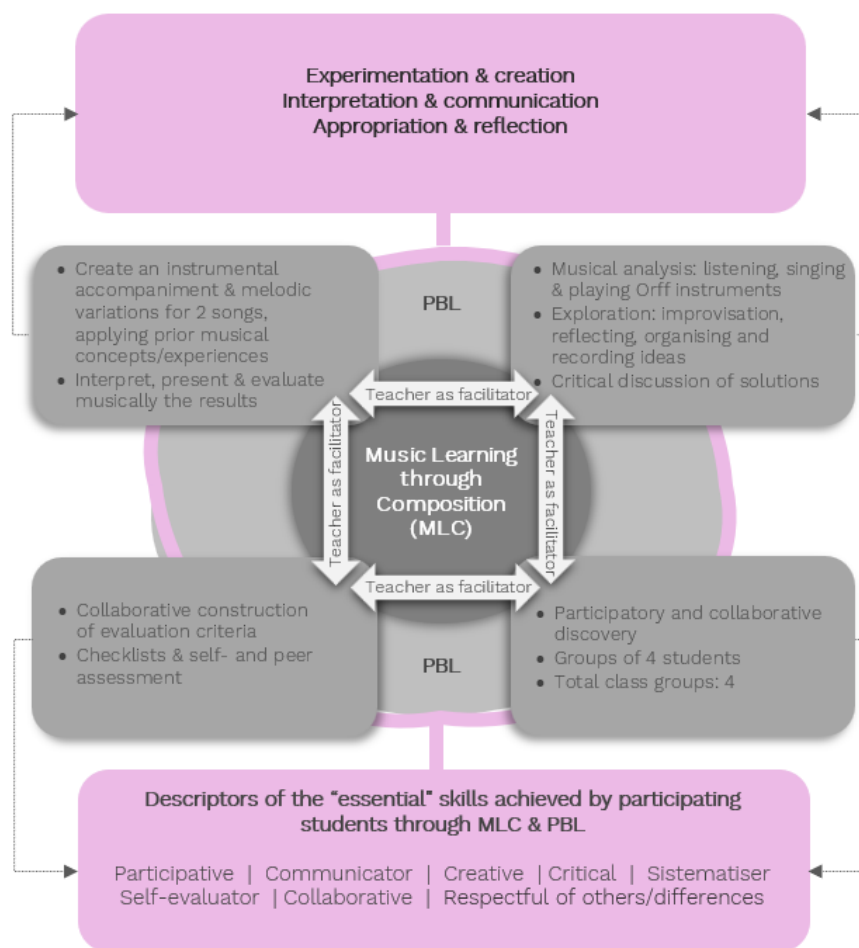
conceptual and curricular intersection, as well as the learning outcomes highlighted by students and teachers.

Figure 3 – Conceptual and organisational intersection between MLC and PBL and its relationship with the Essential Learning (2021)



Source: Developed by the authors based on the Portuguese curriculum&literature.

Figure 4 – Structure of the pedagogical-didactic process designed and implemented



Source: Developed by the authors based on the Portuguese curriculum&literature.

Action-research cycles

Three tables are presented below: Table 2 covers the AR cycles and changes, Table 3 includes excerpts from the research diary of the first and second AR cycles, and Table 4 shows the evaluative checklists used in these cycles. Both checklists employed a three-point scale – “not yet able” (-), “able, but...” (+-), and “quite well able” (+) – to provide an initial evaluation of the pupils’ performance. A broader scale was considered impractical. The qualitative scale was later converted into a quantitative one, with numerical values assigned to the total score for each criterion, half the score, or zero points. Final scores were then translated into a scale from zero to 100, in line with the school’s evaluation criteria.

Table 2 – AR cycles and changes

First cycle - second term - four 50-minute lessons (spread over one month)
- Problem: How can we enrich and provide rhythmic accompaniment for the song “The Camptown Races”, considering its style, melody, form, and dynamics? - Main objective: To utilise prior knowledge of forms, measures, rhythmic cells, and musical textures to create, compose, and perform music on instruments. - Assessment: Pupils' reflections, self- and peer assessments, and two checklists – one during the process (ABB) and the other at the end (ABBABB) – with equal weighting given to each criterion.
Changes resulting from the implementation/evaluation of Activity 1 for the second cycle
- Pupils independently organised their working groups, fostering new dynamics of cooperation. - Activity 2 was extended to a fifth lesson to allow more time for creating melodies on pitched instruments, as the prior knowledge required had become more complex. - Self- and peer assessments were used more frequently throughout the process, with a single checklist application during the final product to maintain efficiency. - The checklists from the first AR cycle were reused with adaptations, including changes from binary to rondo form and rhythmic to rhythmic-melodic phrases. An additional criterion for originality was added, as one group's composition was notably recognised for its uniqueness and musicality.
Second cycle - third term - five 50-minute lessons (one month and one week)
- Problem: How can we create melodies for sections B and C of “The Great Wall of China”, based on the G pentatonic scale, considering the style, tonality, form, and structure? - Main objective: To apply knowledge of musical forms, structures, rhythmic-melodic cells, and textures to create, compose, and perform music on instruments. - Assessment: Pupils' reflections, increased self- and peer assessments, and adaptation of the checklists. An additional criterion was allocated 10%, while the remaining criteria were given equal weighting (18%) as it was only observed in one group.

Source: Developed by the authors.

Table 3 – Excerpts from the research diary of the cycles of AR

First cycle
Lesson 1
A dialogue was held about the song's style, followed by an analysis of the lyrics and active listening to the melody. The pupils enjoyed it and found it amusing. They then participated in several rehearsals, exploring different musical possibilities, showing varying levels of engagement and performance.
Lesson 2
Most pupils showed a cooperative spirit, commitment, and the ability to engage in inner hearing while performing the compositions. Overall, they appeared to enjoy the experience, expressing enthusiasm throughout.
Lesson 3
The pupils seemed more familiar with the tasks and showed improved musical interpretation. However, some still needed additional support to fully engage with the creative process. Despite this, the class maintained a positive dynamic, with most pupils displaying enthusiasm and growing confidence in their performances.
Lesson 4
Assessment was consolidated through a proposed checklist that addressed the suggested criteria. Following a dialogue about the process, some adjustments were made.

Second Cycle

Lesson 1

A dialogue was established regarding the cultural and musical context of the song, followed by an analysis and active listening to the melody. The pupils formed work groups, analysed the new problem and began to plan their tasks.

Lesson 2

The pupils selected the instruments and continued creating melodies, with occasional feedback from the RT, along with audio recordings or written documentation of the compositions to aid memory. The RT also facilitated joint reflection on the group dynamics.

Lesson 3

A presentation of the compositions took place, involving two groups. Both chose a melodic ostinato, with one member improvising a melody simultaneously. This presentation format was also used by the other two groups, but without improvisation. The choice to include melodic ostinatos appears to have been influenced by Activity 1, as the pupils applied prior knowledge to address a new challenge.

Lesson 4

The pupils went to the “stage” of the classroom for their presentation. At the end, there was a collective reflection on the work and the criteria to consider in the evaluation.

Lesson 5

The final session prompted a dialogue between the pupils and the RT about evaluation, as well as the learning process. It was concluded that the similarities with Activity 1 allowed for the reuse of the previous checklist, albeit with some adjustments.

Source: Developed by the researcher-teacher.

Table 4 – Evaluation checklists used in the 1st and 2nd cycles of AR

Names/ Pupils	a) 20%	b) 20%	c) 20%	d) 20%	e) 20%	Total 100%
Group 1						
Group 2						
Group 3						
Group 4						
Musical and Problem-Solving Skills*						
a) Create two distinct rhythmic phrase ideas for sections A and B.						
b) Perform and communicate the created rhythmic phrase ideas following the form.						

c) Perform and communicate the created rhythmic phrase ideas adhering to the meter.

Social Skills

d) Cooperates with peers throughout the process.

e) Demonstrates responsibility with an emphasis on the final presentation.

*Expressive processes with available Orff instruments of indeterminate pitch.

Names/ Pupils	a) 18%	b) 18%	c) 18%	d) 10%	e) 18%	f) 18%	Total 100%
Group 1							
Group 2							
Group 3							
Group 4							

Musical and Problem-Solving Skills*

a) Create two distinct rhythmic-melodic phrase ideas, for sections B and C.

b) Perform and communicate the created rhythmic-melodic phrase ideas following the form.

c) Perform and communicate the created rhythmic-melodic phrase ideas adhering to the meter.

d) Create elements that are considered original.

Social Skills

Equal to the previous checklist.

*Expressive processes with available Orff instruments of determinate pitch.

Source: Developed by the researcher-teacher and the pupils.

Main Results

Checklists

Regarding Activity 1 and the two checklists used, an average of 83.8% was recorded, with a slight increase in scores from the first (82,5% - during the process) to the second (85% - in the final presentation). The analysis of pupils' learning outcomes revealed two distinct trends: an increase in social competencies (cooperation and responsibility) and creative musical competencies, and a decrease in performance related to form adherence and metric accuracy. In terms of

individual learning progression, three patterns emerged: six pupils showed an increase in their overall average, five showed a decrease, and five remained stable.

Regarding Activity 2, the average total score from the third checklist showed a further increase compared to Activity 1 (89,1%). Most pupils achieved 90.0% in competencies, except for originality, which was highlighted in only one group. When excluding items related to originality and performance accuracy, all pupils achieved the competencies. Ten pupils achieved the maximum score for metric accuracy, while six scored at intermediate levels. Individually, three pupils scored 81.0%, with the remaining pupils surpassing 90.0%.

Pupil interviews

The semi-structured interviews were conducted by the RT in a classroom, recorded, and later fully transcribed. Despite the formal setting and the use of a guiding script, the interviews took the form of a relaxed conversation between the RT and the pupils. This was facilitated by the fact that a year had passed since the didactic intervention, the pupils were on summer holidays, free from academic assessments, and preparing to transfer to a new school for Year 10, where Music would no longer be a compulsory subject. These factors, in our view, enhanced the reliability and credibility of the interviews, which were structured around three specific objectives (see Table 5).

Table 5 – Specific objectives of the pupil interviews

1
Understand what was important to the pupils in the music classes (and why)
2
Understand the pupils' perceptions of the types of activities conducted and their relationship to learning
3
Understand the pupils' perceptions of their own assessment of learning in music

Source: Developed by the authors.

The categories emerging from the interview results, in relation to the defined objectives, summarise the pupils' accounts of their lived experience in Class A, as outlined in Table 6.

Table 6 – Summary of the pupils' accounts in Class A

Importance of the classes
Working in groups, competing with one another, and striving to improve the work
Learning musical styles
Composing rhythms and melodies
Singing songs and playing instruments
Relationships between activities and learning
Learning from others by sharing with everyone
Respecting one another and providing mutual support
Being resilient and creative
Engaging with video presentations to understand what went well and what did not
Learning assessment
Feedback provided by the teacher for musical and social development
Having the opportunity to propose the criteria considered important for assessment
Participating in the evaluation of each group

Source: Developed by the authors.

The following excerpts from the pupils' interviews (using fictitious names) aim to illustrate their views in their own words.

Table 7 – Excerpts from the pupil interviews

Ana
I think I learned a lot. I remember we recorded ourselves doing the performance. (...) Then, we watched the video again to try to figure out what we had done wrong.
Leonor
We were doing it based on what sounded good to us... I found it fun, and I learned from it. (...) In other subjects, it's always very different. Each person does a part, and the group decides if they like it. This way is different... Because we were all contributing to the same part. But what I learned, I think, was seeing different edits, different ways of doing that work. (...) In the second term, I remember the teacher was helping us because we were having more difficulties. But in the third term, we were doing fine.
Joana
It was a lot of fun because we all gave our opinions to reach a goal. What I remember most is us constructing melodies together...and then trying to improve them. (...) I think it's always good...to be creative and step outside our comfort zone a little. (...) I remember a chart we made, where each person mentioned aspects, they thought were important to evaluate...I don't think I'd ever had the experience of giving input into how we were assessed before, but...it was good because sometimes there are aspects that teachers don't evaluate but that pupils consider important. And I think when teachers ask for pupils' opinions, the pupils...feel happy. I remember that, from time to time, the teacher would come over to our group to check how things were going.
José
Everyone has an idea, and each idea is different; it can help create a better piece of work.
Tiago
Different sounds, the styles of music that exist... it was fun! Music makes me feel good when I need it the most. (...) Sometimes, I tried to help us see the best way to play...it was easier when the teacher was right next to us.

Tomás

Since we were in a group, we had to learn not only how to do what we were working on but also how to work together. Sometimes, I had to hold back a little and let others share their opinions too. Then we had to figure it out...find a solution. Besides learning how to make the music, we also learned how things can turn out differently depending on the people and the groups.

Source: authors' collection.

Teacher interviews

The interviews with the teachers were guided by four specific objectives, as outlined in Table 8.

Table 8 – Specific objectives of the teacher interviews

1
Characterise the interviewee, in general terms, as a lower secondary school music teacher
2
Understand the teachers' memories of the experience in which they participated
3
Describe the impact the educational experience had on them
4
Reflect globally on what the experience meant to each of the interviewees

Source: Developed by the authors.

The results of the interviews, in relation to the objectives set, provide information on the teachers' characteristics and perceptions of the experience, as summarised in Table 9.

Table 9 – Summary of the teachers' accounts

PROFILE – TEACHER A	PROFILE – TEACHER B
26 years of service conservatoire course and in-service professionalisation	16 years of service master's degree and PhD research fellow in music
REFLECTIONS	
Learning Objectives 'Knowing how to listen' and 'knowing how to create' Learning as the development of knowledge over time Stepping outside the comfort zone Sharing objectives and assessment from the beginning Teachers' Role Teacher as a facilitator of pupil learning and autonomy Feelings and Reactions Teachers: 'quite good' and 'comfortable' Pupils: some insecurity regarding the methodology, and enthusiasm for interactivity and the opportunity to create	
PREVIOUS PRACTICES	SUBSEQUENT PRACTICES
Phased development of musical domains	Holistic development of musical domains

Development of autonomy / group work rarely used Teacher-centred assessment / use of written tests	Development of autonomy / group work regularly used Pupil-centred assessment / use of peer evaluation and sharing of criteria
MEANINGS	
Innovative Aspects	
Work methodology and assessment	
Support from the RT	
Effective planning and monitoring	
Impact	
Use of the plan in subsequent academic years	
Constraints	
Individual assessment of pupils as members of a group	

Source: Developed by the authors.

The following excerpts from the interviews with the teachers also aim to illustrate their accounts in their own voice.

Table 10 – Excerpts from the teacher interviews

Teacher A
First, the main objective: knowing how to listen. The second main objective: ...knowing how to create. They were very insecure. It was the first time I...worked on composition...as a planned activity. I felt super comfortable. The classes were quite challenging, and... they surprised me because it was an activity they enjoyed...interactive. They had to create, then rehearse... distributing the different parts among the groups...organising themselves. (...) I loved the experience...but I had a lot of difficulty assessing five pupils at the same time during a single presentation. As I had difficulties in the first assessment...the following year I used a different methodology. I could tell the pupils, 'You will evaluate this pupil, and you will evaluate that one, and you will evaluate this one!' There were already four, let's say, evaluators present. (...) In the following years, there was active participation in the assessment of their peers.
Teacher B
The main objective for me was...for them to understand...that things are not built overnight. I remember...all the parameters were discussed. In this case...where they defined what was expected, it made them more engaged. The great innovation...was them being responsible for their own evaluation process. In lower secondary school...I think...the way forward is...for us to be there just to guide them. I also remember...the competition among them...but...they were quite fair in their assessments. I learned a lot...specifically from this activity and from the interaction I had with you because...I applied many of those things. Although I wasn't required to...I used that experience the following year. (...) (Later,) I always tried to ensure that the activities included...these three domains of listening, composition, and interpretation... (Before,) I was terrified of getting the pupils to work in groups because I thought it would all go wrong... It was indeed a challenge...to let them do things without constantly interfering. (Before,) I would never have discussed a pupil's grade with them. (Later,) I started doing practical assessments and discussing the evaluation grades with the pupils. It made me...have a different perspective...on classroom work and on how to assess that work. I began to view the subject in a completely different way...it helped me structure things well and even define my identity as a teacher.

Source: authors' collection.

Discussion of Results

The triangulation of the results, in conjunction with the literature reviewed, reveals five key ideas, each categorised with a key phrase that encapsulates the relationship established between MLC and PBL, as well as the inherent assessment process.

1 – “The use of composition as a complex problem-solving process”, which enables: the development of skills within creative activities; the mobilisation of knowledge requiring the selection and adoption of strategies to tackle challenges; and the evaluation of multiple hypotheses in the search for solutions. This complexity has also been highlighted in the literature, for example, by Berkley (2004) and Yang (2014), albeit in different musical contexts. In our case, within Class A, the decline in scores for the criteria related to competencies (a) and (c) – “Create two distinct... phrase ideas, respectively for sections...” and “Perform the created... phrase ideas adhering to the meter” – may reflect this complexity.

2 – “Creation activities as promoters of holistic learning”, where the conceptual and organisational framework developed for the tasks appears to facilitate the integration of listening, interpretation, and composition. This aligns with the views of Hickey (2003) and Wiggins (2001), who emphasise constructing meaning from phenomena perceived as a whole. Teachers reinforced this by identifying the development of “knowing how to listen” and “knowing how to create” as the primary learning objectives, guiding the teaching process. The benefits of musical listening and creation – linked to inquiry-based, reflective, and critical thinking, as opposed to mere reproduction – are highlighted, alongside the exploration of sound and musical meaning, with notation serving primarily as a memory aid. The use of a wide range of elements (rhythmic, melodic, formal, timbral...) and the recognition of various approaches to achieving the same goal were also emphasised (as noted by one pupil). Furthermore, the approach to interpretation was seen by both pupils and teachers as a means of showcasing and valuing the performance and work, rather than simply reducing it to practice or a performative product.

3 – “The development of social and creative competences as an added benefit of the conceptual and organisational framework”, as the activities implemented appear to have been valued for their potential to foster socialisation,



cooperation, autonomy, and musical creation, particularly among pupils. This aligns with the findings of scholars who emphasise the positive impact of collaborative classroom activities (Hmelo-Silver, 2006; Schmidt *et al.*, 2011). The improvement in assessment scores from the first to the second presentation of compositions, as well as between Activities 1 and 2, suggests that pupils adapted to the methodology after an initial adjustment period, a process also observed by Koç (2018) and Stevens (2014). As pupils became more accustomed to stepping out of their comfort zones, their initial insecurity diminished, ultimately resulting in the highest scores in social competencies. Their cooperative work with playfulness, interactivity, and even competitiveness appears to have further contributed to this outcome. Additionally, the findings highlight an increased understanding of the creative process and a greater awareness of the professional roles of musicians and composers, reinforcing the motivational impact of PBL (Blackwell; Roseth, 2018; Vasconcelos *et al.*, 2023).

4 – “The shared assessment process as key to the building of learning”, emphasising the role of the teacher as facilitator, as described in numerous publications on PBL and its characteristics (Hmelo-Silver, 2006; Williams, 2012). In this study, this role was enacted through formative feedback, frequent reflection, and the collaborative development of checklists. These strategies proved essential for fostering musical skills and problem-solving abilities, aligning with the findings of Vasconcelos *et al.* (2016) on pupils’ perceptions in lower secondary school music classes. Reflection, identified by Shaffer (2014) as a self-regulatory process, was facilitated through small-group dialogues and whole-class discussions, guided by the teacher. The comparison of audiovisual recordings further enhanced pupils’ understanding of strengths and weaknesses, refining their execution. Additionally, the collaborative development of evaluative checklists, a novel experience for both pupils and teachers, appeared to increase engagement and interest in the assessment process. This aligns with Lenkauskaite *et al.* (2021), who highlight the sense of empowerment pupils experience when actively participating in assessment and self-evaluating their contributions.

5 – “The conceptual and organisational framework developed and its weaknesses”, noting that the pupils’ initial difficulties in adapting to the new methodology were a key constraint, leading to insecurity regarding musical work





and creativity in small groups. Although this diminished over time, the need for a preliminary familiarisation period is highlighted, as the brief introduction in this study was insufficient (see Table 1). Similar challenges in cooperative tasks have been noted across disciplines, including within PBL (Koç, 2018; Stevens, 2014). Despite efforts to integrate various musical dimensions, limitations arose due to cautious planning regarding pupils' prior competencies. The first activity focused solely on rhythm, while the second introduced melody, but timbral elements were not included in assessment criteria. Additionally, evaluating individuals within group work proved challenging for teachers, suggesting peer assessment as a viable solution. Studies in PBL, particularly in higher education, validate the reliability of self- and peer assessment in non-summative contexts (Machado *et al.*, 2008; Segers; Dochy, 2010). The use of audiovisual tools is also considered beneficial, though data protection concerns underage pupil's present challenges. Moreover, the three-point assessment scale, while useful for immediate evaluation, lacks nuance compared to a five-point scale, which allows for more qualitative differentiation. Finally, while the assessment instruments aligned with evaluation goals and showed consistency (Fautley; Colwell, 2018; Hargreaves, 2007), further research on assessment methodologies in extended learning contexts would enhance the reliability and applicability of the findings.

Conclusion

The study conducted points to instructional design inspired by the educational and musical concepts discussed throughout the text, as well as different assessment strategies that offer potential for the development of competencies in the pupils being evaluated, including musical, problem-solving and social skills. Indeed, the conceptual and organisational framework developed appears to have represented a new way of working for the participants. To this end, the mobilisation of learning across various areas of music through composition, the development of cooperative work, the role of the teacher as facilitator, and the shared assessment process emerge as key factors contributing to the success of this innovation.

In addition to the constraints mentioned above, a weakness of the study is that it took place solely within the classroom environment, as a public presentation



of the pupils' work to the school community would have enriched their skill development. Furthermore, while the aim was to avoid an intrusive approach with the two teachers and their practices, and not to overburden them (given the large number of classes and responsibilities they had beyond teaching), it is believed that the development of a second cycle of action with them, including the collection of evaluative data from their pupils, would have benefited this project.

Because of this study, it is necessary to deepen the reflection on the modes and processes of musical learning and its assessment, based on the theoretical concepts presented. In this sense, what is currently accepted as a definition of musical learning is reflected in the quality of what is taught and learned, as well as in what is considered as an element of its assessment. It seems pertinent to conduct new educational and musical practices based on PBL, not least because of what it implies in terms of sustaining and expanding concepts of musical and pedagogical literacy. It is believed that the relationship established here can be further developed through other forms of musical creation not addressed or explored, including expressively and aesthetically, or other domains of music, such as listening or interpretation, which could serve as starting points. This still requires considering clear evaluation criteria, a view supported by the teachers involved, who continued to use the proposed conceptual and organisational framework, successfully adapting the implicit matrix to new school contexts.

Finally, we'd like to make a note of what is the level for the development of RT's entire career. Both in terms of developing her action as a music creator and in finding answers to the already diverse and fertile field of research into composition in music learning. It is a fact that, especially from an aesthetic point of view, the study presented here is still clamouring to break through and broaden its field and substance of action. Although this circumstance should not be justified solely by the reality and constraints of school life (what is curricularly planned in the school's subject group), it is also true that the process of change and transformation of teachers, especially of their know-how (in close alignment with their convictions and visions), takes place at a pace that is hardly sensitive to abrupt breaks.

Particularly in a difficult and almost always unknown area of their training, such as the paths required for creation and composition. We see this not as a

setback, but rather, maybe, as a dynamic door open to the future. Because, in truth, and seeking encouragement in the metaphor, it was through the attitude that the participants in the study themselves were expected to learn to build—flexibility, open-mindedness and risk-taking—that the desired transformations, which extend to the actions of the RT and the other participating teachers, took place and bore fruit. Small, admittedly, for the world of science, the arts and music. But gigantic for the people who, in their singularity, have the helm of learning as their long mission. Like the author and main representative of what is experienced and disseminated in this text.

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