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Differences mathematics and music teaching-learning process between A Coruna and Lisbon

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Abstract

Mathematics is considered one of the subjects with a worse school performance. However, its study is fundamental; as not in vain it contributes to the development of logical thinking, exactitude and spatial perception.
On another note, Music has several benefits for the proper development of children and both disciplines keep a closer relation than what it might seem at first sight. Taking that into account, we must pay attention to the teaching-learning process of both subjects connectedly, therefore our research is based on finding out whether they are taught interdisciplinarly during the earliest school years. In order to reach this aim, we have designed a questionnaire that was applied in the province of A Coruna (Spain) and in Lisbon District (Portugal), to ascertain if there are any difference when it comes to interdisciplinary work between both countries. The results show that most of teachers belong to public schools and give the same importance to both subjects, although they do not feel prepared to work with them in an interdisciplinar way.

Keywords: Mathematics, Music, interdisciplinarity, Coruna, Lisbon.

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1. Background

In kindergarten the foundation of the entire education system is built; here kids at their earliest age outline their first identities, which make it a major step in the process of formation and whole development of each person (Gomez Martin, 2012). Therefore school is an enriching context in the development of children, as it allows them to build their personality, broaden their experiences and promote their socialization (Castro Rojas, 2008). Given its importance and in order to obtain a maximum benefit, methods and strategies should be sought so that children get involved in solving problems, carrying out an autonomous and self-directed learning (Alsina & Climbing, 2008). It is therefore important to create learning groups in which people work together and in an interdisciplinary way. Hence our efforts to seek methodologically pluralistic and open educational responses that contribute to the improvement of pedagogical work from the early years.

That is why, based on the constructivist current, and to achieve an education of quality, the teaching process must be perceived and implemented as a dynamic, participatory and interactive process. This will require coming up with activities that achieve to arouse the interest of students and enable observation and experimentation. This approach leads us to think of educational concepts such as globalization and interdisciplinarity, which are something opposed to traditional disciplinary models (Edo, 2012; Gomez, 2012). We wonder if these concepts, seen as methodological strategies, are actually received at school or simply are reduced to a mere slogan.

To address our concerns, we selected as the object of our investigation two disciplines present in the lives of boys and girls which are very important for their development: Music and Mathematics; both have an important role right from the early years of kindergarten. The reason of our analysis has to do with the fact that mathematics is considered to be one of the subjects with poorer academic performance at school. However, its study is essential; it contributes to the development of logical thinking, accuracy and the development of spatial perception. Mathematics are permanently present in our daily lives. They are a basic tool that allow us, and in this case children, to order, establish relationships and position in space and time the objects around them and which constitute their environment. They represent a language that is related to other forms of expression, with the different languages that are commonly used in kindergarten, and as such, we would not be able to develop ourselves in our everyday life without it (Chao, Mato & Lopez, 2014).

However, recent studies claim that the interest in mathematics decreases as students go past each school year, and that the early years are critical for the acquisition of the development of mathematical thinking, and especially the prevention of negative attitudes (Mato, 2014). Previous studies also show that one of the reasons why students are not interested in mathematics is the methodology.

On the other hand, the educational value of music education is known since old times, as it contributes to the integral development of the individual, the overall development of their core competencies, and it provides many benefits for the cognitive development of learners (Chao, Mato & Ferreiro, 2014); Fonseca & Toscano, 2012; Levitin & Alvarez, 2008; Perez Adalguer & Leganes, 2012). However, in many cases, music education tends to lack relevance under the eyes of teachers, especially compared to other subjects considered as essential, as in the case of Mathematics.

Starting from the premise that we believe that both disciplines keep a much closer relationship than you might think (Fauvel, Flood, 2003; Liern; Queralt, 2008), plus the benefit obtained in the integral formation of the individual if they work together, we believe that attention should be paid to linking both teaching and learning materials. In this regard, several authors (Fernandez-Carrion, 2011; Chao & Mato, 2015) claim that once Mathematics and Music are approached to in an interdisciplinary way, similarities are established with the reality that is happening, it gets approached to everyday life, and proves itself as more useful, practical, dynamic and above all, it presents itself as more motivating. In addition, singing, dancing or music listening are motivating activities and contain musical-mathematical relationships which are simple to understand.

2. Object of Research

Our goal is to find out whether mathematics and music are being taught in an interdisciplinary way in kindergarten classrooms in Coruna and Lisbon, how that is done, and whether there are differences between the two countries.

3. Methodology

To carry out this study a mixed questionnaire with open and closed questions was designed. This was covered by staff from the faculty of Early Childhood Education and Music Education. It consists of several items, grouped into four main sections:

1: Information on the Faculty

2nd: Interdisciplinary character of subjects

3rd: Methodology used in the classroom

4th: Rating on their teaching

4. Shows

The sample consists of 364 teachers, of which 180 belong public, subsidized and private schools in the province of A Coruna (Spain) and 184 teachers of public and private educational schools within the Province of Lisbon (Portugal).

The questionnaires were distributed in March 2014. Once collected, a qualitative analysis of the blocks of Methodology and interdisciplinary nature of the subjects and a quantitative analysis of the sections of Information about the questioned people and Evaluation. In the latter case the data were collected in graphs.

5. Results

Below is a brief description of the results obtained.

- Information on the Faculty staff

Of the total sample in A Coruna, 164 teachers belong to public schools, 15 to subsidized schools and 1 to private schools.

In the province of Lisbon (Portugal), among the sample (184), 98 belong to public schools, 83 to public-private schools and 3 to private schools.

Regarding the ages, most of the sample is between 31 and 50 years old in both countries. It is to be noted that in A Coruna there were 30 people who did not respond to this item.

Regarding the studies, in the sample of A Coruna the whole sample are graduates (180), although 14 also claim to have a master's degree, and 6 people declare to possess other studies, although they do not specify which ones. Interestingly, of the total sample, only 8 teachers studied the specialty of Musical Education. In Lisbon all teachers declare to have a degree (184). In addition, thirty-seven also have a Master's degree, and one person claimed to have a PhD.

- Interdisciplinary nature of courses

Both in Spain and in Portugal the legislation determines that it is the tutor the one who should be responsible for the musical teaching in kindergarten. It should be noted that in Portugal the Advanced Course for Basic Education (established in the Basic Law of the Education System) is required and in

Spain you must have the degree or enablement of specialist teacher in Music Education in order to teach Music, although the reality in centres is quite different, since in some cases it is the specialist music teacher who is responsible for teaching the subject also in Early Childhood, despite having no obligation or time allocation.

When asked if the same teacher teaches Music and Mathematics in A Coruna, 15% of the answers of this item are affirmative, ie, it is the specialist of Early Childhoold Education who is responsible for both areas, compared to which 85% answered negatively. In Lisbon this percentage drops, being 8% teachers in charge of both subjects.

Teachers who claim to be the same teacher responsible for teaching Music and Mathematics, were asked if that was done jointly or separately for both subjects schedules, activities, materials, resources and evaluation. In A Coruna 15% of teachers said to make use of the same schedules and materials and resources to work on the two subjects, compared to 85% who do not. In Lisbon this percentage in slightly lower. Regarding activities, surprisingly in La Coruna, 90.9% of respondents said to be using the same activities for both subjects, as opposed to 9.1% who do not. In Portugal this response is more consistent with previous responses, as only 27% of the sample use the same activities for both subjects. Finally, with regard to evaluation in A Coruna, 81.8% assess these subjects together, compared with 18.2% making it separately. In Lisbon only 31% of teachers do so.

Teachers who claimed the responsible for teaching Music to be different from that teaching Mathematics were also asked whether they had made common or separated schedules, activities, materials, resources and evaluation. Here in La Coruna, 12.5% say that they have the same settings and use the same resources in both subjects, compared with 87.5% who do not. In relation to both the activities and the materials, l00% of the sample responded that they use specific materials and activities for each subject. In Lisbon they declare that none of these parameters are made together. Finally, referring to the assessment, in A Coruna 25% of the respondents answered that they perform the same assessment while in Lisbon only 18% of the sample does so.

- Methodology used in the classroom

When asked if about the use of mathematics and music in an interdisciplinary way, 60% of respondents in Coruna considered they do use mathematics and music in an interdisciplinary way, as opposed to 40% reporting they use them independently. Among the percentage that assures to use them in an interdisciplinary way, only 20% say they work these areas combined. In Lisbon, only 10% of the sample ensures to use them in an interdisciplinary way.

In relation to how they conduct it in A Coruna, 20% explained they use different songs and rhymes to write numbers. Lisbon did not explain how.

As to the question "what methodology is employed to work Music and Mathematics in the development of your classes?", it should be noted that being an open question several teachers have expressed to employ various methodologies combined. Thus 50% of the subjects in A Coruna, and 38% of Lisbon intend to carry out activities in a playful way to provide a better learning to students. Within this percentage, in A Coruna 35% of the answers are postulated to face towards a more participatory teaching and in turn, 15% specified actively do. In Lisbon, the results indicate that 45% advocate a participatory education, and 40% do so actively. In A Coruna 25% of the total sample claim to use an interdisciplinary approach, the same percentage as those using meaningful learning as a base for day to day in the classroom. In Lisbon the 32% of the sample declared using an interdisciplinary education (though not all in music and mathematics) and 58% support meaningful learning. On the other hand, 15% of respondents in A Coruna and Lisbon 18% base their work on the constructivist theory. Finally, in A Coruna a percentage of only 5% answer making reference to projects, individually, in teams or based on the interests of children. This type of teaching methodology is more represented in Lisbon, with 49% of responses.

Referring to the question "What resources do you use?", again it is an open question, so in some cases they have provided various resources. So 75% of the sample of A Coruna and 90% of Lisbon sample answered to be using materials provided by the centre, alternating with other resources, in most cases. Of the total sample of A Coruna, 30% of teachers are based on ICT, as well as using the PDI and other audiovisual resources. This percentage is reduced to 25% in Lisbon. 20% of teachers of A Coruna and Lisbon 30% report to use editorial materials such as textbooks and rely on the use of paper tasks daily. This percentage is higher than the barely 15% of respondents in A Coruna and 25% of Lisbon that is responsible for making learning materials from scratch, totally produced by themselves. Returning to the total sample, it should be noted that 15% of A Coruna and 5% of Lisbon recall resources that can be exploited from the surroundings. Extracurricular activities are only done by a 5% in A Coruna 5% and 8% in Lisbon. 20% of A Coruna and 35% in Lisbon refer to the use of the resources needed to work the music in the classroom, especially based on musical instruments. In turn, another 20% of A Coruna and 45% in Lisbon work the mathematical field focusing on materials and logical-mathematical games.

- Rating

In relation to the question of whether you feel prepared to work interdisciplinary Music and Mathematics, only 12% of A Coruna states that their training is sufficient, compared to 88% who think that they feel unprepared. In Lisbon the 97% of the sample do not feel prepared to work both subjects in an interdisciplinary way. It is to be noted the presence of 45% of respondents in A Coruna, within the group of people who believe that their preparation is insufficient, adding a remark about the lack of experience in musical education.

About the question that refers to whether they value more music or mathematics, 5.5% of the sample of A Coruna and 18% of Portuguese think that music is more important; 16.5% of A Coruna and Lisbon 38% think that math is the most important, while 34.4% of A Coruna and 42% of Lisbon samples think that the two subjects are equally important. A very high percentage in La Coruna (43.6%) does not answer this question. In contrast, only 5% are not satisfied with their work. In Lisbon the percentage of satisfied teaching is 89%.

As for the question of whether they consider that the teaching-learning process improves when both areas are worked on together, surprisingly, 88.8% of the sample of A Coruna and 79% of Lisbon consider that working on both subjects together improves the process in both areas.

6. Conclusions

Most of the sample, both the Galician and Portuguese sides, state that in their centres there is a different teacher to teach both subjects, although the percentage is minimal when it comes to performing schedules jointly, and non-existing when it comes to the same using materials and common activities.

The vast majority of respondents consider important to work on Mathematics and Music in an interdisciplinary way, however, the results of the research show that the majority of respondents (88% in Corunna and Lisbon 97%) do not feel able to work in an interdisciplinary way both materials and that they do not consider themselves as sufficiently prepared.

The findings drawn along this work allow us to make some final considerations for improving the educational proposals of teachers involved:

- The purpose of this research is not so much to show school reality, but to publicize the need to continue working and improving to reach a truly interdisciplinary education.
- The benefits of working Music and Mathematics in an interdisciplinary way are countless, because there is a special connection between the two subjects. Proper education can help

the students succeed in associating concepts. As a result, comprehensive and unfragmented education can be obtained.

- Finally, to promote meaningful learning and education, teacher training is very important, as is the constant renewal of both methodologies and materials and resources, adapting to the characteristics and circumstances of young children.

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