Can We Use Music as a Useful Teaching and Learning Strategy? A Pre-experimental Design Applied to the Study of Fermentation

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Introduction

XXIst century society

- Information and knowledge accessible in an immediate way.

- Teachers need to select, conceive and implement new teaching methodologies and strategies, in order to engage students with the school curriculum, commit them to their learning process and thereby improve the construction of knowledge.
Goal
Verify if the use of music to teach scientific content, could increase students’ motivation and learning of scientific concepts.

Sample
• Convenience sample of 30 students
• 10th grade Biology and Geology class

Curricular contextualization
• 10th grade curriculum of Biology and Geology
• Transformation and utilization of energy by living beings - Fermentation
Methodology

• Pre-experimental design

Traditional class plus practical work

Pre-test

Music experience

Post-test

- The lyrics of a recent famous Portuguese pop song, was adapted to the scientific theme of the fermentation process.
- Students learnt the lyrics in the class and sang it with the teacher *

Fig. 1 – Images from the practical work of alcoholic yeast fermentation *

* Practical work procedure and music available in extra materials.
### Results

Table 1. Descriptive statistics obtained in the pre-test and post-test results

<table>
<thead>
<tr>
<th></th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average score</strong></td>
<td>45.8%</td>
<td>75.5%</td>
</tr>
<tr>
<td><strong>Standard deviation</strong></td>
<td>20.9%</td>
<td>18.1%</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td>3.4%</td>
<td>25.9%</td>
</tr>
<tr>
<td><strong>Maximum</strong></td>
<td>85%</td>
<td>100%</td>
</tr>
</tbody>
</table>

The Wilcoxon’s statistical test for paired samples (non-parametric) allowed to attest that the post-test results reflect a statistically significant increase in the classifications obtained ($Z = 4.47; p < 0.00001$), for a confidence interval of 99%.
The results seem to be good indicators of the effectiveness of using music as a teaching and learning strategy, in a particularly difficult theme, such as the fermentation process, by:

- promoting the acquisition of scientific content;
- increasing both students' motivation and engagement in the science class.

Conclusions

Potential for using non-traditional forms of teaching scientific content (such as music and perhaps other forms of art, like acting or poetry) as complementary strategies to formal science education.
End of presentation

Thank you so much for your attention!