HSCI2020

Viana do Castelo
Portugal
13-17 July 2020

Pollution Soil Perception and Biodiversity Impact: Can Students Enrich their Scientific Knowledge Using Problem Based Learning?

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Introduction

The improvement of quality and efectiveness in school science education to promote a growing level of scientific literacy

In an Inquired Based Science Education perspective [1]

In an Social construtivist perspective

Using PBL – Problem Based Learning

Activation of previous knowledge

Development of new knowledge

With the development of reasoning and investigative capacities

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Methodology

A Research Project was developed, in order to evaluate the student learning about the impact of soil pollution on biodiversity.

Using mixture of methods [2]

A convenience sample [3], n=28
17 girls and 11 boys.

Contributed to raise awareness among generations, particularly the younger ones.

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Methodology

1 - Problematic scenario exploration

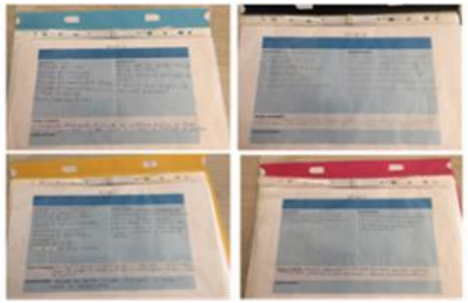

Figure 3 . Dossies of research material for the 4 groups.

2 - Diagnostic test realization

3 – Investigation material exploration by each work group

4 – Problem solution presentation by each work group

Figure 2 . Mind map of soil pollution and biodiversity impact

5 – Discussion by each group

6 - Reevaluation test realization

Figure 4 . Posters of 4 groups.

7 – Poster work by each group

8 – Premiation for each group

Figure 5 . Performance diplomas.









Results

Quantitative

Qualitative

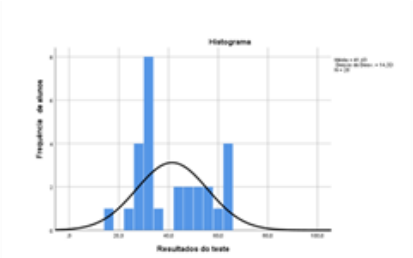

Figure 6 . Graph 1 of the percentage ratings obtained by students in the assessment test of conceptual content.

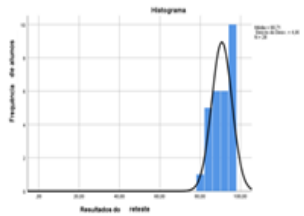

Figure 7 . Graph 2 of the percentage ratings obtained by students in the reevaluation test of conceptual content.

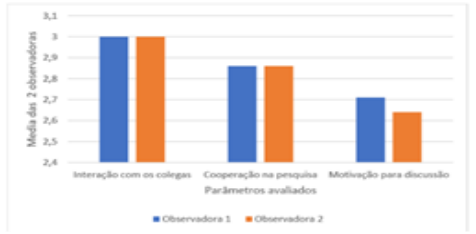

Figure 8 . Graph 3 of the average of the observations made by the two observers.

	Assessment test	Reevaluation test
Media (%)	41,42	90,71
n	28	28
Deviation error	14,32	4,99
Minimum	16,00	80,00
Maximum	64,00	96,00
Medium	34,00	92,00

It was used IBM software® SPSS Statistics® (version 25).
The Wilcoxon statistical test result : Z = - 4.63 , p = 0.000), with a confidence interval of 99%.

PBL methodology has a positive influence on the results obtained in the cognitive assessment tests.

The result obtained was very close to the maximum, overall.

Development of skills as interaction and cooperation among students.

Promotion of motivation for discussion and debate, from a social constructivist perspective.

Conclusions

This investigation is a good indicator that PBL educational methodology contributes positively to the cognitive and attitudinal/relational development of students.

The improvement of quality and effectiveness of learning in school science education was achieved.

Awareness-raising to maintain sustainable development was also achieved by contact with the 2030 Agenda.

As for the students, it allowed them to develop their critical thinking and analysis, as well as their autonomy of work (individual and group), in an interactive perspective.

Finally

- teachers can walk alongside with students on their "road of knowledge“
- evolving together towards an integral education, forming citizens conscious, autonomous, supportive and committed to the issues and challenges of the world
- enriched with essential skills, so important to citizen´s behaviour troughout life.

References

[1] Vasconcelos C, Almeida A. Aprendizagem baseada na resolução de problemas no ensino das ciências: propostas de trabalho para ciências naturais, biologia e geologia. Porto: Porto Editora, 2012.

[2] Gay L, Mills G, Airasian P. Educational research: Competencies for analyses and applications (10th ed.). New Jersey: Pearson, 2012.

[3] Carmo H, Ferreira M. Metodologia da Investigação – Guia para Autoaprendizagem. (2ª edição). Lisboa: Universidade Aberta, 001-89, 2008.