New Perspectives in Science Education
International Conference
NEW PERSPECTIVES in SCIENCE EDUCATION

BLIC & CLIC: Bringing Life Into the Classroom Use of Mind Maps on the Chemistry Class

ALLEN Isabel (1), **DIAS José (2)**, **SANTOS Luísa (3)**, **PINHO Manuela (4)**, **RIBEIRO Rui (5)**

Agrupamento Escolas da Maia, Portugal (1)
Agrupamento Escolas da Maia, Portugal (2)
Agrupamento Escolas da Maia, Portugal (3)
Agrupamento Escolas da Maia, Portugal (4)
Agrupamento Escolas da Maia, Portugal (5)

Abstract

The present article is based on an Erasmus+ project named Blic & Clic which uses mobile learning pedagogy to promote an effective inclusive education. The inclusion of students with special needs in classroom activities is an enriching experience for all students. Mind Maps have been integrated into emerging teaching techniques such as the Flipped Classroom and can be particularly effective with students since it engage them, it encourage creativity and teach how to learn rather than memorizing contents [6].

This research study using Flipped Learning, as pedagogical methodology, was developed in a Chemistry class of the 12th grade. A student with special motor cerebral palsy worked with non-disabled peers used the APP-Popplet, to make the report of the laboratory activity "A Copper Cycle". In a 10th grade class, students with cognitive difficulties and Asperger syndrome prepare aqueous solutions used by their 12th graders colleagues. This study concluded that the activities proposed allowed all students to have new opportunities to deepen and apply their previous and new learning. There was also the promotion of cooperative learning in the development of social and cognitive competences of the students. It increased their autonomy, their organizational management of work, their nterpersonal relations and their motivation for learning.

Keywords*: Mobile Learning; Inclusive Education; Mind Maps; Flipped Classroom*

Introdution

Six European schools (Agrupamento de Escolas da Maia - Portugal, Colegiul Tehnic Edmond Nicolau Focsani - Romenia, 1st Lyceum of Rhodes Venetokleio - Greece, IIS M. Filetico - Italy Zsespol Zscol im.por. Jozefa Sarny w Gorzicach – Polond and Toki Halkali Anadolu Imam Hatip Lisesi - Turqy) and the University of Minho have developed an Erasmus+ project in a strategic partnership for innovation. The main goals of this project are to share experiences between teachers and students, to disseminate their practices and to build collaboratively pedagogical innovation practices in learning thanks to the use of mobile devices.

The potential of multimedia applications, adapted to the contexts of teaching and learning, can be seen as important teaching tools in the different dynamics of the classroom [5]. In addition, there is a great popularity and familiarity with mobile devices present features which will enhance potential users [4]. The rise of these resources is a fact that can be explored in the educational process, using the pedagogical model called Mobile Learning [4][5]. Mobile devices are necessary tools that can be used to facilitate learning. We need them to supplement schools resources, to extend learning process outside the class walls, to prepare students for working life after their graduation[8].

The Education and Training 2020 Strategic Framework [3] emphasizes that educational systems need to provide the successful inclusion of all learners. Students from disadvantaged backgrounds, with special needs or migrants must have an equal chance to succeed. The inclusion of students with special needs in classroom activities is an enriching experience for all students.

Mind Maps have been integrated into emerging teaching techniques such as the Flipped Classroom and engage students, encourage creativity and teach how to learn rather than memorizing contents. [6].These activities used Flipped learning as pedagogical methodology consists of the realization and observation of a sequence of reactions involving the element copper of the Chemistry students of the 12th grade, with or without disabilities. The proposed reaction cycle converts the copper according to the following scheme:

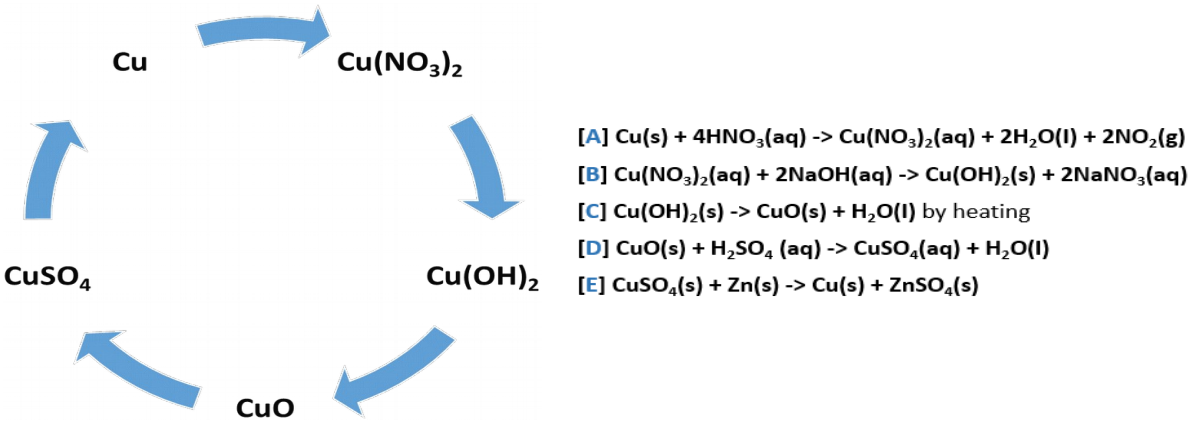

Fig. 1: Copper Cycle

With the photos and videos taken during the experimental procedure students drew up a report using the APP - Popplet.

Objectives

The goals of the Copper Cycle experiment are: to characterize the reactivity of metallic elements, taking as an example the Copper reactivity; to recognize the importance of recycling copper and the potential of recycling of metals in general and to identify some pollution problems related to the recycling of copper.[7]

Methods

During this activity teacher used Flipped learning as pedagogical methodology. Initially students answered a quiz individually, then they were divided into groups: students read a text or watch a video about the “Cupper Cycle” [1] (reading and research scenario) (figure 2). After that, they performed the experimental activity, took photos or recorded videos (figure 3) (collaborative and practice scenario).

Fig. 2. Students read a text or watched a video

Fig. 3,4. Students took photos

Fig. 5, 6 and 7. Special needs students working (cognitive difficulties, Asperger syndrome and motor cerebral palsy)

Afterwards using the APP Animoto, students produced a video [9], figure 8, with the experiment procedure using the Mind Map, Popplet, students wrote a lab report [2], (collaborative and production scenario) Before starting the report, they divided the different tasks of the report among them deciding who was doing what. Then one of them enter his/her Popplet account, create a new Popplet and add the other colleagues of the group as collaborators. When the mind map was finished, students exported it as a jpg, sending it to the teacher and answering a quiz individually (evaluation scenario).

Fig. 8. Example of a video produced by the students

Results

Students used the Popplet mind map to write the experimental activity report, figure 9. Each student was responsible for one part of the report. In figure 9 we can see the distribution of tasks, carried out by the students responsible for the report. Each student appears in a different colour. The teacher evaluated the preparation of the experimental report done by each student Using the Animoto application, the students produced a video with photos and videos of the practical activity they have performed and added to the popplet.

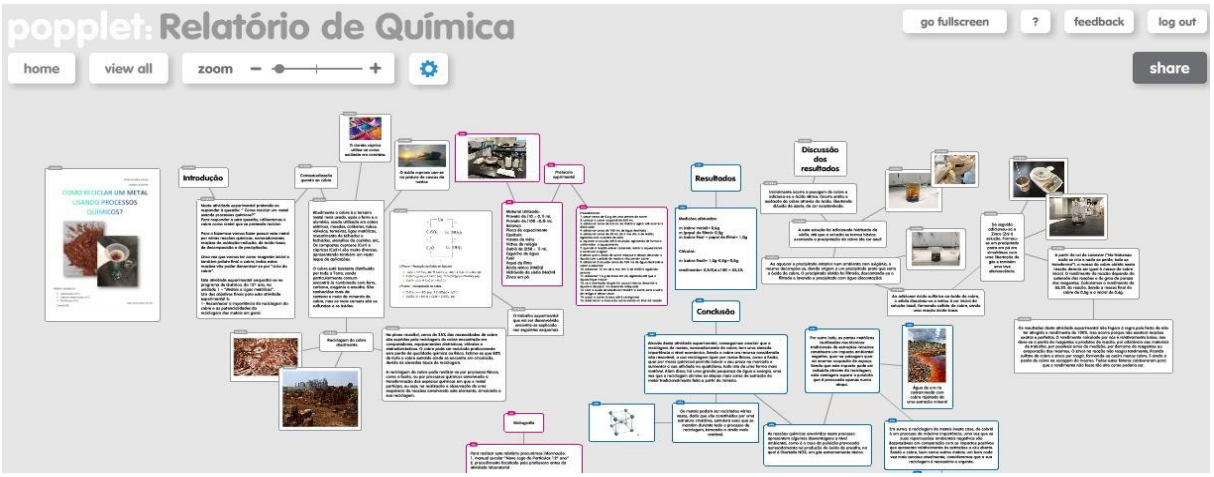

Fig 9. Lab Report using the Mind Map Popplet

Conclusions

The activities proposed allowed all the students to have new opportunities to deepen and apply their previous and new learning. There were intentional contents somehow explored by the different students according to their competences; there was the promotion of autonomy, organizational management of work and interpersonal relations. Special needs students brought new strengths into the *classroom and helped to enhance* a climate of giving. The teacher had a more tutorial role, intervening with those who needed it most and whenever requested. Throughout this process, the students had to reflect on their learning, had to question more, had to reread or revise concepts.

Acknowledgments

This work was financially supported by the project “BLIC&CLIC - Bringing Life Into the Classroom: Innovative use of mobile devices in the educational process” (ref. 2016-1-RO01-KA201-024659) funded by the Erasmus+ Programme of the European Union.

References

[1] Casa das Ciências (2012). Ciclo do Cobre. Available in: https://www.youtube.com/watch?v=TI6bfEpXx1k
[2] Costa Inês, Vieira Rita, Almeida Tiago (2018) .A.L. 1.0 Ciclo do Cobre. Available in: http://www.popplet.com/app/#/4959641
[3] Council of the European Union (2009). Council conclusions on a strategic framework for European cooperation in education and training (ET 2020). Official Journal of the European Union, C 119, 28.5, 2-10.
[4] Kukulska-Hulme, A. (2012). Mobile Usability in Educational contexts: What have we learnt. International Review of Research in Open and Distance Learning, 8(2), 2-16.
[5] Lencastre, J. A., Bento, M., & Magalhães, C. (2016). “MOBILE LEARNING: potencial de inovação pedagógica”. In Tânia Maria Hetkowski & Maria Altina Ramos (orgs.), Tecnologias e processos inovadores na educação (pp. 159-176). Curitiba: Editora CRV. ISBN: 978-85-444-1126-1.
[6] Leyden, A. (2017, November). 10 Mind Mapping Strategies For Teschers. Retrieved from https://www.teachthought.com/pedagogy/10-mind-mapping-strategies-for-teachers/
[7] Martins, I. et al. (2004). Programa de Química do 12ºano do Curso Científico-Humanístico de Ciências e Tecnologias. Direcção Geral de Inovação e de Desenvolvimento Curricular. Ministério da Educação. (pp. 29-32).
[8] Moraru P. et al. (2018).Teaching Toolkit: Innovative use of mobile devices in the educational process. (pp. 108). Braga: Research Centre in Education (CIEd), Institute of Education, University of Minho. ISBN 978-989-8525-58-1
[9] Pinto R. (2017). A.L. 1.1 Ciclo do Cobre. Available in: https://www.youtube.com/watch?v=XVv3k-FezDg&t=21s